IZVIRNI ZNANSTVENI ČLANEK – ORIGINAL SCIENTIFIC PAPER

RELATION OF THE INTRINSIC VALUE OF COMPANIES AND SHARE PRICES ON THE STOCK EXCHANGES OF CENTRAL AND EASTERN EUROPEAN TRANSITION COUNTRIES

Povezanost med notranjo vrednostjo podjetij in ceno njihovih delnic na borzah vrednostnih papirjev tranzicijskih držav srednje in vzhodne Evrope

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Abstract

This paper examines the relationship of the intrinsic value of companies and the price of their shares on stock exchanges. The research is based on an analysis of indicators of intrinsic values and market price trends among 37 companies from 7 stock exchanges in central and eastern European transition countries. Although a number of studies have confirmed a strong relationship between the intrinsic value of the company and the market price of shares on the stock markets of developed countries, this paper finds that such relationships in the case of companies from transition stock exchanges do not exist. Rather, a direct and very strong relationship exists among the share market price trends and among the leading market indexes of the observed stock exchanges.

Key words: intrinsic value, market price, stock exchanges, stock index, central and eastern Europe

Povzetek

Članek proučuje povezanost med notranjo vrednostjo podjetij in ceno njihovih delnic na borzah vrednostnih papirjev. Raziskava temelji na povezanosti med indikatorji notranjih vrednosti in trendi borznih vrednosti 37 podjetij s sedmih borz vrednostnih papirjev v tranzicijskih državah srednje in vzhodne Evrope. Čeprav številne raziskave potrjujejo močno povezanost med notranjo vrednostjo podjetja in borzno vrednostjo na borzah vrednostnih papirjev v razvitih državah, pričujoča raziskava kaže, da v primeru podjetij s tranzicijskih borz vrednostnih papirjev tovrstne povezave ne obstajajo. Obstaja pa neposredna in zelo močna povezava med trendi borznih vrednosti delnic ter med vodilnimi borznimi indeksi proučevanih borz vrednostnih papirjev.

Ključne besede: notranja vrednost, borzna vrednost, borza vrednostnih papirjev, borzni indeks, srednja in vzhodna Evropa

1 Introduction

Questions about how much shares traded on the stock exchange are really worth or opinions that certain shares are over- or underestimated are quite often heard not only among professional investors or intermediaries, but also within the wider investment public. Such questions or opinions lead to several conclusions—namely, that there is an intrinsic value of the company (and its shares), that this value is different than market value of the shares, and that there is a relationship between the intrinsic and the market value of the shares. The concept of *intrinsic value* was introduced into financial analyses by Graham and Dodd nearly 80 years ago, who defined intrinsic value as "the value justified by the facts, e.g., the assets, earnings, dividends, definite prospects, as distinct, let us

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say, from market quotations established by artificial manipulation or disturbed by psychological excesses" (1940, p. 20). These authors sought to separate a share's intrinsic value from its market price, placing it closer to the value of the company's assets or business performance. The concepts of intrinsic value (separate and different from the market value) led to different theoretical approaches and practical models of financial analysis as well as various investment strategies, directed to one or another aspect of value, to a lesser or greater extent. However, regardless of the acceptance of one or the other value (i.e., intrinsic or market) as a reference in the valuation or choice of analytical instruments and investment strategies, the question of the relationship between the intrinsic value and market prices continues to garner attention.

For the purpose of clarity, in this paper we will use the terms *intrinsic value* and *market price* in accordance with the basic definitions from *Barron's Dictionary of Finance and Investment Terms*, which defines the former as value "determined by applying data inputs to a valuation theory or model" and the latter as "last reported price at which a security was sold on an exchange." In terms of intrinsic value, "the resulting value is comparable to the prevailing market price" (Downes & Goodman, 1998, pp. 293, 351).

2 Relationship of the Intrinsic Value of Companies and Share Prices on the Stock Exchanges in Developed Markets

Many studies have examined the relationship between the intrinsic value of companies and the market prices of their shares in developed financial markets. These studies have generally approached the problem from one of two sides: exploring whether, and to what extent, the market value is determined by the intrinsic value of the company or examining the degree of efficiency of the stock market. The first approach is typically motivated by a desire for confirmation (or refutation, of course) of some practical analytical model; motives for using the second approach in research stem from the confirmation (and again, possible refutation) of efficient markets hypothesis. The two approaches are not mutually exclusive; they are, in fact, complementary. More direct relationships between the intrinsic and the market value of the company witnesses a greater degree of market efficiency, while the absolute determination of the market price by the intrinsic value would actually provide fundamental evidence of a perfectly efficient market.

