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A STUDY ON ACCOUNTING RATIOS TO DETERMINE CHANGE IN MARKET SHARE PRICE OF DHAKA STOCK EXCHANGE WITH REFERENCE TO COMMERCIAL BANKS OF BANGLADESH

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Abstract: The share market in Bangladesh has seen a major turmoil in 2010-2011. The reasons behind it are believed to be several and investigation is still going on. The paper aims to determine if change in company market share price could have been predicted by the financial indicators of the company. The study focuses on the private commercial banks in Bangladesh as it is a growing industry playing a significant role in the capital market of the nation. In Bangladesh, there are 30 private commercial banks listed in the Dhaka Stock Exchange. Of them, 23 banks are selected for the study on the basis of data availability for the ten-year period of January 2005 to December 2014. Accounting ratios indicating bank profitability, efficiency, risk, liquidity, and asset quality are chosen as bank financial indicators. Statistical tools as multivariate regression and correlation have been used on the 230 bank-year observations. Multi-collinearity among the final indicators has also been tested. It is seen that selective accounting ratios can be fine determinants of share price change in the financial market of Bangladesh.

Keywords: *Financial market, private commercial banks, accounting ratios, market share price.*

Introduction

The journey of the banking industry of Bangladesh started in 1971 with 6 nationalized commercial banks, 2 state-owned specialized banks, and 3 foreign banks .Private banks made their entrance into the market in the 1980's. Currently, banks in Bangladesh are primarily of two types with Bangladesh Bank, the central bank of Bangladesh, being the chief regulatory body of the banking sector:

- Scheduled banks
- Non-scheduled banks

Non-scheduled banks are established for special and definite objective and operate under the acts that are enacted for meeting up those objectives. These banks cannot perform all functions of scheduled banks. On the other hand, scheduled banks are the ones that get license to operate under Bank Company Act, 1991 (Amended in 2003). There are 56 scheduled banks in Bangladesh who operate under full control and supervision of Bangladesh Bank which is empowered to do so through Bangladesh Bank Order, 1972 and Bank Company Act, 1991. Scheduled Banks are classified into:

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- State-owned commercial banks
- Specialized banks
- Private commercial banks
- Foreign commercial banks

There are five state-owned commercial banks which are fully or majorly owned by the Government of Bangladesh and three specialized banks established for specific objectives like agricultural or industrial development. These banks are also fully or majorly owned by the Government of Bangladesh. There are nine foreign commercial banks operating in Bangladesh as the branches of banks which are incorporated abroad. There are 39 private commercial banks which are majorly owned by the private entities (Banks & FIs: Bangladesh Bank, 2013). The private commercial banks can be categorized into three categories:

- Full-fledged conventional private commercial banks
- Conventional banks with Islamic windows
- Full-fledged Islamic banks

The banking industry of Bangladesh has undergone unprecedented changes over the last decade. These changes have resulted in fierce competition and greater productive efficiency in the banking market (Ahamed, 2012). However, the Dhaka Stock Exchange crash in 2101-2011 and the subsequent fall of market share prices of the private commercial banks have given the author an incentive to formulate a way which can see if the financial performance of the banks, in other words, their accounting ratios, can determine and predict the change in return from equity investment in these banks, as measured by the change in their market share prices. The objectives of the study are:

i. Determining accounting ratios of twenty-three of thirty private commercial banks listed in the Dhaka Stock Exchange during the period of January 2005 to December 2014.

ii. Estimating the change in annual average market share price of the selected banks during the period of study.

iii. Finding out if accounting ratios can be good predictors of change in return from equity investment in the private commercial banks of Bangladesh, both during pre-Stock Market crash and post-Stock Market crash periods.

Literature Review

Multiple studies have been conducted to determine the rate of return from equity investments. One of the most significant determinants of return in equity is the rate and direction of price change. This has led to numerous researches to identify factors that influence share price change, and, therefore, make price change predictable. Such studies can be classified into three categories: first, those studies that sought to predict future share price changes from past price changes; second, those investigations that attempted to predict price changes from price ratios, such as price/earning ratio; and third, those studies which sought to predict price changes from past changes in other variables, such

