

Correlation of Change in Fundamental Indicators and Stock Price Movements on Sarajevo Stock Exchange

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Abstract

Fundamental analysis is regarded as one of the key tools in evaluating securities by examining intrinsic value of the business, through primarily the analysis of its financial statements. Although in the short run, various factors might influence investment sentiment and thus stock price movements, in the long run fundamentals should determine stock price performance. Sarajevo Stock Exchange is a pioneering enterprise in the development of a capital market in Bosnian transition economy. Upon examining stock price movements and trade volumes over its ten year history, it is difficult to argue that high volatility in both factors can be attributed to changes in corporate fundamentals. We can thus argue that irrational or speculative determinants are at play; a discouraging prospect for a developing capital market. In order to investigate the correlation between the change in fundamental indicators and stock price movements, ten major companies listed on the exchange were selected using pre-defined criteria, and key fundamental indicators, as well as stock price volatility was examined for a five year period during which Sarajevo Stock Exchange had highest trade volumes. The results indicate that ratios that are price-independent have volatility ten times lower than ratios that are price-determined. Additionally, stock price analysis indicates high standard deviation; a traditionally accepted measure of volatility and intra-year stock price spreads often reach hundreds of percent. Furthermore, when selected indicators are correlated with stock price movements, the research determined that correlation coefficients are low, sometimes negative, suggesting no linear relationship between the change in fundamental indicators and the change in the price of the security. The result of high-risk high-volatility market situation was a significant decline in value of securities listed on the exchange. This decline led to a loss of confidence of individual investors in the exchange which can be illustrated by low trading volumes in the last few years, usually in the region of 1% to 3% of 2007 levels. The exchange thus is incapable of serving most of functions traditionally associated with the business.

Keywords: Stock Price Volatility, Fundamental Analysis, Sarajevo Stock Exchange.

Introduction

Analysis of financial statements using fundamental analysis helps us determine intrinsic value of the business, and help us determine the value of stocks issued by publicly traded companies. In the short run, there might be a number of factors that influence supply and demand for a particular stock, however in the long run; fundamental indicators are a primary determinant of a market capitalization of a business, and thus its share price. Thus, some authors like Banz (1981) or Fama (1970) suggest that companies with low P/BV ratio (price to book value) achieved significantly better results compared to companies with high P/BV ratio. Their research indicates that companies in the bottom tenth of the P/BV ratios have outperformed on average by one percent per month in terms of stock price change,

companies that were in the top ten percentile of value of P/BV ratios. One explanation for this situation is that companies with high P/BV ratio were overpriced and thus provided little return on investment. Some research (Michaely et al., 1995) shows that although initial market reaction is slow, the market does react significantly to the company's earnings information as represented by some fundamental indicators such as EPS (earnings per share).

Other authors have demonstrated that the use of fundamental analysis can be used to determine stock price movement in the future, and thus achieve extraordinary returns, significantly higher than market average. Thus Ou and Penman (1989) used multivariate analysis of financial ratios; and by using statistical tools derived a composite indicator that predicts a change in the company's earnings and thus the movement of its stock. Other authors reached similar conclusions (Lev and Thiagarajan, 1993), while Abarbanell and Bushy (1998) as well as Piotrski (2000) successfully determined which companies will have above average stock returns as well as those that will underperform the market, by using financial statements and fundamental indicators.

The purpose of this paper is to examine whether stock price of companies quoted on Sarajevo Stock Exchange is truly determined by the performance of the issuers, or we have other stock price determinants, such as speculative trading, being the driving force behind the change in value of securities. This is a critical issue to examine since small and relatively new exchanges such as Sarajevo Stock Exchange (SASE), are particularly vulnerable, and in a country with underdeveloped investor protection mechanisms and infrastructure, might lead to a loss of confidence in capital markets, thus perverting the purpose of those markets in a first place and reducing them to a forum for secondary exchange of securities. Events after 2007 peaks on Sarajevo Stock Exchange, and in particular its low trading volume, suggest that this might be taking place at the time.

Methodology

In order to determine whether the performance of a business is reflected in the stock price change on Sarajevo Stock Exchange we will analyze financial reports of selected companies, determine fundamental indicators, and examine if there is a correlation between a change in fundamental indicators and corresponding share price traded on SASE. The following selection criteria were used to select 10 companies examined in this paper: corporate shares were traded during the entire period examined in the paper, that is from 2003 to 2008; during this period, shares were traded during at least 250 trading days; at least 10% of the total shares issued by the company changed owners during that period, excluding the initial registration of shares; the company was listed in year 2002; market capitalization is over KM 30,000,000.00 in 2008; the companies were registered at least five years prior to being listed on SASE.

Using the above mentioned criteria, I selected the following 10 companies for the research sample: Bosnalijek dd, BH Telecom dd, Hidrogradnj dd, Elektroprivreda BiH dd, Elektroprivreda HZ HB dd, Klas dd, Vranic dd, Vispak dd, Šipad Commerce dd and Bihacka Pivovara dd. The selected companies are the leaders in their industry sector in Bosnia, significantly exceed the selection criteria, are well known and established in the region in various industries such as construction, telecommunications, food industry, timber industry and the energy sector.

