ABSTRACT

The interested parties in firm have always focused on profitability. Profitability prediction and ability to anticipate profitability is helpful for decision making concerning credits and Share transaction and guidance for managers. In this research the financial ratios have been used to anticipate the profitability of firms as an abstract of financial data.

First, the financial ratios were decreased from 57 to 7 by using factor analysis, Then the return on investment (ROI) was anticipated using Multivariable regression. Also the return on investment and economic value added (EVA) factor have been used as the best indexes to classify the firms to profitable and less profitable ones.

The decreased to a few ratios so that they could nicely act as indicators for all studied ratios and the ROA can be anticipated using these ratios. Finally the EVA has verified the ROA changes to a great extent as abas is to determine the profitability of firms.

Key Words: Financial Ratio, Profitability Prediction

1) INTRODUCTION

Profitability of firms always is considered by managers, company owners (actual shareholders), investors (potential shareholders), finance lenders (banks, financial institutions), creditors, and so on. Various methods have been used to assess the profitability of firms so far. One of them is financial ratios which have been used since the early twentieth century for predicting firms’ bankruptcy and also for evaluating and predicting profits. This study uses financial ratios to provide an outlook of firms’ profitability for beneficiaries, including company owners, investors, finance lenders, creditors, and especially for managers.
Therefore, owners (shareholders) hold or sell their shares and investors (potential shareholders) buy or refuse to buy company stock. Also lenders and creditors can be partly certain to give credit and be assured of their return on investment.

In all cases, decision making is related to the future. Appropriate and rational decisions require accurate, relevant, and proper information, so that people can access the expected results by decision making. Decision making is one of the managers’ principal tasks in order for organizations to achieve their goals in the future. One of the main goals of for-profit firms is the company’s profitability or in other words to maximize the profits. Therefore, predicting the profitability will help considerably a variety of the manager’s decisions about profitability of the company. The purpose of this study is to identify and introduce effective financial ratios in evaluating firms’ profitability. Therefore, managers and beneficiaries are not obliged to calculate a large number of financial ratios for analysis of financial statements of the company.

2) LITERATURE REVIEW

In the first half of the twentieth century, financial ratios were often used singly for analysis. However, in the second half of this century, multiple ratios were used for analysis of financial statements. For instance, Stevens (1973), Libby (1975), Pinches (1975), Nissim and Penman (1999) used multiple ratios in their studies. Dozens of ratios were derived from financial statements and were studied in financial management literatures. Some of the most important studies and authentic literatures will be discussed here. R.P. Neveu in “Principles of Financial Management” divides ratios into four categories including liquidity ratios, activity ratios (efficiency), debt ratio (leverage), and profitability ratios. Each of these categories contains a number of ratios and the total number of ratios mentioned in this book is sixteen items.

In another categorization (Gibson 1994), financial ratios are divided into five major categories including liquidity ratios, leverage ratios, profitability ratios, asset turnover ratios and cash flow ratios. The number of ratios in this category is forty-four. However, the classification proposed by Leopold (1989) seems more perfect. In this categorization, financial ratios are divided into six main groups including short-term liquidity and activity ratios, capital structure and long-term solvency ratios, return on investment ratios, operating performance ratios, asset utilization ratios, and market ratios.

The description and definition of predictive models in industry was first introduced by Alexander Wall (1919). He compared seven ratios with each other which were divided among more than 981 firms according to region and industry. Later on, Bliss (1923) and Foulke (1937) pursued these cases.

Fitzpatrick (1931), Winakor (1935), and Merwin (1942) focused on studies about financial ratios and identifying firms facing bankruptcy. In each case, specific ratios which were significantly different between the two groups of firms were considered. These studies were based on methods that assess the ability of financial ratios by their power of prediction or distinction.
Horrigan (1965) proposed an article about profitability using previous studies. Since Horrigan (1965) stated that he encounters statistical problems in the analysis of financial ratios, more advanced statistical techniques have been used in several studies.

Nissim and Penman (1999) conducted a research entitled “Ratio Analysis and Equity Valuation”. In this study, the correlation between financial ratios and Equity Valuation was discussed.

3) Research questions

This study will answer the following questions:
1. Is it possible to predict profitability using the available financial ratios?
2. In the prediction of future profitability of a company using financial ratios, what are those financial ratios that show a higher correlation with profitability?

4) Research variables

The financial ratios of firms are considered as variables for the present study. In order to achieve the research objectives, 57 financial ratios such as current ratio, quick ratio, sales to assets ratio, cash to total assets ratio, etc. are selected and calculated. Consequently, the most effective ratios are identified by performing the statistical methods.