Lee, Myers, and Swaminathan (1997) structured their research of the relationship between intrinsic value and market price in an extremely interesting way. The authors used a valuation model of future earnings as a measure of intrinsic value for 30 companies whose shares are included in the DJIA index. They established the statistical relationship of this indicator with the movement of the index. At the same time, as a sort of detachment from the theoretical literature, they did not expect equality between intrinsic values and market prices. By modeling the relationship between the intrinsic value and share price in the time series as a co-integrated system, they concluded that the price and value of the company are long-term convergents, but this does not necessarily give the possibility to forecast the movement of share prices in the future. Testing the relationship described, the authors concluded that traditional indicators of market value (book to market value, earnings to price, dividends to price) from the previous period have little value in forecasting future price movements of shares, while the ratio of intrinsic value and price (with the intrinsic value based on the present value of future earnings available) has statistically confirmed relevance in forecasting future prices.

Brainard, Shoven, and Shapiro (1990), based on theoretical foundations from James Tobin's research, dealt with the empirical links between the fundamental return on a company's physical assets and market return on financial claims to those assets (company's securities). The research sought to determine whether the market return on the securities of a certain company react more to changes in the aggregate intrinsic value of the company or to changes in the market value. The authors further examined the perception of risk and the impact of risk on the establishment of the price of financial instruments, emphasizing the issue of what kind of risk has a greater impact on the price: fundamental or market risk. They conducted their research on a sample of 191 companies from various industrial sectors (not including the oil industry), using the financial reports and stock market reports from 1962 to 1985. The results confirmed two hypotheses—namely, a positive relationship between the intrinsic value of companies and market prices of their financial instruments and (what is especially interesting) the dominant influence of fundamental risk on the price of the securities in the long term.

In addition to papers that investigate the relationship between intrinsic value and the market value of individual companies, among which two of the works have been presented, a number of studies have focused primarily on assessing the degree of market efficiency. Demonstrating a high level of efficiency of the equity market, these authors have indirectly demonstrated the high level of positive correlation of the fundamental parameters of the company's value and the market price of its shares. Barsky and De Long (1993) recognized the current (paid) and the estimated dividend as key factors that influence the market price of the shares. Using the model of the present value of dividends as the basis for assessing the internal value of the company, the authors analyzed the Standard & Poor's Composite index for 1880–1991, comparing the index trend to the movement of the dividends of companies in the same index. In addition to finding a high level of correlation between the dividend, as a parameter of the fundamental value, and the market price of shares, the authors suggested a very interesting and important conclusion: The stock market index fluctuates more widely than the value of dividends paid, not less, which—according to the authors—means that investors in

the capital markets do not base their decisions on the assumption of the constant growth of dividends.

Lehmann (1991) presented a similar view in his systematized presentation of the works of other authors who have studied and confirmed the efficient market hypothesis. Important, for this paper, is the review of Samuelson's paper (1965), entitled "Proof That Properly Anticipated Prices Fluctuate Randomly," because Samuelson confirmed market efficiency in an interesting way: through the negation of inefficiency. In fact, as the author states, "for many, the proposition that returns are unpredictable is synonymous with market efficiency" (Lehmann, 1991, p. 8). If the expected returns were predictable or constant, it would mean that investors can predict the price movements of securities and therefore achieve returns on investment that are different from the market return. Such investors would be able to "beat" the market, which is excluded according to the efficient market hypothesis. Samuelson as well as Barsky and De Long asserted that the assumption of a constant expected return (or predictable returns, in general) is not realistic, except in the short term in daily or weekly trading, when the expected return can be considered constant. In this case, according to Samuelson's model, it is not necessary to make an objective assessment of the intrinsic value of the company for comparisons to the market price of shares.