as earnings (Murphy, 1968). A study has shown that movements in stock prices are driven by news about cash flows. In this case, common variation in prices must be attributable to common variation in cash flows. If discount rates vary over time, however, then groups of stocks can move together because of common shocks to discount rates rather than fundamentals. For example, a change in the market discount rate will have a particularly large effect on the prices of stocks whose cash flows occur in the distant future, so these stocks will tend to rise together when the market discount rate declines, and fall together when the market discount rate increases (Campbell, Polk, & Vuolteenaho, 2010). Some theories suggest that share price changes are associated with changes in fundamental variables which are relevant for share valuation like payout ratio, dividend yield, capital structure, earnings size of the firm and its growth. Investigations of share price changes appear to yield evidence that changes in fundamental variable(s) should jointly bring about changes in share prices both in developed and emerging markets. However, the actual fundamental factors found to be relevant may vary from market to market. For example, changes in asset growth of firms are significant in the case of Japanese shares while earnings appear to be universally a relevant factor. Another relevant factor in affecting the share prices is the capital structure of the firm. The level of debt financing by the firm has impact on the value of firm's assets. A high-risk firm (a firm with debt) must generate high return consistent with the investor's expected return. It follows that with higher debt firm should have greater rate of change in its share price. Hence capital structure (DA as debt to asset ratio) changes must be directly related to the share price volatility. In competitive capital markets the value of a firm is independent of its financial structure. But if markets are imperfect (transaction cost, taxes, informational asymmetry, agency cost etc.) then capital structure matters and influences the share prices. Size of a firm also has effect on the valuation of the firm's assets. Smaller stocks have higher average returns. Introduction of size, as a multiplicative term to dividend, provides a significant improvement in the explanation of share prices. The size of the firm if captured through total capital employed, is expected to influence the share prices positively as large firms are better diversified than smaller ones and thus are less risky. It is seen that as the size of the firm increases, their share price volatility declines (Irfan, Nishat, & Sharif, 2002). Another study conducted in the Abu Dhabi Securities market showed that earnings per share and book value per share have significant effect on share price, while dividend per share has no significant effect on share price (Obeidat, 2009). A study on the Greek stock market shows ratios of working capital to total assets and net profit to sales have a negative impact on stock returns, while the ratios of net profit to total assets and sales to total assets affect returns positively (Dimitropoulos & Asteriou, 2009) An interesting study shows how overconfidence on the part of investors who neglect important information and trade aggressively, can influence share price. Thus, neglect can influence price as well (Daniel & Hirshleifer, 2015).

A study in 1974 regresses average rate of return from common stock on average of financial ratios. It is seen that commonly discussed financial ratios based on published financial data are not useful in ranking common stocks by their future returns (Abdel-Khalik, 1974). This paper aims to see if the result holds true for the capital market of Bangladesh. The paper, thus, attempts to see if commonly discussed financial ratios have

the predicting capacity of the change in market share prices of the private commercial banks of Bangladesh.

Data and Methodology

The paper attempts to investigate if accounting ratios can determine change in market share price of private commercial banks that are listed in the Dhaka Stock Exchange (DSE). There are 30 DSE listed private commercial banks in Bangladesh. Out of 30, the study has selected 23 banks for the ten year period of January 2005 through December 2014. The sample banks are carefully chosen on basis of data availability of data for the period of study. The sample banks are: Al-Arafah Islami Bank Limited, Arab Bangladesh Bank Limited, Bank Asia Limited, Dhaka Bank Limited, Dutch Bangla Bank Limited, Eastern Bank Limited, Export Import Bank of Bangladesh Limited, ICB Islamic Bank Limited, International Finance Investment and Commerce Bank Limited, Islami Bank Bangladesh Limited, Mercantile Bank Limited, Mutual Trust Bank Limited, National Bank Limited, National Credit and Commerce Bank Limited, One Bank Limited, Prime Bank Limited, Pubali Bank Limited, Social Islami Bank Limited, South-east Bank Limited, Standard Bank Limited, The City Bank limited, United Commercial Bank Limited, and Uttara Bank Limited. Relevant data for research have been extracted from audited annual reports of the selected banks. Websites of the chosen banks have provided the study with significant information. The Dhaka Stock Exchange data archive has proved to be an important source of data for the dependent variable. Related oldest to newest literature in this context has also been thoroughly studied.

Twenty-five accounting ratios (given in Table 1) are selected as markers of bank profitability, efficiency, asset management, liquidity, and risk management. The paper calculates the chosen ratios of each sample bank for each year for the ten-year period of the study i.e. January 2005 – December 2014. Bank profitability is represented by six ratios, bank efficiency by seven ratios, bank asset management by four, while two ratios are used to measure bank liquidity, when six ratios give an indication about bank risk management.

