The Impact of the Long Term Performance of a Bank on Its Market Value

Begumhan Ozdincer, Cenktan Ozyildirim

Abstract— The long-term performance besides current performance is expected to play a role on the firm's market value. By using the non-parametric data envelopment analysis the efficient frontier for long-term performance of banks is measured within a production plan to ensure long-term presence. More efficient banks in the long-term are expected to increase their market share and achieve firm value maximization. Current performance is measured by incorporating the cost and risk factors into the return analysis. Return on solvency adjusted for the cost of free capital and short-term liquidity are contributions of this paper in measuring bank performance.

Keywords: Efficiency, Data Envelopment Analysis, Liquidity Gap, Return on Solvency, Risk, Long-term Performance

I. INTRODUCTION

In this study we attempt to examine bank performance by incorporating the long-term as well as the current performance criteria and measure their effects on the market value of banks.

The performance of a bank is multidimensional because the duty of banks is not only to its shareholders but other stakeholders are equally influential such as the depositors, regulators and in a broad sense the whole economy in order to ensure the stability of the financial system. Reference [27] argues that it would be quite difficult to satisfy all the stakeholders as there would be multiple objective functions and thus the corporate objective function should be to maximize the long run value of the firm. However, sometimes increased market share can only come at the expense of increased expenditures and therefore there can be a trade off between the short and the long-term objectives of the firm. Therefore the measurement of bank performance should incorporate the short – term as well as the long-term perspective and the market value should reflect the performance of a bank both in the short as well as the long term.

In measuring performance in the long-term we approach bank performance within an optimization framework by using data envelopment analysis technique whereby a cost minimization function ranks the banks from the most efficient to the least efficient. We choose inputs that banks would like to minimize in order to maximize their output mix. The deviation from the efficient frontier gives us the inefficiency of each bank. The parameters that are selected both for the production plan cannot be changed substantially in the short-term and therefore will be affected by the long-term management perspectives of the bank and increase the bank's market share. In this respect we can claim that the optimization model should capture the long term objectives of firm value maximization of the bank. On the other hand, we also measure the current performance of the bank which incorporates the three pillars of performance; risk, return and cost.

Without doubt, the various risks that a bank carries are a part of the bank management strategy and have a direct effect on profitability literature does not incorporate risk in the analysis of bank performance. The general assumption is that agents are risk neutral which leads to the conclusion that cost minimization and profit maximization are equivalent to value maximization and for this reason this is seen to be a major deficiency of standard efficiency literature, reference [28]. However, risk is an indispensable factor in performance measurement due to the nature of the banking business. There are different approaches to tackling risk on bank performance and efficiency analysis. Several authors have tackled the risk issue by analyzing the effect of regulations on the risk taking behavior of banks References [17],[15],[41] analyze the value at risk measurements of banks to evaluate their approach to market risk. References [21], [11] use the standard error of the predicted returns as a proxy for market price risk. Reference [12] analyzes the effect of risk based capital constraints on profit efficiency. Reference [22] treats the efficiency as a managerial utility maximization problem rather than profit maximization and cost minimization and incorporate the risk incentives in their analysis. Reference [28] examines the effect of risk on efficiency measures.

In this study the short-term liquidity risk and the return on solvency which measures the insolvency risk of the bank with respect to its asset quality are measured. Short-term liquidity risk addresses the short term mismatch problems of the banks which in the recent financial history has caused the eventual

failure of financial institutions. Return on solvency on the other hand is a measure of banks' revenues while taking into consideration the risk weighted assets of the banks measuring the bank's insolvency risk. Considering the fact that our sample covers an emerging economy, we take a more conservative approach by adjusting the ratio for government bonds giving a hundred percent risk weighting to these securities while according to Basel I these securities are considered risk free. Finally the short term cost efficiency is measured by analyzing the effect of current expenses on revenues. Throughout the study the cost of free capital is eliminated from risk adjusted and cost adjusted returns in order to obtain pure commercial revenues and make such revenues more comparable across banks. There are various studies where the cost of capital is incorporated in the analysis such as in references [30], [7], [14]. However, to the best of our knowledge the free capital has not been previously used in the calculation of the cost of capital which we believe is more relevant in measuring the cost of capital than the equity capital because free capital represents the part of the capital the bank can freely use in obtaining the market returns and provides a true cost of capital.