McGrattan and Prescott (2001) provided arguments in favor of the efficient market hypothesis, in a particularly interesting and even extravagant way. These authors also proved market efficiency by disproving market inefficiency; however, unlike others, they used the example of the best known and most drastic crisis of the U.S. equity market in its history: the crash of the New York Stock Exchange in 1929. The overpricing of securities traded at the NYSE is commonly accepted as one of the key causes of the crash and the drastic fall in share prices. This thesis, which actually represents a dramatic example of the inefficiency of the market, has been constantly present ever since. However, just three days before the collapse of the NYSE, Irving Fisher—one of the most important economists of that time (and one of the most important authors in the domain of economic theory in general)—argued that the majority of shares is not overpriced, but that share prices indeed "reached a permanently high level" and that at the same level will remain. McGrattan and Prescott (2001) claimed that Fisher was right.

Following Fisher's claims of stable and strong fundamental indicators of companies (such as disclosed earnings, the high level of investment in research and other forms of intangible capital, favorable industrial environment), McGrattan and Prescott (2001) reevaluated the intrinsic value of companies from NYSE in 1929 and compared the results with the market value of the same companies. They concluded that shares on the NYSE were not overpriced, but rather underpriced, even at the peak in October 1929. In assessing the market value, the authors used the data for the leading 135 companies traded on the NYSE in August 1929 and for the 50 companies in the Standard & Poor's index. As a measure of market value, they used market capitalization (the ratio of capitalization to the U.S. GNP and the ratio of capitalization to the actual company earnings after taxes). As a measure of fundamental value they used the value of productive assets of the company, while they avoided the use of earnings as a measure of value as earnings were a reference point for a comparison.

Research findings have shown that, at the time of the NYSE crash, "a conservative estimate for the market value of U.S. corporations [was] no greater than 19 times corporate earnings (or 1.67 times GNP). A conservative estimate for the fundamental value of U.S. corporations [was] no smaller than 20 times corporate earnings (or 1.78 times GNP)" (McGrattan & Prescott, 2001, pp. 17–18). These data suggest that the companies at that time were not overpriced; on the contrary, they were slightly underpriced. According to this conclusion, the market has not been inefficient; the irrational behavior of investors in the market has actually led to anomalies, with catastrophic consequences.

3 Research Methodology

Research similar to that described in the previous chapter is relatively rare in the financial markets of transition countries of Central and Eastern Europe. For this reason, this paper examines the relationship between the intrinsic value and market price of the shares of companies traded on the stock exchanges in Warsaw, Prague, Budapest, Ljubljana, Zagreb, Sarajevo, and Banjaluka. These exchanges were selected for this study because they are in the same region, but in different stages of development due not only to the different stages of transition of socio-economic systems, but also various business policies of exchanges.

For the purposes of this paper, we selected companies whose shares from 2005 to 2009 dominated traffic on the chosen exchanges, so they collectively realized more than a half share in the composition of the main market index (if there is such a set of shares) or the shares that were retained in the index throughout the considered period. An overview of companies whose shares make up the sample for the research, with the percentage of participation in the composition of the indexes, is included in the Appendix. The study focused on the period of active trading in the stock markets with significant changes in share prices of observed companies. The goal of the research is to investigate the relationship between the trends of intrinsic value of the companies (changes or the absence of changes in key parameters of intrinsic value) and the trends of the market price of the shares. Therefore, as a reference period of study, we selected the five-year period from 2005 to 2009. Before and after this period, all observed exchanges were (more or less) trendless. From the point of technical analysis, this situation is inconclusive.

As a measure of the intrinsic value of a company, we selected 20 ratio analysis indicators, grouped into four key

categories (i.e., liquidity, solvency, operational efficiency, and profitability), as follows[1]:

– Liquidity indicators:

$$\text{Current ratio} = \frac{\text{Current assets}}{\text{Current laibilities}} \quad (1)$$

$$\text{Quick ratio} = \frac{\text{Current assets} - \text{Inventory}}{\text{Current laibilities}} \quad (2)$$

$$\text{Cash ratio} = \frac{\text{Cash} + \text{Short term marketable securities}}{\text{Current laibilities}} \quad (3)$$

$$\text{Working capital productivity} = \frac{\text{Annual sales}}{\text{Working capital}} \quad (4)$$

$$\text{Sales to current assets} = \frac{\text{Annual sales}}{\text{Current assets}} \quad (5)$$

