

The Efficiency of Cyclical and Defensive Stocks

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Abstract. The paper is focused on the relation between intrinsic value of a stock and its market price, in detail on the differences between values and prices of cyclical and defensive stocks. These stocks differ in sensitivity of corresponded industry to business cycle movements. Based on the differences between values and prices, corresponding form efficiency of the market can be found. Author investigates, whether higher market efficiencies are measured for cyclical or defensive stocks and what market efficiencies are measured according to different models. Models, which are used to estimate the intrinsic value of a stock are applied to stocks of chosen stock markets. Cyclical and defensive stocks are analysed within 1996-2012. They are chosen of stock market volume leaders within this period of all stocks included in chosen stock market indexes. US stock market index DJIA, UK index FTSE 100 and German index DAX are used. Period 1996-2012 is chosen because of the middle-term or long-term character of the fundamental analysis and the effort to use current data. Intrinsic values of stocks are calculated by following models of the fundamental analysis: historical model P/S, historical model P/BV, historical model P/CF, historical model P/D, dividend discount model and profit model. Author uses following input data: dividend yield, sales, total assets, book value, cash flow, dividend, profit, P/E, beta coefficient, stock price together with US, UK and German government bond rates. Market efficiency is expressed by means of the ratio of the intrinsic value of a stock and its market price. Based on presented results, author concludes, that measured market efficiencies for cyclical stocks are higher than the ones for defensive stocks. Thus, the differences between values and prices are lower for such stocks, which rise and fall with the business cycle. Analyses focused on the differences between intrinsic values of stocks and their market prices are cited in the paper. Author's analysis of cyclical and defensive stocks can be considered as contributive and unusual with regard to mentioned analyses. Author uses more models of the fundamental analysis, exactly six, than majority of other authors. Cited analyses of Capozza and Israelsen (2009), Foerster and Sapp (2006), Johnson and Xie (2004) and other researchers indicate, that author's paper is current and needed [1,2,3]. Author specifies the contribution of the paper for such investors, that calculate intrinsic values of stocks. Presented results can make easier their decision how to invest and their choice of optimal investment. Further directions of next research in this field are indicated. Results are calculated according to different regions, different models and different stocks. Specifics of individual stock markets or differences among models could be found in the future.

1. Introduction

Weak-form efficiency, semi-strong-form efficiency or strong-form efficiency can be identified on stock markets. The differences between intrinsic value of a stock and its market price are the highest

in case of weak-form efficiency. Veselá (2003) presents, that the more is the market efficient, the lower are the differences [4]. Based on the differences, form efficiency corresponded to certain market can be found. Such form is usually expressed by means of market efficiency. Many papers are focused on measuring of the market efficiency. Author is motivated to add similarly focused papers by specific analysis. Stocks are divided into cyclical and defensive stocks according to sensitivity of corresponded industry to business cycle movements, within this analysis. Author investigates, whether higher market efficiencies are measured for cyclical or defensive stocks and what market efficiencies are measured according to different models. Presented analysis of both stock types can be considered as contributive and unusual with respect to many papers focused on measuring of the market efficiency.

2. Literary Survey

Many researchers try to measure the market efficiency by computing the differences between intrinsic value of a stock and its market price. It indicates, that presented analysis is current and needed. Foerster and Sapp (2006) analyse the differences between intrinsic value of a stock and its market price by stocks included in the Standard & Poor’s Composite Index within 1871-2005 [2]. They use the dividend discount model to estimate intrinsic value of a stock. Zhong, Darrat and Anderson (2003) analyse the differences by chosen stocks from the US stock market [5]. They also present a original methodology to test contention that the present value model should be augmented by time-varying expected inflation. Johnson and Xie (2004) focus on the convergence of the stock price to the fundamental value [3]. They make reference to Frankel and Lee (1998) who show that future stock returns can be predicted up to three years based on ratios of the fundamental value and the stock price [6]. Stocks with extreme so called V/P ratios are initially mispriced but their prices converge to fundamental value estimates over time. Johnson and Xie (2004) also examine whether stock price convergence explains this empirical regularity and how price discovery occurs [3]. Based on their results, only 23 % of the top and bottom V/P quintile stocks exhibit price convergence over the following 36 months. Capozza and Israelsen (2009) find that on average 15-30 % of the difference between the stock price and the estimated intrinsic value is removed in one year [1]. Curtis (2010) focuses on the structural change in the long-run association between stock price and accounting fundamentals [7].