Fundamental indicators will be calculated, for a period from 2003 to 2008, as well as their mean, standard deviation and percentage deviation. The indicators will be divided in two groups, those that are share price independent and those that are share price dependent. The first group of ratios consists of ROE (return on equity), ROA (return on assets), BVPS (book value per share), EPS (Earnings per share) as well as asset (ATO) and equity turnover (ETO) ratios. The second group of indicators consists of MkCap (market capitalisation in absolute terms), P/Bv (price over book value), P/S (price over sales) and P/E (price over earnings) ratios. This will enable us to have a set of ratios whose percentage deviation should be correlated between two sets, if share price change is correlated with fundamental indicator change, that is with the corporate performance. The indicators will be indexed, with year 2003 being a base year with index 1. The next step is to calculate correlation index between a set of indicators and stock price change, in order to determine if there is a linear relationship between the change in fundamental indicators and share price change:

$$\rho_{X,Y} = \text{corr}(X, Y) = \frac{\text{cov}(X, Y)}{\sigma_X \sigma_Y} = \frac{E[(X - \mu_X)(Y - \mu_Y)]}{\sigma_X \sigma_Y},$$

High correlation index would suggest causal relationship between the stock price change and a change in fundamental ratios, which represent corporate performance.

Results

Since this analysis has generated a significant amount of data, which would consume significant amount of space, only relevant derived data will be presented.

Table 1: Indices of price dependent and price independent ratio change in a period of 2003-2008, with 2003 being a base year, for selected publicly traded companies on SASE

		Bosnalijekd.d.			BH Telecom d.d.			Vispakt.d.		
		StDev	Mean	% Dev	StDev	Mean	% Dev	StDev	Mean	% Dev
P independent	ROE	0.088	0.953	9.29%	0.087	0.962	9.00%	0.784	-0.110	-712.52%
	ROA	0.106	0.831	12.73%	0.076	0.898	8.51%	0.732	-0.082	-895.41%
	BVPS	0.165	1.234	13.33%	0.084	1.139	7.36%	0.020	0.979	1.99%
	EPS	0.136	1.170	11.65%	0.071	1.091	6.54%	0.769	-0.101	-759.15%
	ETO	0.060	1.067	5.58%	0.043	0.951	4.57%	0.117	1.080	10.80%
	ATO	0.081	0.930	8.73%	0.065	0.889	7.33%	0.040	0.972	4.16%
P dependent	MkCap	3.030	4.692	64.59%	1.476	2.781	53.09%	2.107	3.420	61.62%
	P/Bv	1.996	3.443	57.96%	1.199	2.396	50.03%	2.210	3.519	62.82%
	P/S	1.937	3.231	59.94%	1.267	2.537	49.96%	1.817	3.194	56.88%
	P/E	2.320	3.717	62.41%	1.370	2.550	53.74%	23.269	15.642	148.76%
		JP ElektroprivredaBiHd.d.			Elektorprivreda HZHB d.d.			SipadKomercd.d.		
P independent	ROE	0.896	-0.275	-326.05%	0.629	-0.497	-126.65%	62.823	-25.282	-248.49%
	ROA	0.863	-0.274	-315.50%	0.640	-0.514	-124.55%	55.505	-22.079	-251.40%
	BVPS	0.049	0.924	5.33%	0.253	1.236	20.50%	93.295	86.254	108.16%
	EPS	0.841	-0.283	-296.53%	0.760	-0.627	-121.23%	49.764	-18.475	-269.35%
	ETO	0.317	1.374	23.04%	0.227	1.227	18.49%	0.545	0.444	122.61%
	ATO	0.300	1.348	22.26%	0.199	1.227	16.23%	0.503	0.506	99.51%
P dependent	MkCap	1.540	2.174	70.84%	2.664	3.351	79.50%	6.249	5.843	106.94%
	P/Bv	1.812	2.424	74.75%	2.161	2.709	79.78%	1.070	0.864	123.82%
	P/S	1.102	1.684	65.47%	1.540	2.149	71.64%	6.131	6.874	89.19%
	P/E	15.053	8.494	177.22%	12.064	-1.752	-688.58%	2.813	2.740	102.65%
		Hidrogradnjad.d.			BihackaPivovarad.d.			Vranicad.d.		
P independent	ROE	1.394	-0.343	-406.50%	0.492	1.376	35.79%	29.729	-10.014	-296.88%
	ROA	2.195	-0.731	-300.36%	0.597	1.449	41.19%	41.478	-13.905	-298.30%
	BVPS	0.006	0.991	0.58%	0.192	1.257	15.27%	1.047	1.942	53.92%
	EPS	1.377	-0.337	-409.14%	0.773	1.752	44.11%	73.219	-26.027	-281.32%
	ETO	0.192	0.695	27.59%	0.094	1.095	8.55%	0.423	0.785	53.88%
	ATO	0.240	0.945	25.43%	0.099	1.140	8.71%	0.313	0.962	32.50%
P dependent	MkCap	2.184	2.870	76.09%	0.977	2.212	44.19%	10.569	8.457	124.97%
	P/Bv	2.212	2.901	76.24%	0.552	1.703	32.40%	3.243	3.316	97.78%
	P/S	4.545	5.006	90.79%	0.592	1.576	37.60%	8.831	7.062	125.05%
	P/E	9.394	7.546	124.49%	0.507	1.310	38.71%	1.358	1.141	119.05%
		Klasd.d.								
P independent	ROE	0.409	0.486	84.09%						
	ROA	0.404	0.448	90.29%						
	BVPS	0.025	1.020	2.46%						
	EPS	0.418	0.497	84.08%						
	ETO	0.113	1.091	10.38%						
	ATO	0.103	0.927	11.13%						
P dependent	MkCap	0.839	1.900	44.17%						
	P/Bv	0.785	1.854	42.36%						
	P/S	0.681	1.696	40.17%						
	P/E	7.215	7.992	90.28%						