– Solvency indicators:

$$\text{Debt/Equity} = \frac{\text{Debt}}{\text{Equity}} \quad (6)$$

$$\text{Debt to Assets ratio} = \frac{\text{Total debt}}{\text{Current assets}} \quad (7)$$

$$\text{Funded capital ratio} = \frac{\text{Stockholders' equity} + \text{Long term debt}}{\text{Fixed assets}} \quad (8)$$

$$\text{Retained earnings to Stockholders' equity} = \frac{\text{Retained earnings}}{\text{Stockholders' equity}} \quad (9)$$

$$\text{Interest coverage} = \frac{\text{EBIT}}{\text{Interest}} \quad (10)$$

– Operational efficiency indicators:

$$\text{Sales to Fixed assets} = \frac{\text{Annualized net sales}}{\text{Total fixed assets prior to accumulated depreciation}} \quad (11)$$

$$\text{Sales to Working capital} = \frac{\text{Annualized net sales}}{\text{Account receivable} + \text{Inventory} - \text{Accounts payyaable}} \quad (12)$$

$$\text{Sales to Equity} = \frac{\text{Annual net sales}}{\text{Equity}} \quad (13)$$

$$\text{Investment turnover} = \frac{\text{Sales}}{\text{Equity} + \text{Long trerm liabilities}} \quad (14)$$

$$\text{Net worth} = \frac{\text{Total assets} - \text{Total liabilities} - \text{Preffered stock dividends}}{\text{Total outstanding common shares}} \quad (15)$$

– Profitability indicators:

$$\text{Gross profit (\%)} = \frac{\text{Revenue} - (\text{overhead} + \text{Direct materials} + \text{Direct labour})}{\text{Revenue}} \quad (16)$$

$$\text{Operat. profit (\%)} = \frac{\text{Sales} - (\text{Cost to goods sold} + \text{sales, general, admin. expenses})}{\text{Sales}} \quad (17)$$

$$\text{Return to assets employed} = \frac{\text{Net profit}}{\text{Total assets}} \quad (18)$$

$$\text{Return to equity} = \frac{\text{Net profit}}{\text{Equity}} \quad (19)$$

$$\text{P/E} = \frac{\text{Comon stock price}}{\text{EPS}} \quad (20)$$

The value of all indicators for all years of the observed period and for all observed companies was calculated; then the average value of these indicators with equal weights for each of them was also calculated, according to the following formula:

$$\begin{aligned} ARAI = {} & 0{,}05 \times x_1 + 0{,}05 \times x_2 + 0{,}05 \times x_3 + 0{,}05 \times x_4 + \\ & 0{,}05 \times x_5 + 0{,}05 \times \frac{1}{x_6} + 0{,}05 \times \frac{1}{x_7} + 0{,}05 \times x_8 + \\ & 0{,}05 \times x_9 + 0{,}05 \times x_{10} + 0{,}05 \times x_{11} + 0{,}05 \times x_{12} + \\ & 0{,}05 \times x_{13} + 0{,}05 \times x_{14} + 0{,}05 \times x_{15} + 0{,}05 \times x_{16} + \\ & 0{,}05 \times x_{17} + 0{,}05 \times x_{18} + 0{,}05 \times x_{19} + 0{,}05 \times \frac{1}{x_{20}} \end{aligned} \quad (21)[2]$$

where:

x_1 is the current ratio,
x_2 is the quick ratio,
x_3 is the cash ratio,
x_4 is the working capital productivity ratio,
x_5 is the sales-to-current assets ratio,
x_6 is the debt-to-equity ratio,
x_7 is the debt-to-assets ratio,
x_8 is the funded capital ratio,
x_9 is the retained earnings to stockholder's equity ratio,
x_{10} is the interest coverage ratio,
x_{11} is the sales-to-fixed assets ratio,
x_{12} is the sales-to-working capital ratio,
x_{13} is the sales-to-equity ratio,

[1] Formulas of ratio analysis indicators are taken from Bragg (2002) and Helfert (2001).

[2] The acronym ARAI is used only for the purposes of this paper.

x_{14} is the investment turnover ratio,
x_{15} is the net worth per share,
x_{16} is the gross profit indicator,
x_{17} is the operational profit indicator,
x_{18} is the return on assets employed ratio,
x_{19} is the return on equity ratio, and
x_{20} is the price-to-earnings ratio.