These performance criteria are analyzed in a panel regression of the Turkish Banks that are publicly trading and the effects of long-term efficiency as well as current performance are analyzed on market value. Although extensive analyses have been made both covering US banks as well as European banks in measuring the performance efficiencies of banks, a few studies have discussed the unquestionable effect of bank efficiency on shareholder value. Reference [24] analyzes the relationship between efficiency and stock values by calculating the shortfall of a market's value from its highest potential market value. Reference [14] brings the shareholder value efficiency concept which he defines as a bank producing maximum possible shareholder value given particular outputs. The marketability efficiency, developed by reference [38], uses the output of profitability efficiency evaluated via a non-parametric model as an input to calculate marketability efficiency. Reference [29] compares the profitability and marketability efficiencies obtained by adopting the reference [38] model, and shows that profitability efficiency is better in predicting likelihood of bank failures.

Bank Performance has been analyzed from the perspective of profit maximization and cost minimization in the last two decades extensively. X-efficiency in banking which is a general term used by reference [2] to describe all technical and allocative efficiencies of banks as distinguished from scale and scope efficiencies - is widely explored by academicians in measuring bank performance. There are 130 studies reviewed by reference [3] let alone the growing literature since then. Some of the literature that focused mostly on Europe and emerging Europe have analyzed the efficiency among the EU and European banks through the examination of the cross border differences in bank efficiency or the estimation of a common cost or profit frontier or the best or worst performers in the region references [39] , [5].

Reference [33] makes an analysis and review of efficiency in Europe. In reviewing the literature among emerging Europe there are various efficiency studies of banks that are country specific references [18], [19], [31]. There are also efficiency studies of Turkish Banks of which some prominent ones are; references [25], [26], [43], [10], [32], [9].

Whereas standard efficiency literature focuses on cost minimization and profit maximization as has been summarized above, more recent studies incorporate the risk factor in their analysis, references [22], [23], [28].

The next section explains the methodology and data followed by the empirical findings and conclusion.

II. METHODOLOGY AND DATA

As of 2007 there are 3 state and 29 privately owned banks in Turkey. Of the privately owned banks 16 are commercial banks with branch networks. We have included 9 of these banks that are currently trading at the Istanbul Stock Exchange for which we collect the financial data excluding the three state banks and the non-deposit banks. Two banks merged during the analysis period and therefore were excluded. Quarterly data is used covering the period January 2003- June 2007. Both foreign and Turkish banks are included in the analysis. It should be noted that some of the Turkish banks have been taken over by foreign banks during the period analyzed. We obtained the financial statements data from the Turkish Banking Association official website, the stock market data from the Istanbul Stock Exchange, and the Treasury bill rates from the official website of the Turkish Central Bank.

There are two alternative major methods to calculate X-efficiency, namely non-parametric and stochastic methods. Stochastic methods incorporate econometric techniques utilizing random error measurements or dummy variables to obtain inefficiencies. An econometric function, either cost or profit function, is defined, in which output is a function of inputs, inefficiency and random error and estimated to obtain inefficiencies. On the other hand, non-parametric model involves implementing linear programming techniques of data envelopment analysis (DEA), which picks the most efficient units and constructs an efficient frontier. Efficient banks can be defined as the units whose inputs or outputs can't be improved without worsening some of its other inputs or outputs, reference [8]. Both parametric and non-parametric methods have some advantages and disadvantages. Stochastic methods need to make some assumptions, such as the functional form of the econometric function and the distribution of the efficiency term. Another problem is that only one output can be defined to be assessed. The major advantage of stochastic methods is that it implements an error term to incorporate the noise in measurement. This issue is, on the other hand, the major disadvantage of the DEA. Therefore, the evaluated inefficiency, or in other words, the deviations from the efficient frontier, may indeed result from measurement errors or other noise factors. To summarize, it is

impossible to say that one is better than the other. We follow the studies which use DEA analysis in measuring bank performance since it performs well with small data sets.

In measuring efficiency of banks, there exist different approaches to the input output factors to be used references [3], [4], [24]. According to the intermediation approach, products such as loans and deposits are considered as outputs and the funds and their interest cost are included as inputs references [2]. To maintain long-term competitive presence, commercial banks seek solid and stable revenue streams. For this purpose they focus on their mainstream activities that are to generate income on client balances and transactions rather than making trading profits. With this in mind, in measuring the long-term efficiency of banks we selected our input and output measures from among factors pertaining to client business and that would serve the purpose of increasing the market share of the firm in the long-term. Thus the inputs in our optimization model are 1) equity capital 2) personnel expenses and 3) interest rate spread.

