THE DEPENDENCE BETWEEN STOCK PRICE AND INTRINSIC VALUE OF A STOCK

RADIM GOTTWALD

Mendel University in Brno, Zemedelska 1, 613 00 Brno, Czech Republic
email: radim.gottwald@mendelu.cz

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Abstract: The paper focuses on analyze of the dependence between stock price and intrinsic value of a stock in the framework of fundamental analysis. First of all, fundamental analysis is characterized, focusing on the intrinsic value of a stock. Based on recent empirical researches, cited in the paper, important factors, which influence the dependence are presented. The dependence relates to the ratio between stock price and intrinsic value of a stock. This ratio is used to identify overvalued and undervalued stocks and to predict the expected yield on stocks in the future. Statistical analysis of stock prices and intrinsic values of stocks from selected capital market makes investors decision more easier. That is decision how to invest, what is the optimal way of investing.

Keywords: stock price, intrinsic value of a stock, fundamental analysis

1 Introduction

Investors invest in many types of securities in capital markets. Stocks are one of these types. To find reliable information about selected stocks, investors use different investment analyses, especially fundamental analysis or technical analysis. Investors also try to calculate the intrinsic value of a stock. Calculating intrinsic value, investors find undervalued and overvalued stocks. Investors should sell overvalued stock, because stock price will obviously fall in the future whereas he should buy undervalued stock.

2 Objectives and Methodology

The objective of this paper is to analyze dependence between stock price and intrinsic value of a stock in the framework of fundamental analysis. Data founded from many cited empirical researches are statistically evaluated. Descriptive and analytical methods are used in this paper. Descriptive method is used for explaining of important terms related to fundamental analysis, concretely to estimation the intrinsic value of a stock. The results from empirical researches are analyzed by analytical method.

3 Results

3.1 Fundamental Analysis

This type of investment analysis is very often used by investors, because it provides a long-term and medium-term forecast of stock price trend. Fundamental analysis is able to identify the factors which influence stock price. Many subjects need to know this kind of information. Not only investors, but also stockholders, stockbrokers, bank staff, financial managers and others. Fundamental analysis also incorporates economic situation of issuer of a stock. The aims of fundamental analysis are to calculate intrinsic value of a stock and to make forecast of stock price trend. Long-term forecast is also known as projection, medium-term forecast is also known as cyclic forecast. Fundamental analysis is not able to provide the short-term forecast, because stock price changes during are caused by other factors, which are described in the framework of mob psychology. Fundamental analysis does not incorporate that factors at all. Creating medium-term forecast it is insisted on demand fixing, because level of business activity is determined rather changes of receipts and expenditures than changes of capacity. The probability of major changes of capacity is too low. Economic changes are mostly caused by changes of receipts, expenditures and profits, changes of fiscal and monetary policy. Medium-term forecast are caused by economic forces acting inside economic structure. Creating long-term forecast it is insisted on demand fixing. While medium-term forecast is valid for one or two years, the validity of long-term forecast is not so exact limited.

3.2 Intrinsic Value of a Stock

One of the premises of fundamental analysis is, that securities, which actual price does not equal to its intrinsic value, really exist and they are listed in some stock exchange. Proponents of fundamental analysis believe that certain intrinsic value can be calculated for every security. Intrinsic value of a stock can be calculated by methods of fundamental analysis. It means the „justified price" and it express the real value of a stock. Ideally stock should have this price. Stocks are overvalued while intrinsic value > price, whereas stocks are undervalued while intrinsic value < price. If intrinsic value equals to price, stocks are fairly valued. The estimating the intrinsic value of a stock belongs among basic aims of fundamental analysis.

Investors use different methods for estimating the intrinsic value of a stock. The choice depends on known parameters, which are needed for certain method. Often used methods are: dividend discount model, profit model, combination of dividend discount and profit model and historical model. There are different types of dividend discount model signed as Gordon models depending on decreasing, stagnation or increasing of dividends. The increase or decrease can be linear or nonlinear. Probabled increase rate of dividends can be estimated by means of historical data analysis, subjective estimation of financial analysts or financial indicators of companies. The rate depends on return of equity capital, indebtedness, margin of profit and generally on chosed dividend policy. Damodaran linear and loglinear model are used, too.

