

A study of the relationships between probability ratios and B/M, P/E, and Q'Tobin ratios

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Abstract: Net profit is considered as a criterion for evaluating performance. Most investors and creditors make decisions based on the profitability of a business in the past as well as predictions of future profits, which makes net profit and profitability ratios significant. On the other hand, when the economy experiences crisis, the price of shares are affected and almost equals the book value of the company. Decline in the price of shares makes the investors use the opportunity and start to invest, hoping the crisis will end soon and the price of shares will increase. Given the relationships among profitability ratios and most financial ratios, the present study investigates the relationships among probability ratios, the B/M ratio, P/E, and the Q'Tobin index. To this end, the information provided by 111 businesses admitted to the Tehran stock market during 2005-2009 was studied. The method adopted here is the multivariate linear regression and correlation. The findings revealed that there is not a significant relationship between profitability ratios and the ratio of the book value to the market value. Also, the results suggested a significant and positive relationship between ROA and EPS ratios with the ratio of the price of shares to the earnings of each shares. Furthermore, there is a negative and significant relationship between ROA and ROS ratios and the Q'Tobin index. In addition, there is a significant and positive relationship between the EPS ratio and the Q'Tobin index.

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Introduction

In order for a country to grow economically, it is vital that people invest their surplus income. Therefore, in order to gain shares with higher return and fewer risks, investors need some information about those shares. The information about a company is provided by both internal and external profile of that company. The internal profile is reflected in financial statements such as the profit and loss statement and the balance sheet. The external profile can be found in the stock market. Both external and internal profiles affect the return and determine the price of shares in the market. They naturally influence the way investors make decisions, as well. Sometimes, the return of shares might not be a reliable criterion for the investors' decision making. In these cases, the value created by shareholders can serve as good criteria for evaluating the state of shares. The ratio of the book value to the market value can reflect the aforementioned value. It also could serve as criteria for evaluating risk and profitability (Moridipoor & Moosavi, online).

Theoretical Framework

A ratio used for evaluating the value of the stock market is the ratio of the book value to the market value. This ratio is the product of dividing the book value to the value of the stock market. The value of the stock market reflects the desirability or undesirability of the performance of businesses. If businesses have a good performance, they develop

values and their values in the stock market increase. The size of the company is a factor affecting this ratio. It is expected that larger companies have a smaller ratio than small ones.

Furthermore, the ratio of the price of shares to the earnings per share (P/E) shows the status of a company. When this ratio increases, the shares grow in price, and a decrease in this ratio leads to a decline in the earnings of each share. This can reflect the decisions that potential or real investors make.

The evaluation of performance is one of the most important issues considered by shareholders, creditors, managers, and the government. Managers use evaluating performance to evaluate their own performance as well as those of their subordinates. Shareholders are interested in this issue because they use it to evaluate the manager's ability to exploit their resources. Creditors evaluate performance to make decisions on the amount and rate of credits they want to grant. The most important issue considered by creditors is whether value is generated for them or not (Moridipoor & Moosavi, online)? Based on this, the question which arises is whether the ratios of profitability to book values affect the market value. Do the ratios of profitability affect the ratio of the price of shares to earnings per share?

Is there a relationship between the profitability ratios and the Q'Tobin?

Literature Review

Foreign literature

Banz (1981) investigated the relationships between the market value to the return of normal shares. The results indicated a significant relationship between the value of the stock market and the return of normal shares. In other words, as the return of normal shares increases, the value of the stock market increases. This study shows a positive relationship between these two variables.

Lakonishock et al (1994) consider the influence of the book value on the market value as a reason for systematic undervaluation or overvaluation which stem from constant biased expectations from prospective values of investors. The supporters of the results of this study consider the effect of the book value on the market value as the basis to reject the hypothesis of efficient markets.

Liew and Vassalou (1999) reported that portfolios based on the size of the company, and the ratios of the book value to the market value are related to the future economic growth.

Bary et al. (1999), found that small companies as well as those with low B/M have a higher average return than other companies.