3. Methodology

Author investigates in this paper, whether higher market efficiencies are measured for cyclical or defensive stocks and what market efficiencies are measured according to different models. Chosen models used to estimate the intrinsic value of a stock are assessed within 1996-2012. This time period was chosen because of the middle-term or long-term character of the fundamental analysis and the effort to use current data. Author uses more models, exactly six, than majority of other authors. These models do not contradict themselves, they are rather considered to be complements.

Results of two questionnaire surveys presented by Veselá (2003) influenced the choice of the fundamental analysis [4]. The first survey is focused on US and UK financial analysts, while the second on Czech financial analysts. Results are summarized in the Table 1. This table reports how much are various investment analyses used by financial analysts, in detail, how many percentages of financial analysts use corresponding analysis „almost always”.

Table 1. Investment analyses used by financial analysts. Source: [4].

Investment analysis	US financial analysts	UK financial analysts	Czech financial analysts
Fundamental analysis	86.2 %	76.1 %	81.250 %
Technical analysis	12.5 %	12.5 %	35.484 %
Psychological analysis	-	-	40.000 %
Modern portfolio theory	4.9 %	2.0 %	3.572 %

The choice of models of the fundamental analysis used in this paper was influenced by similar questionnaire survey also presented by Veselá (2003) [4]. Author uses following models: historical model P/S, historical model P/BV, historical model P/CF, historical model P/D, dividend discount model and profit model. Indicators used in these models are available in financial statements like balance sheet, income statement or cash flow statement. Input data are following: dividend yield, sales, total assets, book value, cash flow, dividend, profit, P/E, beta coefficient, stock price together with US, UK and German government bond rates. Databases MSN Money (2013), Yahoo Finance (2013), Ycharts (2013) and Patria Online (2013) are used [8,9,10,11].

Author uses following formulas to calculate intrinsic value of a stock, presented by Baker and Powell (2009) [12]. Intrinsic value of a stock is according to the historical model P/S calculated as follows:

$$V = (P/S) \cdot S_1, \quad (1)$$

whereas V is the intrinsic value of a stock, (P/S) is the average historical ratio of stock price and sales per share and S_1 is the expected sales per share. Intrinsic value of a stock is according to the historical model P/BV calculated as follows:

$$V = (P/BV) \cdot BV_1, \quad (2)$$

whereas V is the intrinsic value of a stock, (P/BV) is the average historical ratio of stock price and book value per share and BV_1 is the expected book value per share. Intrinsic value of a stock is according to the historical model P/CF calculated as follows:

$$V = (P/CF) \cdot CF_1, \quad (3)$$

whereas V is the intrinsic value of a stock, (P/CF) is the average historical ratio of stock price and cash flow per share and CF_1 is the expected cash flow per share. Intrinsic value of a stock is according to the historical model P/D calculated as follows:

$$V = (P/D) \cdot D_1, \quad (4)$$

whereas V is the intrinsic value of a stock, (P/D) is the average historical ratio of stock price and dividend per share and D_1 is the expected dividend per share. In order to calculate intrinsic value of a stock according to the dividend discount model, at the first expected return on the capital asset is calculated as follows:

$$k = r_f + (r_m - r_f) \cdot \beta, \quad (5)$$

whereas k is the expected return on the capital asset, r_f is the risk-free interest rate, r_m is the expected return of the market and β is the beta coefficient. Intrinsic value of a stock is according to the dividend discount model calculated as follows:

$$V = \frac{D_1 + P_1}{1 + k}, \quad (6)$$

whereas V is the intrinsic value of a stock, D_1 is the expected dividend per share, P_1 is the expected sale price and k is the expected return on the capital asset. Intrinsic value of a stock is according to the profit model calculated as follows:

$$V = (P/E)_N \cdot E_1, \quad (7)$$

whereas V is the intrinsic value of a stock, $(P/E)_N$ is the average P/E and E_1 is the expected earnings per share.