3.3 Empirical Researches Relating to Dependence Between Stock Price and Intrinsic Value of a Stock

Foerster and Sapp (2006) analyze the dependence between the actual values and estimated intrinsic values of the Standard & Poor´s Composite Index. They analyze data with one month period using a comprehensive database of U.S. economic and price-based factors during 1871-2005. The intrinsic value of a stock is estimated by dividend discount model, which is based on an estimated 30-year rolling equity premium and corresponding cost of equity combined with perfect foresight of dividends. They find, that stocks are undervalued, on average, by approximately 26 % over the entire sample. Prior to 1945, the stock were permanently undervalued and they displayed more bond-like characteristics ince. Since 1945, stocks were, on average, fairly valued but with long periods of undervaluation and overvaluation. Since 1945, the Federal Reserve System model also finds equities were undervalued, but its predictive ability decreases when one considers other factors. Across both periods economic and price-based factors can explain much of the levels and changes in "pricing errors" on the markets. Based on comparison of estimated cost of equity (using the Capital Asset Pricing Model) with implied measures from the actual price and dividend series they observe that many of the differences are related to economic conditions in the country. There are the means (and standard deviations in parentheses) for dividends, earnings, returns and valuation measures:

Table I: Summary Statistics for the Characteristics of the Standard & Poor´s Composite Index

	1871 - 1913	1914 – 1944	1945 – 2005
Change in dividends	0.0219 (0.1191)	0.0209 (0.1659)	0.0609 (0.0596)
Change in earnings	0.0255 (0.1659)	0.0648 (0.3284)	0.0871 (0.1811)
Dividend payout	0.7049 (0.1438)	0.7144 (0.2276)	0.5053 (0.0953)
Dividend yield	0.0501 (0.0115)	0.0579 (0.0155)	0.0364 (0.0140)
Capital gain	0.0293 (0.1561)	0.0454 (0.2667)	0.0894 (0.1557)

Total return	0.0793 (0.1493)	0.1033 (0.2558)	0.1258 (0.1547)
Price/earnings ratio	14.4119 (2.9430)	12.9423 (4.4077)	16.1108 (6.8435)

Source: Foerster and Sapp (2006)

Decomposing the levels (as opposed to the variances) of stock prices into their fundamental and non-fundamental elements in the context of a multivariate present value model co-integrating framework is the subject of research of Zhong, Darrat and Anderson (2003). They utilize the Gonzalo and Granger procedure to formally test for the statistical significance of the non-fundamental component. They also propose a new methodology to test Fama's contention that the present value model should be augmented by time-varying expected inflation to more adequately account for actual stock price behavior. Based on analyze of US post-WWII monthly data during 1947-1997 they confirm the inability of the present value model, even after augmentation by time-varying expected inflation, to adequately explain actual market behavior. The non-fundamental component of stock prices is significantly different from zero.

Similarly Johnson and Xie (2004) analyze the convergence of stock price to fundamental value. They advert to Frankel and Lee study published in 1998, which show that fundamental value-to-price ratios (V/P ratio) predict future stock returns for up to three years. This empirical regularity is known as a V/P effect and it is consistent with the notion that extreme V/P ratio identify stocks that are initially mispriced but whose prices converge to fundamental value estimates over time. Johnson and Xie find whether price convergence explains the V/P effect and how price discovery occurs. The results of their research work imply that only 23 % of the top and bottom V/P quintile stocks exhibit price convergence over the ensuing 36 months. Price convergent subsample returns are disproportionately concentrated around future quarterly earnings announcements. The collective evidence supports mispricing, rather than risk, as an explanation for the V/P effect. The descriptive statistics for the sample utilised in testing are presented in Table II.

Table II: The descriptive statistics for the sample

	Mean	Standard deviation	First quartile	Median	Third quartile	Observations
V/P	0.83	0.79	0.54	0.73	0.98	25.662
BM	0.69	1.29	0.34	0.55	0.81	25.662
K	0.27	0.29	0.00	0.21	0.43	25.662
R	0.12	0.03	0.10	0.12	0.14	25.662
ROE	0.10	0.15	0.07	0.12	0.17	25.662
ROA	0.04	0.08	0.01	0.04	0.08	25.662
B	13.40	273.34	3.64	6.95	12.29	25.662
P	21.53	437.00	7.38	13.50	22.17	25.662
MV	2.204	9.276	135	423	1.345	25.662

Source: Johnson and Xie (2004)

There are used variables:

V/P … the ratio of estimated fundamental value (V) to share price (P)

BM … the year-end per share book value of equity, divided by closing share price in June of the following year

K … the historical dividend payout ratio (if income is positive) or the rate of historical dividends divided by six percent of total assets

R … the estimated cost of equity capital, calculated as the one-month T-bill rate plus a Fama and French industry-specific three-factor risk premium

ROE … return on equity, calculated as the ratio of income before extraordinary items divided by year-end equity book value

ROA … return on total assets, calculated as income before extraordinary items divided by year-end asset book value

B … year-end equity book value per share

P … the June closing share price

MV … the market value of equity as of the end of June

Capozza and Israelsen (2009) find how quickly do equity prices converge to intrinsic value. They focuse on markets where information costs, transactions costs and the economic impact of information can vary widely. They find that 15-30 % of the difference between the stock price and the estimated intrinsic value is removed in a year. Moreover, levels of predictability vary with firm characteristics like leverage, size and number of analysts. While momentum is stronger for larger firms with more analysts, reversion to the intrinsic value is greater for smaller firms with more analysts. They reach that the value of information is the net payoff from trading on the information. Information is less costly to acquire for some securities, especially large firms and widely followed firms. Net revenue from information is higher for more levered firms and more liquid firms. Private information is more valuable than public information so that corporate insiders have an information advantage. Barriers to entry increase the value of information, e.g. for market makers and specialists. The descriptive statistics for the sample utilised in testing are presented in Table III.