There are several reasons for using equity capital as an input in the analysis. Many studies have shown that scale is an important factor in an industry such as banking where overheads can be prohibitively high in the face of regulations and intense competition. Banks that have an established share will be less vulnerable to market fluctuations and are expected to dominate the market in the future. Also reference [20] argues that higher capitalization serves as a cushion against losses due to a sudden decline of asset prices and a signal to outsiders about the solvency of the bank.

Personnel expenses on the other hand, may be the most crucial resource for banks to serve their clients in a competitive way. Equally important are technology and systems related expenses for ensuring long-term competitiveness. However these figures are not traceable in bank financial reports whereas personnel expenses are distinctly available items as such can be reliable input in determining a bank's long-term efficiency. The last input is the interest rate spread. It is the difference between the interest received from the debtors and the interest expense paid to the depositors. This measure has also been used as an output in measuring efficiency reference [18]. However, we consider this item as a cost to the bank because as this spread is increasing the cost of creating loans and deposits is decreasing for the bank and thus should be treated as a source of fund. Also the spread signifies a managerial decision on how aggressive the bank will be in providing the long term services of the bank incorporating the risk attitude as well.

Outputs of our model are services provided to the clients of the bank that ensure sustainability in the long-term and increase market share; deposits, loans and fee income. Deposits have been used in various studies as both input and output. Reference [37] refers to studies that have been used at both ends even though they advocate the use of deposits as inputs. Client base in itself is seen as a significant value that a bank creates with the potential to sell and cross sell its products and services. Banks provide services for their clients

both on the assets and liabilities side of their balance sheet and without doubt loans are the most prominent services that a bank provides. The final output, fee income excludes interest income and trading profits and comprises fees and charges collected from clients against financial services rendered. As such is considered to be a major indicator of a commercial bank's performance representing a solid and stable revenue stream and client base. Such level of commissions and charges collected is considered as an indicator for the level of service quality and technology as well as breadth and depth of client relationships and loyalty which are crucial to long-term presence and performance.

The inefficiencies obtained from the DEA analysis can be interpreted as the long term relative performance of each bank. If a bank is more efficient in providing long-term services it will increase its market share through a higher share of deposits and loans and higher fee income from client business. The results are shown on Exhibit 2.

The mean and standard deviation of the outcome are given in Table 1, along with the other independent variables.

In the second part of the study, we combine the long term performance results with the current performance measures. These parameters incorporate the cost and risk factors in bank revenues and short-term liquidity risk. Next, a panel data analysis is performed to figure out the effect on market to book values of long-term performance obtained from the DEA analysis, along with current performance criteria.

In measuring profitability, return on equity is an extensively used and comprehensive ratio that indicates profit performance. Not only does it show shareholder return on capital, it also gives an idea of the leverage of the firm. However, ROE has drawbacks. The risk profile in generating profits is of great concern in evaluating profitability. The quality and sustainability of the profits depends on the risk profile of the bank. Therefore a need to measure the profit performance of a bank incorporating the risk factor as well as the cost of capital has resulted in the industry analysts using ratios such as RAROC, EVA, ROS, etc. In our case, we use the Return on Solvency ratio (ROS) adjusted for the cost of free capital. ROS is the revenues net of the cost of free capital divided by the adjusted risk weighted assets of the firm - adjusted for Government Bonds. (These bonds are 100 % risk weighted in our calculations even though they are considered to have 0 % weight in official risk calculations).

The reason for using free capital in our calculation of the cost of capital is that some of the banks are heavily invested in non-interest earning assets and they would have a disadvantage against the banks who earn interest on their capital when the cost of capital is being measured and deducted from revenues. It is a scarce resource utilized by banks as a buffer/ liquidity as well as a regulatory requirement against credit lines they grant to their clients, reference [36]. Free capital is calculated by deducting from own means non-interest earning assets like fixed assets, participations, non-performing loans as well as non-cash revenue items. In

measuring the cost of capital short-term Treasury bond rates of the prevailing period are used.