Basu (2000) used financial ratios to distinguish successful businesses from unsuccessful ones. The findings showed that companies with a higher ratio of the book value to the market value have a greater return.

Boyer (2004) studied the effects of the past return of shares on the current financial leverage. He concluded that the ratios of the book value to the past market value and the past return of shares have a significant influence on the financial leverage.

Boucher (2006) showed that in the period of 1998-2003, the risk of the return of the shares depended on the size and the ratio of the book value to the market value. However, other factors such as GDP, inflation, and interest rate also affect the return of shares.

Tinglin (2004) showed the same results as those of Boucher (2006) in the period of 1998-2003.

Navazish (2008) investigated the differences between the return of the companies with the ratios of book values to high market values (companies with high risks) and companies with ratios of book values to low market values (companies with low risks) in the U.S, Japan, Hong Kong, Malaysia, Taiwan, and Thailand in 1998. They showed that the differences between the return of companies with high risks and those with low risks in the U.S, Japan, Malaysia, and Hong Kong were great. However, this difference in Thailand and Taiwan was great.

Domestic literature

Namazi and Derakhshandeh (2003) studied the effects of the size of the company and the ratio of the book value to the market value on the market value and the profitability of the company using the cross-sectional method. They attempted to introduce the link between the size of the company and the ratio of the book value to the market value with the return of shares and profitability as criteria which are used in making decisions for investing in shares of companies. The findings of the study for the period of 1997-2001 indicated a significant and direct relationship between the size of the company and return as well as a significant and reverse relationship between the ratio of the book value to the market value and return and profitability after 1998.

The findings of Poorheidari and Amiri (2005) showed that, firstly, a remarkable number of changes in the company are determined by profit and, secondly, the largest part of the explanatory power of the sum of profit and the book value is due to profit. Thirdly, the book value of the company does not have a good explanatory power compared to the earnings per share and the differential coefficient, especially the difference differential coefficient, calculated for this variable shows the weak explanatory power of this variable in explaining fluctuations of the value of the company.

Anari Rostami and Talaneh (2006) conducted a comparative study of two methods used for ranking companies based on the excellence indicator of the Tehran Stock Market and profitability ratios. The findings showed a weak correlation between two methods, which means companies chosen by the stock market do not necessarily rank high in terms of profitability.

Saqafi and Talaneh (2006) investigated the role of profit and book value in evaluating the proprietary right. Using the post-tax profit and the book value of shares at the beginning of the period, both of which were measured based on each share and were deflated based in general index of cost of goods and consumer services in Iranian urban areas. The research provided evidence on the negative relationship between the price of shares and profit as well as the role of the book value of the proprietary right as the indicator of transfer rights for suffering companies. These findings were consistent against sensitivity analysis.

Ahmad Poor and Rahmani (2007) investigated the influences of market, size, and the ratio of the book value to the market value on the return of shares in the Tehran Stock Market. They also investigated whether the explanatory power of the size is more than that of the ratio of the book value to the market value. The findings showed these three factors influence the return in the stock market, and using a

multifactor model cannot explain the dispersion of shares compared to a single agent model.

Hejazi and Oskooie (2007) stated that criteria based on accounting information would not suffice to meet the demands of shareholders and consumers to measure the wealth of shareholders and the value created in the company and other criteria are needed which are based on economic information and the creation of value. Cash added value is a new concept introduced for evaluating the internal performance of companies and investigates the cash wealth created inside the business unit. The results of the relative information content test showed that the cash added value is a better index of the return of shares than the P/E ratio. The results of the increasing information test for the cash added value and the P/E ratio showed that both of them have increasing information content to each other.

Tehrani and Ranama (2008) studied the ratio of the book value to the market value as a variable replacing risk, using the leverage approach. The findings showed that the ratio of the book value to the past market value and the past return of shares have a remarkable influence on the financial leverage and could serve as a good alternative to risk.