5) Research methodology

Accounting information is located in both nominal and interval scale and financial ratios normally are located in interval scale. For this reason, those statistical techniques should be used which are specifically suited for the analysis of the correlation between the variables in this scale. Multivariate regression is one of the most popular and effective techniques in financial investigations which has been used frequently for prediction and correlation between variables. Many ratios can be extracted from the financial statements. Of course, all these ratios do not show the same correlation with profitability. Therefore, those ratios are selected which have a high correlation with profitability. These ratios are reduced through factor analysis in order to be calculated and analyzed by beneficiaries. This technique has been used by many financial researchers and has provided good results. After data reduction, required predictions for the selected financial ratios are done using multivariate regression.

In order to find whether the predicted ratios estimate profitability for the future of a company or non-profitability, firms are divided into two groups of high-profit and low-profit firms.

This work (division of firms) is done using DuPont system and Economic Value Added. This way firms are divided into two groups of firms that have high profitability during the 5-year review and firms that have low profitability during the 5-year review.
6) Research sample

Firms which are listed in Tehran Stock Exchange and are active in non-metallic mineral industry was selected as the statistical universe. Since there is not a large number of firms in this industry (40 firms), sampling is not used and the whole statistical universe will almost be studied.

7) Results

7.1) Regression analysis

In this research 57 financial ratios have been calculated in five years and by using factors analysis, factors loading and factors rotation, 7 financial ratios have been selected as final ratios in order to further analyzing. These ratios are net income to equity (1), equity to long liabilities (2), cash to sales (3), cash to interest expense (4), current assets to current liabilities (5), sales to total assets (6) and cost of goods sold to inventory (7).

After selecting the important ratios, regression analysis is done in each of the 5 years. The results of regression analysis are shown in table (1).

<table>
<thead>
<tr>
<th>TABLE (1): RESULTS OF REGRESSION ANALYSIS IN EACH OF THE FIVE YEARS</th>
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<tbody>
<tr>
<td>ratio</td>
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<td>1</td>
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<td>5</td>
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<td>6</td>
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</tbody>
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As highlighted in table, the ratio (1) and (5) are significant in four years, Ratio (7) is significant in 3 years, ratio (3) and (6) are significant in two years and ratio (4) is significant in only one year. Also, ratio (2) is not significant in any of the 5 years.

### 7.2) Classification Of Firms Based On Roa

Financial ratios usually don’t have meaning by themselves. There are two ways of interpreting these ratios. First, the financial ratios of a company can be compared in several years and the change process can be observed. Second, financial ratios can be compared with the industry average and they can be interpreted in this way. Therefore, condition and performance of the company becomes clear. Whether the company has a good condition or not? Whether it is growing and improving or is leading to weakness and recession? In this research, firms are divided into two groups of profitable and less profitable. Firms that their ROI in all years under review is higher than the industry average are considered as profitable firms. Firms that their ROI in all years under review is lower than the industry average are considered as less profitable (non-profitable) firms. In table (2), ROI for all firms are shown in five years.

<table>
<thead>
<tr>
<th>year</th>
<th>First year</th>
<th>Second year</th>
<th>Third year</th>
<th>Forth year</th>
<th>Fifth year</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROI</td>
<td>18%</td>
<td>21%</td>
<td>22%</td>
<td>21%</td>
<td>22%</td>
</tr>
</tbody>
</table>

Therefore, firms that their predicted ROI for the coming years is higher than the industry average are likely to be profitable. However, in firms with reverse situation, managers should find the problem and attempt to solve it.

Firms can also be classified according to the average rate of ROI in profitable firms (Firms whose rates of returns on investment is higher than the industry average) and in less-profitable firms. In table (3), ROI for profitable and less profitable firms are shown.
TABLE (3): ROI FOR PROFITABLE AND LESS PROFITABLE FIRMS

<table>
<thead>
<tr>
<th>year</th>
<th>First year</th>
<th>Second year</th>
<th>Third year</th>
<th>Forth year</th>
<th>Fifth year</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROI in profitable firms</td>
<td>29.5%</td>
<td>32.7%</td>
<td>31.2%</td>
<td>29.4%</td>
<td>29%</td>
</tr>
<tr>
<td>ROI in less profitable firms</td>
<td>9.4%</td>
<td>12.4%</td>
<td>13.5%</td>
<td>10.9%</td>
<td>10.5%</td>
</tr>
</tbody>
</table>

7.3) Classification of firms according to EVA

Using ROI, profit, earnings per share, etc. for determining the performance and value of a company has some problems and we cannot fully rely on these methods. To overcome these problems, economic value added is used which is the best method to determine the performance and value of a company. First, it is discussed whether firms’ economic value added can be predicted by using financial ratios.