World Federation of Exchanges (2013) presents, that US stock market belongs among the world's most important stock markets [13]. Americas time zone market capitalization in December 2012 is 23 193 billion USD (about 43 % of total world stock market capitalization), Asia-Pacific time zone is 16 929 billion USD (about 31 %) and Europe Africa Middle East time zone is 14 447 billion USD (about 26 %). Dow Jones Industrial Average Index (DJIA) is chosen to be representative of the US stock market. Financial Times Stock Exchange 100 Index (FTSE 100) and Deutscher Aktien Index (DAX) are chosen to be representatives of the European stock market.

Chosen stocks of DJIA, FTSE 100 and DAX indexes are used in the analysis. Stocks are divided into cyclical and defensive according to sensitivity of corresponded industry to business cycle movements.

15 stock market volume leaders within 1996-2012 are identified for each of chosen indexes. Then 2 cyclical and 2 defensive stock market volume leaders are chosen of each list of 15 stocks.

4. Results

At the first, 15 stock market volume leaders within 1996-2012 are identified for each index. Table 2 reports 15 stock market volume leaders of the DJIA index within 1996-2012.

Table 2. 15 stock market volume leaders of the DJIA index within 1996-2012. Source: [10] and own calculations.

Stock	Trading volume [USD]	Industry	Stock type
Bank of America	287 264 466 900	Money Center Banks	cyclical
Microsoft	285 876 300 500	Business Software & Services	cyclical
Intel	269 703 318 200	Semiconductor – Broad Line	cyclical
Cisco Systems	262 487 127 200	Networking & Communications Devices	cyclical
General Electric	158 115 596 300	Diversified Machinery	cyclical
Pfizer	117 606 464 800	Drug Manufacturers – Major	defensive
JP Morgan Chase	85 037 374 900	Money Center Banks	cyclical
Exxon Mobil	69 537 254 300	Major Integrated Oil & Gas	cyclical
AT&T	62 507 813 600	Telecom Services – Domestic	cyclical
The Coca-Cola	57 064 274 100	Beverages – Soft Drinks	defensive
Hewlett-Packard	55 897 266 200	Diversified Computer Systems	cyclical
Alcoa	49 018 982 600	Aluminum	cyclical
Wal-Mart Stores	48 515 508 900	Discount, Variety Stores	cyclical
Home Depot	45 836 133 100	Home Improvement Stores	cyclical
Merck&Co Ord	43 379 717 900	Drug Manufacturers – Major	defensive

Similarly, Table 3 reports 15 stock market volume leaders of the FTSE 100 index within 1996-2012.

Table 3. 15 stock market volume leaders of the FTSE 100 index within 1996-2012. Source: [10] and own calculations.

Stock	Trading volume [GBP]	Industry	Stock type
Lloyds Banking Group PLC	221 404 143 500	Money Center Banks	cyclical
BP PLC	139 798 000 400	Major Integrated Oil & Gas	cyclical
BT Group PLC	137 573 600 200	Wireless Communications	cyclical
Barclays PLC	114 953 934 300	Money Center Banks	cyclical
HSBC Holdings PLC	94 864 888 500	Money Center Banks	cyclical
Legal & General Group PLC	76 919 778 800	Life Insurance	cyclical
Tesco PLC	74 149 319 700	Grocery Stores	defensive
Kingfisher PLC	54 163 920 600	Home Improvement Stores	cyclical
RSA Insurance Group PLC	47 392 653 700	Property & Casualty Insurance	cyclical
BG Group PLC	44 951 683 100	Independent Oil & Gas	cyclical
BHP Billiton PLC	41 431 883 100	Industrial Metals & Minerals	cyclical
Old Mutual PLC	39 088 392 500	Life Insurance	cyclical
GlaxoSmithKline PLC	38 540 477 800	Drug Manufacturers – Major	defensive
BAE Systems PLC	37 321 870 800	Aerospace/Defense – Major Diversified	defensive
National Grid PLC	35 349 710 000	Electric Utilities	cyclical

Table 4 reports 15 stock market volume leaders of the DAX index within 1996-2012.

Table 4. 15 stock market volume leaders of the DAX index within 1996-2012. Source: [10] and own calculations.