Tehrani and Falavarjani (2008) used a leverage approach to investigate the capacities of the ratio of the book value to the market value to replace risk. The findings revealed that the influence of the ratio of the book value to the market value on the past returns of shares is based on leverage with book values and leverage with market values and could replace risk.

Methodology

This is an applied study with a semi-experimental and ex post facto design. This method is used when data are taken from an environment which naturally exists or from an event in which the researcher could not interfere.

Hypotheses

In order to achieve the goals of the study, 3 primary and 8 secondary hypotheses were developed and tested.

The first primary hypothesis: there is a significant relationship between profitability ratios and the ratio of the book value to the market value (B/M) of companies.

Secondary hypotheses

- 1- There is relationship between ROA and B/M ratios
- 2- There is a significant relationship between ROE and B/M ratios
- 3- There is a significant relationship between EPS and B/M ratios
- 4- There is a significant relationship between ROS and B/M ratios

The second primary hypothesis: there is a significant relationship between profitability ratios and the ratio of the price of shares to the earnings per share (P/E)

Secondary hypotheses

- 1- ROA and P/E are related.
- 2- ROE and P/E are related
- 3- EPS and P/E are related
- 4- ROS and P/E are related

The third primary hypothesis: there is a significant relationship between profitability ratios and the Q'Tobin index.

Secondary hypotheses

- 1- ROA and Q'Tobin index are related.
- 2- ROE and Q'Tobin index are related.
- 3- EPS and Q'Tobin index are related.
- 4- ROS and Q'Tobin index are related.

Population and sample

The population consisted of all companies admitted to the Tehran stock market during 2005-2009. Sampling was conducted using no specific methods and companies were selected by the exclusive method under the following conditions.

- 1- The financial year ended on March 22nd.
- 2- The financial year was fixed during 2005-2009
- 3- The companies are not investing, bank or holding types.
- 4- The financial information was available for the specified period.

Under these conditions, 111 companies were selected. Due to these limitations, some industries have few or no representatives. Therefore, industries with few representatives were classified with similar industries.

Time period

The time period consisted of 2005-2009. Data were gathered through library research. The theoretical framework was developed by reading books, magazines, as well as English and Persian articles. Financial data were gathered from financial statements of the specified companies published in the website of the Tehran stock market and www.rdis.ir and www.tsetmc.com.

Variables and measurement methods

Independent variables included the B/M and P/E ratios. The dependent variables included profitability ratios (return of assets, return on equity, return of sales, earnings per share) and the Q'Tobin index. The control variables included size and the leverage ratio which will be discussed later.

Dependent variables

Profitability ratios included:

- a) Return of assets (ROA): the ratio of the net profit to the total value of assets.

- b) Return on equity (ROE): the ratio of the net profit to the assets of the shareholders.
- c) Return on sales (ROS): the ratio of the net profit to net sales.
- d) Earnings per share (EPS): the ratio of the net profit to common shareholders to the number of published common stock during the year.
- e) Q'Tobin index: the ratio of the market value to the book value or the replacement value of assets.

Independent variables

- 1- The ratio of the book value to the market value (B/M).

This ratio is calculated by dividing the book value by the market value of shares and is a criterion for evaluating the value of these shares. The book value of assets is the numbers and figures which are recorded in the balance-sheet of the company. The book value of each share is the ratio of the shareholders' assets to the number of shares.

- 2- The ratio of the price paid for shares to the earnings per share (P/E)

Control variables

In this study, the control variable included size and financial leverage. The leverage is calculated by dividing total debts by total assets. A lot of researchers such as Vafeas (2000), Fan and Wang (2002), and Ahmed et al. (2006) used these control variables in their studies.

Methods of Data Analysis and Hypotheses Testing

In order to analyze data and test the hypotheses, descriptive statistics (median and standard deviation) and inferential statistics (Pearson correlation coefficient and simple linear regression model) were applied and the variables were calculated using the EXCEL 2007. Then the hypotheses were tested using the SPSS 17.0, Stata 9.1, and Eviews 7.

Analysis and Findings

The results of hypotheses tests are shown in tables 2 to 4.