This approach was intended to facilitate mutual comparability as the focus of this research was not the analysis of intrinsic values of individual companies, but the comparisons of trends of intrinsic values and share prices over time. It should be noted that the ratios of debt to equity and debt to assets in calculating the average were taken in inverse form, so their negative or positive gain would better fit the trend of the average ratio analysis indicators (positive or negative). The ratio of price to earnings (P/E) in the calculation of averages was also taken in inverse form because, despite the controversies in the interpretation, the lower value of the P/E ratio was commonly considered as a positive signal for investment (i.e., the company is underpriced in the market). The trends of averages of ratio analysis indicators were then compared with the trends in the shares of market prices of individual companies. Furthermore, the same averages of ratio analysis indicators were calculated on the level of the index (where the weights were equal to participation that companies had in the index), and comparisons with the index trends were made. Finally, we compared the share price trends of the companies and the trends of stock market indexes to each other.

4 Results

The following tables present the values of correlation coefficients between trends of averages of ratio analysis indicators ("ARAI") and the trends of the share prices[3]:

Tables 1 through 7 present the different values of correlation coefficients between ARAI and share price trends, from a few companies with a relatively high positive correlation (SAVA, ATPL, BSNLR) to companies whose intrinsic value is even negatively correlated with the market price (CEZ, TELEFONICA, MOL, OTP, RICHTER, KRKG, DLKV, ULPL, METL, TLKM, BHTSR, JPESR). It is important to note that the correlation coefficients of prices and ARAI is statistically significant for 20 companies, while for six

[3] Correlation coefficients and significance factors were calculated using the program SOFA Statistics (www.sofastatistics.com), according to the Pearson's method ("Pearson-R" and "two-tailed p"). The level of significance was 0.05. A comparative series was taken of the closing or official price on the stock exchange (depending on which of these two was uninterrupted) and the ARAI value for the current year, during all days of the year.

Table 1: *Correlation coefficients between ARAI and share prices—Warsaw SE (2005–2009)*

Company	KGHM	PEKAO	PKNORLEN	PKOBP	TPSA
Correlation coefficient ARAI—share prices	0.2573	0.0133	0.4136	0.4144	0.5293

Source: Author's calculations

Table 2: *Correlation coefficients between ARAI and share prices—Prague SE (2005–2009)*

Company	CEZ	ERSTE	TELEFONICA
Correlation coefficient ARAI—share prices	-0.2573	0.2282	-0.0125

Source: Author's calculations

Table 3: *Correlation coefficients between ARAI and share prices—Budapest SE (2005–2009)*

Company	MOL	OTP	RICHTER
Correlation coefficient ARAI—share prices	-0.4007	-0.4616	-0.0245

Source: Author's calculations

Table 4: *Correlation coefficients between ARAI and share prices—Ljubljana SE (2005–2009)*

Company	KRKG	MELR	PETG	SAVA
Correlation coefficient ARAI—share prices	-0.6672	0.3734	0.4804	0.7069

Source: Author's calculations

Table 5: *Correlation coefficients between ARAI and share prices—Zagreb SE (2005–2009)*

Company	ADRS	ATPL	DLKV	IGH	JDPL
Correlation coefficient ARAI—share prices	0.0301	0.6255	-0.0844	0.5488	0.4518
Company	KOEI	PBZ	PODR	TNPL	ULPL
Correlation coefficient ARAI—share prices	0.0898	0.0041	0.2557	0.3132	-0.3872

Source: Author's calculations

Table 6: *Correlation coefficients between ARAI and share prices—Banjaluka SE (2005–2009)*

Company	BIRA	BLPV	BOKS	METL
Correlation coefficient ARAI—share prices	0.3838	0.0804	0.0819	-0.2896
Company	RFUM	TLKM	TRZN	VITA
Correlation coefficient ARAI—share prices	0.7583	-0.0405	0.2861	0.1046

Source: Author's calculations

Table 7: *Correlation coefficients between ARAI and share prices—Sarajevo SE (2005–2009)*

Company	BHTSR	BSNLR	ENISR	JPESR
Correlation coefficient ARAI—share prices	-0.2462	0.6999	0.2893	-0.0945

Source: Author's calculations

Table 8: *Correlation coefficients between average ARAI at the level of exchange and index trend*

Stock exchange	WSE	PSE	BSE	LJSE	ZSE	BLSE	SASE
Correlation coefficient Average ARAI—index	0.0663	0.3636	-0.3945	0.3036	0.0578	-0.6215	0.0067