Table 1: Accounting Ratios And Their Formulae Used To Indicate Bank Profitability, Efficiency, Asset Management, Liquidity, And Risk Management

Ratios	**Formulae**
Profitability	
Return on assets	Net income/ Average total assets
Return on equity	Net Income/ Average total shareholders' equity
Profit margin	Net income/ Operating income
Return on deposits	Net income/ Average total customer deposits
Return on shareholder capital	Net income/ Shareholder contributed capital
Net operating margin	Operating income/ Interest income
Efficiency	
Interest income to expense	(Interest income–Interest expense)/ Average total loans and advances
Operating expense to assets	Operating expense/ Average total assets
Operating income to assets	Operating income/ Average total assets

Operating expense to revenue	Operating expense/ Operating income
Asset turnover	Interest income/ Average total assets
Net interest margin	(Interest income–Interest expense)/ Average total assets
Net non-interest margin	(Non-interest income–Non-interest expense) Average total assets/
Asset Management	
Provision to earning assets	Provision for loan loss/ Average total loans and advances
Write-off ratio	Loans written off during the year/ Average total loans and advances
Loan ratio	Average total loans and advances/ Average total assets
Loan to deposits	Average total loans and advances/ Average total customer deposits
Liquidity	
Cash to assets	Cash/ Average total assets
Cash to deposits	Cash/ Average total customer deposits
Risk Management	
Deposits to assets	Average total customer deposits/ Average total assets
Equity multiplier	Average total assets/ Average total shareholders' equity
Equity to deposits	Average shareholders' equity/ Average total customer deposits
Liabilities to equity	Average total liabilities/ Average total shareholders' equity
Liabilities to shareholder capital	Average total liabilities/ Average total shareholder contributed capital
Retained earnings to assets	Retained earnings/ Average total assets

Note: Adapted from the *Journal of Islamic Economics, Banking and Finance,* Vol. 9, No. 3, p. 76, by F. Zehri and N. Al-Herch, 2013, IBTRA.

Annual change in average market share price of each bank for each year is determined for a year more than the entire study period, which is, from of January 2004 till December 2014. In order to calculate this, the end-of-month market share price of each bank for each month for eleven years is accumulated. The annual average market share price of a sample bank for a single year is calculated by:

$$Annual\ average\ market\ share\ price = \frac{\sum_{i=1}^{12} Month - end\ maket\ share\ price\ of\ month\ i}{12} \quad (1)$$

Annual change in average market share price of each bank for each year is computed by:

$$\Delta Average\ market\ share\ price\ in\ year\ "t" = \frac{Average\ market\ share\ price\ in\ year\ t - Average\ market\ share\ price\ in\ year\ t-1}{Average\ market\ share\ price\ in\ year\ t-1} \quad (2)$$

Annual changes in average market share price of banks are regressed on their accounting ratios over the ten year period of study using multivariate regression. Statistical tools as Wald (z-statistic) and chi-square have been used to test the significance of the predictor variables and goodness of fit of the model. Karl Pearson's coefficient of correlation (r) has been used to test the multi-collinearity among the independent variables to ensure the study is free of such matter.

Empirical Findings

Summary statistics of the accounting ratios of the sample private commercial banks listed in the Dhaka Stock Exchange for years 2005 to 2014 are presented in Table 2.

Table 2: Descriptive Statistics Of Accounting Ratios Of The Sample Private Commercial Banks Listed In The Dhaka Stock Exchange For Years 2005-2014

Ratios	Mean	Median	Standard Deviation	Minimum	Maximum	Count
Return on assets	24%	20%	23%	-7%	200%	230
Return on equity	31%	25%	85%	-525%	770%	230
Profit margin	3%	2%	5%	-20%	31%	230
Return on deposits	5%	2%	40%	-194%	556%	230
Return on shareholder capital	97%	63%	445%	-57%	6804%	230
Net operating margin	6%	4%	38%	-99%	522%	230
Interest income to expense	3%	2%	3%	1%	38%	230
Operating expense to assets	9%	6%	44%	-4%	666%	230
Operating income to assets	46%	40%	53%	-307%	475%	230
Operating expense to revenue	10%	9%	7%	1%	115%	230
Asset turnover	2%	3%	11%	-71%	105%	230
Net interest margin	0%	0%	3%	-5%	25%	230
Net non-interest margin	2%	1%	13%	-2%	185%	230
Provision to earning assets	2%	0%	5%	0%	40%	230
Write-off ratio	64%	67%	18%	4%	168%	230
Loan ratio	133%	85%	189%	6%	2254%	230
Loan to deposits	9%	8%	10%	1%	147%	230
Cash to assets	18%	10%	26%	1%	225%	230
Cash to deposits	72%	80%	29%	3%	246%	230
Deposits to assets	1311%	1291%	546%	-619%	3480%	230
Equity multiplier	15%	10%	20%	-51%	135%	230
Equity to deposits	1186%	1161%	719%	-719%	7204%	230
Liabilities to equity	2858%	2195%	2799%	4%	21311%	230
Liabilities to shareholder capital	4039%	2616%	3833%	941%	21311%	230
Retained earnings to assets	1%	1%	1%	0%	4%	0

Multivariate regression has been run on sets of different combinations of accounting ratios to devise a statistically significant model that explains change in bank market share price. The equation of the regression goes:

$$Y_i = \alpha + \sum_{j=1}^{n} \beta_j X_j + \varepsilon_i \quad (3)$$

Where, Y_i is the annual change in average market share price of bank "i". α is the slope. β_j represents parameter of the econometric model for accounting ratio "X_j", while ε is the error term.