Table III: The descriptive statistics for the sample

Variable	Mean	Standard deviation	Minimum	Maximum
Monthly Log Return for Price	0.00	0.14	-0.52	0.43
Monthly Log Return for Intrinsic Value	0.00	0.26	-1.35	1.14
Percent to Target	0.20	0.72	-1.27	3.23
Liquidity	12.63	2.34	7.30	17.84
Size	12.99	1.84	8.98	20.18
Leverage	0.54	0.27	0.00	1.26
Analysts	1.58	1.09	0.00	4.25

Source: Capozza and Israelsen (2009)

Stock price changes are caused by different reasons. Expected growth rise, expected risk rise and fundamental changes belong – in accordance with Curtis (2010) – among these reasons, too. He focuses on stock price volatility. Creating specific method for estimating the intrinsic value of a stock, he find the dependence between stock price and intrinsic value of a stock. This fundamental analysis based method incorporates expected growth and expected risk. Using Phillips-Peron test and Johansen test he find that price and fundamental values are cointegrated during 1979-1993, but during 1994-2008 there is no evidence of cointegration. Curtis also finds whether recent price movements include significantly larger speculative components than observed historically. Results of his research provide evidence of a significant change in the long-run association between stock price and accounting fundamentals and imply that large speculative components in price cannot be ruled out in recent periods.

The stocks of two companies have usually different elasticity. Their prices move up and down differently. Vaknin (2010) tries to find the reason of it. He describe fundamental and technical models. Fundamental models rely on the company´s performance and assets. The value of a stock means, according to him, the sum of the income that a reasonable investor would expect to get in the future, discounted at the appropriate rate. He uses Capital Asset Pricing Model (CAPM) and Dividend Discount Model (DDM) to identify the risk.

Relation between actual stock price and actually calculated intrinsic value stock enable to give signal to investors to buy or to sell some stock. Stock can be overvaluated, fairly valuated or undervaluated. These opinions about stocks are related to stock recommendations and earnings forecasts, which reflect future fundamentals. Future fundamentals determine value, so that forecasts and recommendations should be related. Bradshaw (2000) tests for evidence of it. Using residual income valuation model, he generates intrinsic value estimates for a

comprehensive range of plausible calibrations of the model parameters. Based on achieved results, it is clear, that analysts' stock recommendations are generally unrelated to the deviation of intrinsic value estimates from trading prices. The evidence suggests that analysts incorporate their earnings forecasts into their recommendations in a manner consistent with earnings-based heuristics rather than a discounted present value valuation model. The descriptive statistics for the sample utilised in testing are presented in Table IV.

Table IV: The descriptive statistics for the sample

Variable	Mean	Median	Standard deviation	Minimum	Maximum
REC	3.88	3.87	0.49	1.00	5.00
N_{REC}	13.62	11.00	9.69	1.00	56.00
V/P	0.67	0.59	0.48	0.00	10.00
R	0.11	0.11	0.03	0.04	0.18
MV	4079.34	851.53	11736.66	6.22	248255.26
B/M	0.46	0.41	0.28	0.01	3.75
DP	0.19	0.12	0.22	0.00	1.00

Source: Bradshaw (2000)

There are used variables:

REC … consensus (mean) analyst recommendation, ranging between 1 to 5 , with 1=Strong Sell, 2=Sell, 3=Hold, 4=Buy, and 5=Strong Buy

N_{REC} … number of analysts' recommendations included in the consensus recommendation

V/P … intrinsic value estimate V divided by PRICE, where PRICE is the share price on the date the consensus recommendation and forecasts are calculated by First Call. V/P is calculated as described in the text

R … industry cost of capital estimates based on Fama and French three-factor estimates of the industry -specific equity risk premia and the risk-free ra te in effect for the month prior to the release of the forecasts and recommendations. The risk-free rate is proxied by the 30-day treasury bond yield

MV … market value as of the beginning of the fiscal year being forecasted

B/M … book-to-market ratio calculated as of the beginning of the fiscal year being forecasted

DP … dividend payout ratio as of the most recently completed fiscal year

4 Conclusion

Many researchers try to explain the dependence between stock price and intrinsic value of a stock in detail. Their research is based on theoretical formulation of both of terms. Realizing empirical analyses, researchers try to verify theoretical relation between these terms. Results of the empirical analyses depend especially on used samples of stocks, time period and method. Mostly they do not incorporate different types of stocks – common stocks, preferred stocks, staff stocks etc. Research focused on relation between theoretical price and market price is important not only for academic workers and investors. Results are needed for different participants on financial market. Describing fundamental analysis and intrinsic value of a stock, some empirical researches were cited. These researches related to dependence between stock price and intrinsic value of a stock. Results of statistical analyses presented in the paper makes investors decision how to invest more easier.

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