Source: Author's calculations

companies (i.e., PEKAO, TELEFONICA, RICHTER, ADRS, PBZ and TLKM) it is not. Due the variety of correlation coefficients of ARAI and price trends of individual companies, a better foundation for drawing conclusions could give a comparative examination of the movement of the index and the average of ARAI at the level of exchange, as can be seen from Table 8:

Although some companies have a high positive correlation of intrinsic value and market price, at the level of the market as a whole, this is not the case. The highest degree of positive correlation between the average ARAI and index is at the Prague and Ljubljana Stock Exchanges, but it still falls within the domain of weak ties. The intrinsic values of companies traded at the Warsaw, Zagreb, and Sarajevo Stock Exchanges is not related with their market values, while the correlation coefficient of intrinsic and market value of companies from Budapest and Banjaluka Stock Exchanges is even negative.[4]

At the same time, the relationship between market price trends of companies whose shares are traded on the same stock exchange is generally positive and statistically significant (except in the case of the VITA–BLPV pair). The same is true in most cases in strong, very strong, or even extremely strong domains,[5] as can be seen in Tables 9 through 15:

The high level of correlation between price trends of shares traded on the same stock exchange, which also dominate the index of that exchange, should not be a surprise. However, it is especially interesting to examine the correlation between the indexes of selected stock exchanges. As can be seen from Table 16, all indexes are positively correlated (all significant), with a very strong or extremely strong relationship:

5 Conclusion

According to the distribution of correlation coefficients, there is no causality in the relationship between the intrinsic value of companies and the market prices of their shares on the stock exchanges of transition countries of Central and Eastern Europe. Correlation close to perfect was not found, and no company showed a very strong relationship between intrinsic and market value. In six of the 37

[4] Correlation coefficients of average ARAI and indexes were statistically significant in all cases except BLSE.

[5] An interpretation of correlation coefficients as relationship strength levels is given by Mujić, Legčević, and Mikrut (2009).

Table 9: *Correlation coefficients between share price trends—Warsaw SE*

	KGHM	PEKAO	PKNORLEN	PKOBP	TPSA
KGHM					
PEKAO	0.7576				
PKNORLEN	0.2881	0.6163			
PKOBP	0.7721	0.8688	0.2816		
TPSA	0.1506	0.6091	0.6639	0.4684	

Source: Author's calculations

Table 10: *Correlation coefficients between share price trends—Prague SE*

	CEZ	ERSTE	TELEFONICA
CEZ			
ERSTE	0.1015		
TELEFONICA	0.5643	0.6931	

Source: Author's calculations

Table 11: *Correlation coefficients between share price trends—Budapest SE*

	MOL	OTP	RICHTER
MOL			
OTP	0.8996		
RICHTER	0.6355	0.4874	

Source: Author's calculations

Table 12: *Correlation coefficients between share price trends—Ljubljana SE*

	KRKG	MELR	PETG	SAVA
KRKG				
MELR	0.8608			
PETG	0.9061	0.9545		
SAVA	0.8683	0.9058	0.8954	

Source: Author's calculations

Table 13: *Correlation coefficients between share price trends—Zagreb SE*

	ADRS	ATPL	DLKV	IGH	JDPL	KOEI	PBZ	PODR	TNPL	ULPL
ADRS										
ATPL	0.5308									
DLKV	0.7652	0.8614								
IGH	0.5734	0.9456	0.9013							
JDPL	0.7397	0.9092	0.8650	0.8688						
KOEI	0.7438	0.8077	0.9532	0.8732	0.7754					
PBZ	0.8549	0.7261	0.9392	0.7952	0.7777	0.9659				
PODR	0.8724	0.5546	0.8595	0.6361	0.6516	0.8764	0.9378			
TNPL	0.8847	0.7832	0.9148	0.7788	0.9072	0.8519	0.9066	0.8293		
ULPL	0.8406	0.5369	0.7570	0.5584	0.7257	0.6609	0.7739	0.8118	0.8627	

Source: Author's calculations

Table 14: *Correlation coefficients between share price trends—Banjaluka SE*

	BIRA	BLPV	BOKS	METL	RFUM	TLKM	TRZN	VITA
BIRA								
BLPV	0.4276							
BOKS	0.8516	0.5401						
METL	0.7912	0.1069	0.7027					
RFUM	0.9554	0.4417	0.8294	0.8196				
TLKM	0.8611	0.7052	0.9109	0.6191	0.8450			
TRZN	0.7590	0.0760	0.7310	0.9046	0.8083	0.5920		
VITA	0.8164	0.0327	0.7070	0.9174	0.8052	0.6246	0.8941	