Probability of chi-square statistic, in other words, the p-value, is computed for each model using different combinations of accounting ratios. The model with p-value (0.0000) less than α (0.05) is selected to be statistically significant. Output of the model is summarized in Table 3.

Table 3: Output Of Multivariate Regression Model For Years 2005 - 2014

R-sq:	within = 0.1234	Number of obs	=	230
	between = 0.2026	Wald chi2(5)	=	31.84
	overall = 0.1244	Prob > chi2	=	0.0000

Δ Average share price	Coefficient	Standard error	z	P>|z|	[95% Confidence	Interval]
Return on deposits	1.8036	0.9641	1.87	0.061	-0.086	3.6931
Net non-interest margin	3.1401	1.1466	2.74	0.006	0.8928	5.3873
Loan to deposits	0.0652	0.0242	2.68	0.007	0.0176	0.1128
Equity to deposits	-0.8638	0.3006	-2.87	0.004	-1.453	-0.2746
Equity multiplier	0.017	0.0058	2.92	0.003	0.0056	0.0284
Constant	-0.334	0.082	-4.08	0.000	-0.4946	-0.1734

(Source : Estimated Results)

Wald statistics (z-values) are obtained by dividing the coefficients of the predictors by their respective standard errors. Probabilities of z-values, which are the p-values, indicate if the coefficients of predictors are significantly different from "zero" and therefore, whether the null hypothesis can be rejected. The p-values of the majority ratios in the model are less than α (0.05) and thus, are statistically significant. Exception is return on deposits. The model can be summarized as:

(4)

Δ Annual average bank market share price	= -0.33	+1.8 Return on deposits	+3.14 Net non-interest margin	+0.06 Loan to deposits	-0.86 Equity to deposits	+0.02 Equity multiplier
	(0.08)	(0.96)	(1.15)	(0.02)	(0.3)	(0.01)

n = 230, R^2 = 0.1244.

The model shows that increase in bank return on deposits by one unit brings about one unit rise in the rate of change of bank market share price ceteris paribus. Net non-interest margin of a bank appears to have the largest impact on bank market share price change. The only variable that has a negative impact on change in bank market share price is equity to deposits. The model shows while bank efficiency seems to have major impact

on bank market share price change, bank liquidity seems to be playing no role at all. Negative parameter of equity to deposits seems to indicate a tendency of bank market share price decrease with average shareholders' equity increase in the financial market of Bangladesh. Thus, inputting ratios of a certain bank into this model might tend to give an indication as to whether the bank's market share price will rise or fall.

Multi-collinearity has been tested among and between the predictors. It can be seen from Table 4 that most of the predictors share low correlations between and among themselves, hence, ridding the study of any such issues.

Table 4: Correlation Among The Independent Variables Of The Derived Multivariate Regression Model For Years 2005-2014

	Return on deposits	**Net non-interest margin**	**Loan to deposits**	**Equity to deposits**	**Equity multiplier**
Return on deposits	1				
Net non-interest margin	0.0098	1			
Loan to deposits	0.5059	-0.0703	1		
Equity to deposits	0.7467	0.0133	0.7428	1	
Equity multiplier	0.2497	0.0545	0.1364	0.086	1

(Source : Estimated Results)

From the results, it is seen that the more efficient and profitable a bank, the higher would be its market share price. Bank liquidity does not seem to have an impact on its market share price in the capital market of Bangladesh.

The paper further studies if the model remains statistically significant during both pre-Stock Exchange crash and post-Stock Exchange crash periods. Table 5 exhibits the results of the model during pre-Stock Exchange crash period.