Stock	Trading volume [EUR]	Industry	Stock type
Deutsche Telekom AG	69 701 440 500	Wireless Communications	cyclical
Infineon Technologies AG	35 426 251 100	Semiconductor – Broad Line	cyclical
E.ON SE	32 319 232 200	Diversified Utilities	cyclical
Daimler AG	20 435 324 700	Auto Manufacturers – Major	cyclical
SAP AG	19 156 957 000	Technical & System Software	cyclical
Deutsche Bank AG	18 832 539 200	Money Center Banks	cyclical
BASF SE	17 528 137 400	Chemicals – Major Diversified	defensive
Siemens Aktiengesellschaft	16 993 898 400	Diversified Machinery	cyclical
Bayer AG	13 348 481 200	Drug Manufacturers – Major	defensive
Deutsche Post AG	12 844 636 400	Air Delivery & Freight Services	cyclical
Deutsche Lufthansa AG	11 605 092 900	Major Airlines	cyclical
Adidas AG	11 455 721 500	Textile – Apparel Footwear & Accessories	cyclical
ThyssenKrupp AG	10 289 064 900	Steel & Iron	cyclical
Allianz SE	9 073 800 700	Property & Casualty Insurance	cyclical
BMW AG	9 031 963 700	Auto Manufacturers – Major	cyclical

2 cyclical and 2 defensive stock market volume leaders within 1996-2012 are chosen of each index. These stocks are highlighted in bold in Tables 2, 3 and 4. Final list of stocks is reported in Table 5.

Table 5. Final list of stocks. Source: [10] and own calculations.

Index	Stock type	Stock	Ticker	Trading volume
DJIA	cyclical	Bank of America	BAC	287 264 466 900 USD
DJIA	cyclical	Microsoft	MSFT	285 876 300 500 USD
DJIA	defensive	Pfizer	PFE	117 606 464 800 USD
DJIA	defensive	The Coca-Cola	KO	57 064 274 100 USD
FTSE 100	cyclical	Lloyds Banking Group PLC	LLOY.L	221 404 143 500 GBP
FTSE 100	cyclical	BP PLC	BP.L	139 798 000 400 GBP
FTSE 100	defensive	Tesco PLC	TSCO.L	74 149 319 700 GBP
FTSE 100	defensive	GlaxoSmithKline PLC	GSK.L	38 540 477 800 GBP
DAX	cyclical	Deutsche Telekom AG	DTE.DE	69 701 440 500 EUR
DAX	cyclical	Infineon Technologies AG	IFX.DE	35 426 251 100 EUR
DAX	defensive	BASF SE	BAS.DE	17 528 137 400 EUR
DAX	defensive	Bayer AG	BAYN.DE	13 348 481 200 EUR

Market efficiency is expressed by means of the ratio of the intrinsic value of a stock and its market price. These ratios are reported in Table 6.

Table 6. Ratios within 1996-2012. Source: [8,9,10,11] and own calculations.

Stock	Stock type	Historical model P/S	Historical model P/BV	Historical model P/CF	Historical model P/D	Dividend discount model	Profit model
Bank of America	cyclical	1.27	1.35	4.15	1.08	1.21	1.40
Microsoft	cyclical	1.09	0.97	1.18	1.51	1.13	1.32
Pfizer	defensive	1.09	1.07	1.30	1.02	1.12	1.44
The Coca-Cola	defensive	0.98	1.10	1.25	1.04	1.02	1.27
Lloyds Banking Group PLC	cyclical	1.04	1.65	2.03	1.17	1.49	0.01
BP PLC	cyclical	0.91	0.85	1.33	0.76	1.00	0.02
Tesco PLC	defensive	0.82	0.71	1.33	0.75	1.00	0.01
GlaxoSmithKline PLC	defensive	1.20	0.95	0.75	1.01	1.07	0.01
Deutsche Telekom AG	cyclical	1.07	1.37	2.24	1.43	0.86	1.59
Infineon Technologies AG	cyclical	1.02	1.41	2.68	2.35	2.32	10.00
BASF SE	defensive	0.86	1.32	1.31	1.34	0.99	2.50
Bayer AG	defensive	1.06	1.30	1.87	1.14	0.94	0.93

Stock is considered to be undervalued according to some model when the ratio is higher than 1.00. Similarly, when the ratio equals to 1.00, stock is fairly valued, when it is lower than 1.00, stock is overvalued. The differences between values and prices are clear from the ratios of values and prices presented in Table 6. Thus, market efficiency is not determined by almost the same differences between values and prices. Based on obvious variability, it is clear, that choice of more models within estimating the intrinsic value of a stock leads to different estimates.