Table 2. The results of testing the first primary hypothesis with coefficients of control and independent variables.

According to the value of f and the level of significance, the multiple regression model is significant. Also, , given the upper limit (d_u) and the lower limit (d_L) of the Durbin-Watson statistic for a 111-member sample and 6 control and independent variables in the regression model, the results of the Durbin-Watson are 1.550 and 1.803, respectively. The final Durbin-Watson statistic is 2.333678 which is in $d > d_u$, which shows a lack of self-correlation among the error statements. The differential coefficient for the regression model is %5.2236. The differential coefficient is a standard for showing the degree of changes in the independent variables made

by the dependent variables. The results of the regression model show a limited influence of the independent variables on the dependent ones.

After testing the first hypothesis and its secondary hypotheses, the calculated profitability value in the significance level of %5 shows that there is not a significant relationship between the ratios of profitability to the B/M ratio. Therefore, the first primary hypothesis and its secondary ones are not supported.

Table 3: The results of testing the second primary hypothesis with control and independent variables coefficients

According to the value of f and the level of significance, the multiple regression model is significant. Also, , given the upper limit (d_u) and the lower limit (d_L) of the Durbin-Watson statistic for a 111-member sample and 6 control and independent variables in the regression model, the results of the Durbin-Watson are 1.550 and 1.803, respectively. The final Durbin-Watson statistic is 2.051844 which is in $d > d_u$, which shows a lack of self-correlation among the error statements. The differential coefficient for the regression model is %93.5673. The differential coefficient is a standard for showing the degree of changes in the independent variables made by the dependent variables. It shows that %93.5673 of the changes in the dependent variables is made by independent variables.

After testing the first hypothesis and its secondary hypotheses, the calculated profitability value in the significance level of %5 shows that there is a positive and significant relationship between the ROS and EPS ratios with the E/P. therefore the first and third secondary hypotheses are supported. However, based on the probability value calculated for the second and fourth secondary hypotheses, there is not a significant relationship between ROS and ROE with P/E. therefore these secondary hypotheses are not supported.

Table 4: the results of testing the third primary hypothesis with control and independent variables coefficients.

According to the value of f and the level of significance, the multiple regression model is significant. Also, , given the upper limit (d_u) and the lower limit (d_L) of the Durbin-Watson statistic for a 111-member sample and 6 control and independent variables in the regression model, the results of the Durbin-Watson are 1.550 and 1.803, respectively. The final Durbin-Watson statistic is 2.212946 which is in $d > d_u$, which shows a lack of self-correlation among the error statements. The differential coefficient for the regression model is %86.4692. The differential coefficient is a standard for showing the degree of changes in the independent variables made

by the dependent variables. It shows that %86.4692 of the changes in the dependent variables is made by independent variables.

After testing the first hypothesis and its secondary hypotheses, the calculated profitability value in the significance level of %5 indicates a negative and significant relationship between the ROA and ROS ratios with the Q'Tobin ratio. Therefore the first and second and fourth secondary hypotheses are supported. However, based on the probability value calculated for the second and fourth secondary hypotheses, there is not a significant relationship between ROE and the Q'Tobin ratio. Therefore these secondary hypotheses are not supported.

Table 5: the Pearson correlation coefficient among probability ratios with P/E, B/M, and Q'Tobin

This table shows a negative and significant correlation between B/m with EPS and ROS in the %0.5 significance level. Also, there is a positive and significant correlation between the Q'Tobin ratio and the return of the shareholders' assets. As table 5 shows, other profitability ratios and P/E, B/m, and the Q'Tobin are not correlated.

Conclusion

This study attempted to answer the question "whether the profitability ratios and the ratio of the book value to the market value, the ratio of the price of shares to the earnings per share and the Q'Tobin ratio are related or not".

The results revealed a lack of correlation between profitability ratios and the B/M ratio.

Furthermore, ROA and EPS are positively correlated with the E/P. in addition, the results showed a lack of significant correlation between ROE and ROS with the E/P.