Table 2: Correlation between selected fundamental indicators and stock price change for a period of 2003-2008

	Ratio	Correl		Ratio	Correl
Bosnalijek d.d.	Net income	0.552	Bihacka Pivovarad. d.	Net income	0.474
	ATO	-0.604		ATO	-0.132
	ROE	-0.493		ROE	0.254
	ROA	-0.774		ROA	0.266
BH Telecom d.d.	Net income	0.072	Klasd.d.	Net income	-0.363
	ATO	-0.311		ATO	-0.319
	ROE	-0.517		ROE	-0.380
	ROA	-0.653		ROA	-0.445
JP Elektroprivreda BiH d.d.	Net income	0.434	Vranicad.d.	Net income	-0.226
	ATO	0.325		ATO	-0.552
	ROE	0.419		ROE	-0.248
	ROA	0.426		ROA	-0.230
JP Elektroprivreda HZHB d.d.	Net income	-0.428	Vispaskd.d.	Net income	-0.332
	ATO	0.466		ATO	0.201
	ROE	-0.408		ROE	-0.326
	ROA	-0.414		ROA	-0.348
Hidrogradnja d. d.	Net income	0.254	SipadKomerced. d.	Net income	0.296
	ATO	-0.684		ATO	-0.696
	ROE	0.255		ROE	0.284
	ROA	0.297		ROA	0.283

Discussion

In the observed time period, six out of ten companies observed in this study, suffered net loss for the period of 2003-2008, which was covered by the reduction in the capital. Yet at the same time corporate share prices have risen dramatically, with mean value for the period ranging between 190% of the index year mean price (year 2003) up to 846% for a company Vranicad.d., as an example. Other companies enjoyed similar growth in share value, and the growth was most notable in 2005 – 2007 period, despite poor and declining fundamentals. Only Bihacka Pivovarad.d. demonstrated same level of change of price dependent vs. price independent ratios; in the case of this company, corporate performance parameters grew proportionally to the share price, and this is a rare case of share price growth substantiated by the growth in corporate intrinsic value.

Volatility of the market at the time was very high. Previous research by author (Dzanic et al., 2010) indicated that volatility of SASE index SASX-10 was about ten times larger than Dow Jones Industrial Average. At the same time, correlation between those two indices was -0.38474, and SASE-10 index grew by 57% in the first half of the year. This is an indication of relative independence of SASE from major capital markets, when those markets are relatively stable. With the onset of 2007 recession, volatility increased in the United States, and capital markets started to mount losses. In 2007-2008 and with increasing volatility and losses in the US capital markets, SASE quoted shares started to lose value, especially in 2008. During that year, correlation between SASE and NYSE indices was 0.84775 in sharp contrast to 2005, which is an indication of a crisis spillover effect, as demonstrated by other authors (Longin and Solnik 2001), in other emerging markets (King and Wadhvani 1990).

In terms of correlation of share price with fundamental indicators, seven out of ten companies had correlation coefficient for net income in a range less than 0.4, indicating no linear relationship between share price movement and change in corporate earnings. One company even had a strong negative correlation coefficient for net earnings (Elektroprivreda HZHB) indicating that as earnings dropped over the period, and the company netted a loss, share price was growing.

The results of the research suggest that fundamental indicators are not a driving force behind a change in share price of companies quoted on SASE, as demonstrated in seven out of ten companies examined in this study. Only one company had magnitude of change of fundamental indicators correlated to share price performance, while the other two demonstrated direction, and not necessarily the magnitude.

Conclusion

The research determined that fundamentals do not determine share price in the examined period. We can thus argue that irrational or speculative determinants are at play; a discouraging prospect for a developing capital market. The result of high-risk high-volatility market situation was a significant decline in value of securities listed on the exchange. This decline led to a loss of confidence of individual investors in the exchange which can be illustrated by low trading volumes in the last few years, usually in the region of 1% to 3% of 2007 levels. The exchange thus is incapable of serving most of functions traditionally associated with the business. In order to discourage speculative activities, authorities must learn to cope with the problem and legislation as well as oversight has to be improved, if confidence is to return to the Sarajevo Stock Exchange, together with the lost trading volumes.

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