Market efficiencies measured for cyclical and defensive stocks according to different models are reported in Table 6. Ratios of values and prices measured for cyclical and defensive stocks are reported in Table 7.

Table 7. Ratios of cyclical and defensive stocks within 1996-2012. Source: [8,9,10,11] and own calculations.

Stock type	Historical model P/S	Historical model P/BV	Historical model P/CF	Historical model P/D	Dividend discount model	Profit model
Cyclical	1.06	1.23	2.07	1.30	1.26	0.41
Defensive	0.99	1.05	1.26	1.04	1.02	0.28

Table 7 shows that ratios are the highest by the historical model P/CF and the lowest by the profit model for each stock type. Ratios of cyclical stocks are always higher than ratios of defensive stocks. Total ratio of all cyclical stocks is calculated as the geometric mean of ratios in Table 7 related to cyclical stocks. This total ratio is 1.1080. Similarly, total ratio of all defensive stocks is 0.8560. Based on the comparison of total ratios, it is clear, that higher market efficiency is measured for cyclical stocks.

5. Discussion

The contribution of the paper is clear. Results can make the decision of investors how to invest to be easier. Results presented in the paper are important for such investors who estimate intrinsic value of a stock within the choice of optimal investment. Higher market efficiency is measured for cyclical stocks. Achieved results are determined by definite quality and quantity of input data, in general. The decision of investors who are more experienced and who use input data of high quality and quantity is more objective. Investors use not only one model but several models to estimate the intrinsic value of a stock in order to decide more objectively. The focus of the author on investigation of market efficiency for stocks divided according to sensitivity of corresponded industry to business cycle movements can be also considered to be seminal.

The differences between intrinsic value of a stock and its market price can be expressed as the margin of safety as a percentage. Based on these differences, investment recommendation to buy, hold or sell stock can be created. The reliability of such recommendation can be verified according to stock prices in the future. Every model can be assessed by number of exact recommendations and number of inexact recommendations.

Achieved results differ in following parameters: used model (historical model P/S, historical model P/BV, historical model P/CF, historical model P/D, dividend discount model, profit model), stock type (cyclical, defensive) and region (USA, United Kingdom, Germany).

Further research in this interesting and current field of stock valuation can continue in several directions. Specifics of US stock market, UK stock market and Germany stock market can be founded by the comparison of stocks of these regions. The comparison of different models can be important for investors deciding what model to choose. Based on this comparison, models can be ordered according to different criteria. Other models or stock markets can be chosen. The differences between results achieved within stable period and unstable period can be founded. Author is sure of necessity of next research. Investors use different investment analyses. The position of the fundamental analysis

as one of investment analyses is still important, even when stock markets are permanently changing. It is also clear, that research realized in presented directions can lead to interesting findings which can be compared with results of this paper.

6. Conclusion

Author investigated in the paper, whether higher market efficiencies were measured for cyclical or defensive stocks and what market efficiencies were measured according to different models of estimating the intrinsic value of a stock. Author chose several stock indexes and stocks to be representatives of the US stock market and European stock market, in detail 4 stocks of the DJIA index, 4 stocks of the FTSE 100 index and 4 stocks of the DAX index. Every group of 4 stocks contained 2 cyclical and 2 defensive stock market volume leaders. Chosen models of the fundamental analysis were applied to these stocks within 1996-2012, in detail historical model P/S, historical model P/BV, historical model P/CF, historical model P/D, dividend discount model and profit model. The differences between intrinsic values and market prices of cyclical and defensive stocks were quantified by ratios of these values and prices.

Based on results, author concluded, that higher market efficiency was measured for cyclical stocks. Thus, the differences between intrinsic values and market prices were lower for such stocks, whose market prices tended to move in the same direction from the overall economy. Author added the field of stock valuation by the analysis when stocks were divided into cyclical and defensive stocks according to sensitivity of corresponded industry to business cycle movements.

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