The results of testing the third hypothesis indicated a negative and significant correlation between ROA and ROS with the Q'Tobin ratio. Also, EPS and Q'Tobin are positively correlated. But ROE and Q'Tobin are not correlated.

Limitations

- 1- Some businesses were young and did not have a long history. So they were excluded.
- 2- The influences of macro-economic indices such as inflation have not been considered.

Implications

Investors in the Tehran stock market are advised to take into account other performance factors in addition to the price of shares to make decisions. The Q'Tobin ratio, as a good criterion for judging performance, could be of good help in making decisions.

Future researcher can consider these issues:

- 1- Investigating the relationships between the Q'Tobin ratio and profitability ratios in investing and holding companies.
- 2- Duplicating this study considering the age and type of the business.
- 3- Duplicating this study considering inflation.
- 4- Studying the relationships between profitability ratios and their changes by systematic and non-systematic risks of shares.

Table 2. The results of testing the first primary hypothesis with coefficients of control and independent variables

significance	t statistic	Standard deviation	coefficient	Variable
0.1802	-1.341784	0.004650	-0.006240	ROA
0.1203	-1.555827	0.000904	0.001407	ROE
0.6665	-0.431242	1.19E-06	-5.15E-07	EPS
0.0700	-1.815466	0.003811	0.006918	ROS
0.0915	1.690587	0.002878	0.004865	LEV
0.0068	2.717742	0.064488	0.175261	SIZE
0.8494	0.189961	0.018107	0.0034440	AR(1)
0.0634	-1.860519	0.754708	-1.404148	constant
	Durbin-Watson	0.052236		Differential coefficient
		0.041802		Adjusted differential coefficient
0.000052	Level of significance	5.006322		f statistic

Table 3: the results of testing the second primary hypothesis with control and independent variables coefficients

significance	t statistic	Standard deviation	coefficient	Variable
0.0109	2.558273	1477947	37.8.993	ROA
0.2317	-1.197709	1.894307	-2.268828	ROE
0.0000	79.56963	0.003534	-0.281164	EPS
0.1228	1.546048	9.662981	14.93944	ROS
0.5922	-.0535984	5.886412	-3.15502	LEV
0.0139	-2.469925	146.8042	-362.5953	SIZE
0.0097	2.599179	1718.348	4466.293	constant
2.051844	Durbin-Watson	0.936703		Differential coefficient
		0.935673		Adjusted differential coefficient
0.000052	Level of significance	909.0587		f statistic

Table 4: the results of testing the third primary hypothesis with control and independent variables coefficients

significance	t statistic	Standard deviation	coefficient	Variable
0.0000	-4.978772	0.712294	-3.546350	ROA
0.0000	46.27621	0.131759	6.097323	ROE
0.7821	-0.276800	0.000171	-4.75E-05	EPS
0.0000	-5.078207	0.566849	-2.878578	ROS
0.7672	0.296227	0.412778	0.122276	LEV
0.7818	-0.277158	11.23345	-3113445	SIZE
0.8616	-0.174394	131.9428	23.00988	constant
2.212946	Durbin-Watson	0.864692		Differential coefficient
		0.828610		Adjusted differential coefficient
0.0000	Level of significance	23.96463		f statistic

Table 5: the Pearson correlation coefficient among probability ratios with P/E, B/M, and Q'Tobin

SIZE	LEV	ROS	EPS	ROE	ROA	Dependent Variables	
						Independent Variables	
0.013	-0.006	0.097	0.876	0.033	0.040	P/E	Pearson Correlation
0.715	0.715	0.796	0.831	0.714	0.436		(P_value)
0.078	0.079	-0.157	-0.021	-0.123	-0.15	B/M	Pearson Correlation
0.760	0.891	0.022	0.000	0.438	0.352		(P_value)
-0.041	-0.003	-0.018	-0.001	0.813	-0.020	Q'tobin	Pearson Correlation
0.331	0.938	0.679	0.974	0.000	0.632		(P_value)

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