Table 5: Output Of Multivariate Regression Model For Years 2005-2010

R-sq:	within = 0.0696	Number of obs	=	138
	between = 0.2481	Wald chi2(5)	=	14.24
	overall = 0.0981	Prob > chi2	=	0.0141

Δ Average share price	Coefficient	Standard error	z	P>|z|	[95% Confidence	Interval]
Return on deposits	2.2697	1.2132	1.87	0.061	-0.1081	4.6474
Net non-interest margin	2.7925	1.2738	2.19	0.028	0.2959	5.2892
Loan to deposits	0.8703	0.033	2.64	0.008	0.0224	0.1517
Equity to deposits	-1.2497	0.5178	-2.41	0.016	-2.2646	-0.2348
Equity multiplier	0.01179	0.0068	1.74	0.082	-0.0015	0.0251
Constant	-0.1157	0.1032	-1.12	0.262	-0.3179	0.0865

(Source : Estimated Results)

It is seen that the model holds statistically significant as indicated by the probability of chi-square being less than α. The direction of the individual parameters remains the same, though there is a slight change in the strength of the parameters. The regressor equity multiplier does not appear statistically significant in the pre-crash period. The R-squared

statistic seems to indicate that the independent variables can explain for 9.81% change in market share price of the private commercial banks in Bangladesh during the pre-Stock Exchange crash era. The pre-crash model can be represented by:

(5)

Δ Annual average bank market share price = *-0.12* + *2.27* *Return on deposits* + *2.79* *Net non-interest margin* + *0.87* *Loan to deposits* - *1.25* *Equity to deposits* + *0.01* *Equity multiplier*

(0.1) *(1.21)* *(1.27)* *(0.03)* *(0.5)* *(0.01)*

n = 138, R^2 = 0.0981.

Multi-collinearity between and among the predictors are low during the pre-crash period as can be seen in Table 6.

Table 6: Correlation Among The Independent Variables Of The Derived Multivariate Regression Model For Years 2005-2010

	Return on deposits	**Net non-interest margin**	**Loan to deposits**	**Equity to deposits**	**Equity multiplier**
Return on deposits	1				
Net non-interest margin	0.0012	1			
Loan to deposits	0.4756	-0.0433	1		
Equity to deposits	0.7839	0.0363	0.8121	1	
Equity multiplier	0.2513	0.0888	0.1409	0.2585	1

(Source : Estimated Results)

The model, however, does not hold statistically significant during the post-Stock Exchange crash period. Probability of chi-square is not less than α, and, therefore, null hypothesis cannot be rejected. The outcome of the post-crash period is in Table 7.

Table 7: Output Of Multivariate Regression Model For Years 2011-2014

R-sq:	within = 0.1458	Number of obs	=	92
	between = 0.0436	Wald chi2(5)	=	10.32
	overall = 0.1071	Prob > chi2	=	0.0667

Δ Average share price	Coefficient	Standard error	z	P>|z|	[95% Confidence	Interval]
Return on deposits	-3.3246	1.8747	-1.77	0.076	-6.999	0.3498
Net non-interest margin	2.0693	1.9567	1.06	0.290	-1.7657	5.9044
Loan to deposits	-0.0826	0.0458	-1.80	0.072	-0.1724	0.0073
Equity to deposits	0.9753	0.3607	2.70	0.007	0.2683	1.6822
Equity multiplier	0.0189	0.0103	1.83	0.067	-0.0014	0.0391
Constant	-0.5995	0.1297	-4.62	0.000	-0.8537	-0.3454

(Source : Estimated Results)

Multi-collinearity among and between the predictors are low as displayed in Table 8.

Table 8: Correlation Among The Independent Variables Of The Derived Multivariate Regression Model For Years 2011-2014

	Return on deposits	Net non-interest margin	Loan to deposits	Equity to deposits	Equity multiplier
Return on deposits	1				
Net non-interest margin	0.0159	1			
Loan to deposits	0.6476	-0.2301	1		
Equity to deposits	0.7758	-0.0195	0.6956	1	
Equity multiplier	0.1647	-0.1476	0.0411	-0.1841	1

(Source : Estimated Results)

It is seen that, a model can be devised to describe change in market share price of private commercial banks operating in the financial market of Bangladesh. The model, however, does not hold strong after the crash of the Stock Exchange in 2010.

Conclusion

The purpose of the paper is to develop a model that would be able to determine and predict bank market share price change on the basis of bank financial indicators in the capital market of Bangladesh. Bank financial indicators are accounting ratios measuring bank profitability, efficiency, asset management, liquidity, and risk management. It is seen that initially commonly used accounting ratios seem to compose a statistically significant model that can determine change in market share price. But when studied if the ratios could have predicted the change in market share price during the Dhaka Stock Exchange crash during 2010-2011, the results vary. The model seems to be a good fit during pre-Stock Exchange crash period, but it is not a good fit during the post-Stock Exchange crash period. The paper, therefore, suggests for further studies to be done to find out factors that can predict change in market share price more accurately in the capital market of Bangladesh.

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