To do this, regression analysis is performed, exactly like predicting return on investment using financial ratios. The result of multiple regression analysis showed that the linear regression model for predicting the economic value added in the years under review is significant. However, the ratio factors which are selected for prediction are not significant, except in one case (net income to equity ratio) which is significant in all years.

This means that economic value added cannot be predicted using financial ratios. However, a very important use of this method is classification of firms based on economic value added. It can also be determined that how economic value added is associated with the rate of returns on investment. For this reason, average economic value added are calculated for all firms and showed in table (4).

TABLE (4): AVERAGE ECONOMIC VALUE ADDED IN MILLION RIAL (IRAN MONETARY)

<table>
<thead>
<tr>
<th>year</th>
<th>First year</th>
<th>Second year</th>
<th>Third year</th>
<th>Forth year</th>
<th>Fifth year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average EVA</td>
<td>54.8</td>
<td>95.5</td>
<td>125.7</td>
<td>156.4</td>
<td>148.8</td>
</tr>
<tr>
<td>Average EVA in profitable firms</td>
<td>111.24</td>
<td>180.24</td>
<td>226.48</td>
<td>308.2</td>
<td>257.4</td>
</tr>
<tr>
<td>Average EVA in less profitable firms</td>
<td>18.6</td>
<td>22.5</td>
<td>32.4</td>
<td>60.5</td>
<td>50.76</td>
</tr>
</tbody>
</table>

Therefore, according to the average economic value added, firms that their economic value added is higher than the industry average in all years under review are considered as profitable firms. However, firms
whose economic value is lower than the industry average are considered as less profitable firms. To find the relationship between the rate of return on investment and economic value added, firms whose rate of returns on investment is higher than the industry average were compared with the firms whose economic value added is higher than the industry average. Also firms whose rate of returns on investment is lower than the industry average were compared with the firms whose economic value added is lower than the industry average. Firms with fluctuation (one year higher and another year lower than the industry average) were also compared with each other. In this comparison, economic value added approves the rate of returns on investment in 87% of cases. It means that in 87% of cases, firms whose rate of returns on investment is higher than the industry average also have the economic value added higher than the industry average, and vice versa.

8) CONCLUSION

Data analysis was led to the following conclusions:

1. One of the problems is that the number of financial ratios is high which results in less use of them. First, high number of financial ratios requires more time to analyze and is very time consuming for financial analysts both inside and outside the company (managers, shareholders, financial institutions, investors, etc.).

Second, all financial ratios are not equally important. Therefore, only those ratios which are more important should be analyzed. Most importantly, additional information always causes confusion and making more mistakes.

Third, the cost of research should always be considered. Certainly, analysis of a large number of financial ratios will lead to higher costs. For better use of financial ratios and also to resolve the above problems, an appropriate number of financial ratios should be selected. In this research, factor analysis which is a very powerful statistical method was used for data reduction. The results indicate that a large number of financial ratios can be reduced into a small number. The resulting financial ratios perfectly represent all financial ratios. In this research, 57 financial ratios from various aspects of firm performance were studied and their number was reduced to 7 financial ratios using factor analysis. In addition to reducing variables using factor analysis, it was revealed that what aspects of company performance are respectively expressed by the main factors. This way, one variable (ratio), that has high factor loading on the factors during the period under review (all the years), is selected from each factor.

2. Profitability is one of the most important elements which are very significant for all beneficiaries in firms. Managers use profit and profitability to demonstrate their performance. Shareholders make decision to hold or sell their shares based on company’s profitability. Financial institutions pay credit to firms based on their profitability. Investors make decision to buy shares of firms based on profitability. The main question of this research is that is it possible to predict the rate of returns on investment (ROI), which is one of the most important profitability indicators, using financial ratios? The result shows that by using
multivariate regression, the rate of ROI can be predicted by particular financial ratios. This prediction has little difference with reality. Therefore, the company outlook can be somewhat clear. This awareness is very important for the above users to make their decision easier. This can be especially useful for managers, so they can find and fix the problem before facing it.

3. Rate of ROI and all the methods in which accounting profit is used have some problems because the stated profit is not real. The best way to fix these problems is EVA which is used for classifying profitable and less profitable firms. The relation between the rate of ROI and EVA was studied and results show that economic value added approves the rate of returns on investment.

9) REFERENCES