Table 1: Summary Statistics of the Data Set

|		Mean	Std. Dev.	Min Value	Max Value
DEA Input Parameters	Equity Cap.	1172733	1959744	-1562953	8435644
	Int. Spread	9.31	9.59	-45.00	29.61
	Per. Exp.	63918	63840	3018	307467
DEA Output Parameters	Fee Inc.	165719	223366	2269	1044657
	Loans	7378129	8759426	333773	33360489
	Deposits	10502475	12407748	574701	49542770
Regression Dep. Var.	Mv/Bv	1.48	1.03	0.05	4.97
Regression Independent Variables	Liq. Gap	-5899620	7328985	-31978675	124200
	ROS	0.29	0.25	-0.14	1.60
	ICR	1.45	0.55	-0.47	3.37
	Efficiency	0.72	0.17	0.38	1.00
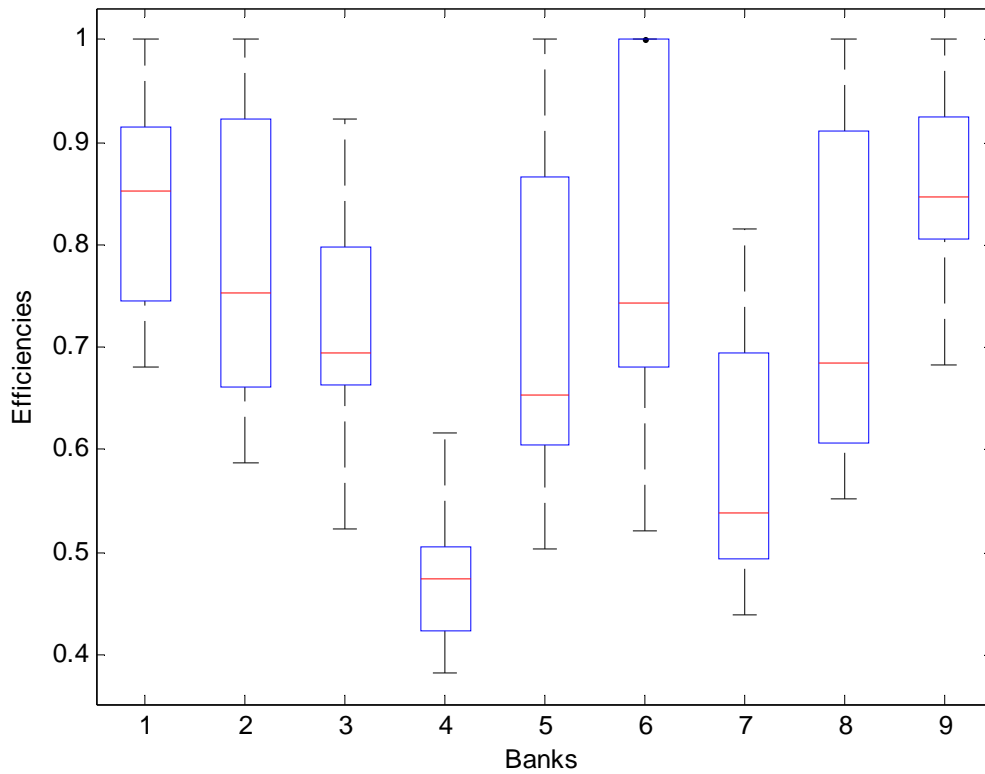
Figure 1: Results of DEA Analysis

We also incorporate short-term liquidity risk. Many banks in recent history have defaulted not because of lack of profits but because of short term liquidity problems. Banks run a liquidity risk if they have a liquidity gap (LG) between their assets and liabilities and this can cause problems for a bank especially in sharp economic downturns. They may fail to meet their obligations if they cannot roll due to lack of liquid assets and new funding sources as well. The bank may end up in great amount of losses if the interest rates move the wrong way for LG. Therefore we measure the gap between the assets and liabilities for the 3 months period that is considered to be more critical. We expect that prudent banks should not run such a risk however we should also note that banks can realize significant amount of profits by running a mismatch between their short term assets and liabilities because the profits from borrowing short and investing in the long-term are a considerable source of income.

We also include in the analysis the adjusted income cost ratio (ICR). Analysts and regulators view income cost ratio as the key measure of bank performance references [4], [40]. In this study, we use the revenues adjusted for the cost of free capital divided by total operating expenses. We expect that those banks who work more efficiently in terms of total operating costs thus having a higher revenue per unit of cost should have a higher market value.

III. EMPIRICAL FINDINGS

The summary statistics of the DEA analysis as well as the dependent and independent variables of the panel regression are given in Table 1. The results of the panel regression by using fixed Effects and Random Effects are reported in Table 2. A Hausman test is implemented to select the appropriate model. The null hypothesis that there is no correlation between the explanatory variables and unobserved firm-specific effects term can't be rejected. Then the Random Effects is consistent and the more efficient alternative compared to Fixed Effects. A more detailed explanation of panel data analysis can be found in references [43], [1].

The results of our study show that market values are affected not only by current performance criteria but also by the bank's long-term competitiveness. The market-to-book values are significantly and positively affected by the long term performance measures of banks obtained in the DEA analysis.

On the other hand performance criteria as measured by the risk adjusted revenues and cost adjusted revenues as well as the short term liquidity risk affect market values as well.

ROS affects market values positively and significantly. This ratio that shows the pricing of risk adjusted for the cost of capital therefore confirms that the market values an increase in net banking revenues controlled for risk.

LG is significant and positive. Banks can face serious problems in the short term in case of running a maturity mismatch between their short-term assets and liabilities. Even if they can meet their obligations their interest rate losses may wipe their profits. Therefore a LG is expected to be discounted by the market. This problem is partly

responsible for the liquidity crisis in 2001. However, our analysis shows that the market value increases with increased short term liquidity risk. This can only be explained by the previously mentioned high profit potential from running such a short position and that banks that are taking higher short term risk are expected to be rewarded by the market albeit the reverse effects in a possible economic downturn could have detrimental effects.

ICR shows the cost adjusted revenues of the bank in the short term. It is significant but negative. We initially expected that a higher ICR should imply a higher market value as a result of increased cost efficiency in current operations. In this respect we suspect total expenses are treated as an investment because these expenses incorporate heavily either technology and/or marketing expenses in an attempt to establish market share. Also it has been quite a busy period in terms of takeovers in the Turkish Banking industry. The banks that have been takenover by foreign banks have gained huge premiums in market value. These banks as well as their competitors have been incurring high expenses for sales & marketing and for establishing their names in the market and increase market share which might also be a part of the reason. Consequently, a trade off of the current profits in order to obtain long-term benefits is observed and the welcomes such behavior.

Table 2: log(Mv/Bv) Regression Results

	FE	RE
ROS	0.967	0.953
	(0.20)*	(0.19)*
ICR	-0.288	-0.278
	(0.10)*	(0.10)*
EFF.	0.828	0.824
	(0.33)**	(0.33)**
LIQGAP	-3.22E-08	-3.40E-08
	(1.2E-08)**	(1.2E-08)*
Constant	-0.597	-0.615
	(0.29)**	(0.43)
R^2	0.14	0.14

The values in parenthesis are standard deviations.
*, **, *** stands for 1%, 5% and 10% significancy level correspondingly.

IV. CONCLUSION

Financial institutions like other institutions want to maximize profits. However, in achieving this goal they have to keep an eye on their risk exposure while increasing their revenues, be prepared for possible short-term liquidity problems as well as establish themselves in the market in the long-term. Our purpose is to examine how the market perceives the performance of the bank in view of these

concerns bearing in mind that some managerial decisions may imply a trade off between increasing market share and maximizing current profits.

Long term performance is obtained through a DEA optimization analysis while the current performance is analyzed by measuring the cost adjusted and risk adjusted revenues as well as the short term liquidity risk. We use measurement criteria which have not previously been used in measuring bank performance such as adjusted return on solvency and liquidity gap. We also use the free cost of capital in measuring revenue related ratios to eliminate the return on free capital where market rates are quite high and as such banks are evaluated on an identical setting.

The results show that the market rewards banks that are more efficient in the long-term. This finding indicates that efficient banks will increase their market share which arguably will result in value maximization in the long-term and this fact is priced in by the markets. The other most important result is that banks that have a better pricing of risk have higher market to book values.

On the other hand, income cost ratio has a negative impact on market value. This result implies a trade off between the short and the long term performance of the banks. Banks in order to increase their market share in the longer term do not abstain from increasing their current expenses in the short-term which would impact current results negatively and this decision of the banks is treated by the market as a value enhancing activity.

The results of our analysis show that market values are not only affected by current performance of a bank that considers the cost adjusted and risk adjusted revenues but also keeps one eye on the long-term prospects as well which according to this study can be traced by examining their long-term efficiency in providing banking services. We believe that there is a gap in the analysis of the banking performance with respect to the long term perspective and its implications on market values and we expect that more studies will follow that focuses on this issue.

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