Source: Author's calculations

Table 15: *Correlation coefficients between share price trends—Sarajevo SE*

	BHTSR	BSNLR	ENISR	JPESR
BHTSR				
BSNLR	0.9630			
ENISR	0.9784	0.9648		
JPESR	0.9504	0.9592	0.9542	

Source: Author's calculations

Table 16: *Correlation coefficients between indexes of selected stock exchanges*

	WSE	PSE	BSE	LJSE	ZSE	BLSE	SASE
WSE							
PSE	0.9542						
BSE	0.9391	0.9562					
LJSE	0.7803	0.7795	0.7257				
ZSE	0.8692	0.8413	0.7860	0.9570			
BLSE	0.8232	0.7776	0.7015	0.7481	0.8417		
SASE	0.8406	0.8326	0.7578	0.8638	0.9156	0.9537	

Source: Author's calculations

companies tested, a strong correlation was found, with correlation coefficients ranging between 0.51 and 0.76. Most of the remaining companies were located in the zone of weak or no relationship, and some had negatively correlated intrinsic and market values. Although correlation as a statistical measure does not determine the nature or direction of the relationship, the absence of a strong relationship for most companies in the sample, we believe, justifies the conclusion.

At the individual company level we have variety of results, but the relationship between the average ratio analysis indicators at the level of the stock market and market index trends is generally weak. Two exchanges indicated weak relationships, three have no relationship between intrinsic and market values of the companies, and two have a negative correlation coefficient between those two values. Thus, the absence of a relationship between intrinsic value and market price is generally the case.

Opposed to the relationship between intrinsic values of the companies and market prices of their shares (both at the level of individual companies and at the level of stock exchanges), the relationship between the trends of analyzed stock market indexes is positive and very strong—all without exception. The correlation coefficients of all individual pairs fall in the area of strong, very strong, or extremely strong relationships. Here we highlight two regions where the indexes are in almost perfect correlations: stock exchanges in the region of Central Europe and exchanges from the Western Balkans.

Considering these findings, it can be concluded that the intrinsic value of a company is neither a determinant nor generator of the share market price on the stock exchanges of these transition countries. The question of what it is remains. Transition markets are far from efficient, according to efficient market hypothesis. The nature and intensity of relationships between intrinsic and market

values strongly suggest this conclusion. In order for the market to be efficient, the relationship between the indicators of company's business performance that result in a financial report at the end of the year and the share market price should always be measured by a positive and high correlation coefficient, which in the case of companies and stock exchanges in the sample is not present. Investors in transition stock markets do not recognize the intrinsic value of a company and do not incorporate it into the share market price.

However, the movement of share prices on the observed stock exchanges is not a consequence of pure chance. Unconditionally positive and high correlations between the stock market index trends (especially within the two regions) leave no room for the conclusion of randomness in price movement. In contrast, stock indexes "track" each other, leading to the possible conclusion that the fundamental determinant of share prices on the transition stock exchange is the behavior of investors and other market participants. Although the intrinsic values of companies in the sample are not even close to the same, it appears that investors have an almost identical perception of these values and, following that perception, drive supply and demand trends in nearly identical direction and intensity. Therefore, the generators of the market value of companies in transition stock markets, we believe, can be found in the behavioral rather than the rational domain.

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Appendix

Companies from the sample and review of participation of shares of these companies in the stock indexes

Stock Exchange	Ticker	2005	2006	2007	2008	2009
Warsaw (WSE)		Participation in WIG20 at the end of year (%)				
KGHM	KGHM	15,91	10,79	10,42	5,11	13,59
Pekao Bank	PEKAO	10,98	12,17	13,84	15,38	14,68
PKN Orlen	PKNORLEN	13,85	7,69	13,61	12,45	11,59
PKO Bank	PKOBP	9,19	15,30	16,70	17,46	15,64
Telekom Polska	TPSA	10,07	10,93	9,62	14,07	8,40
Total		60,00	56,88	64,19	64,47	63,90
Prague (PSE)		Participation in PX at the end of year (%)				
ČEZ Group	CEZ	25,67	25,28	25,11	25,03	24,81
Erste Group	ERSTE	18,13	25,42	24,13	20,09	24,41
Telefonica	TELEFONICA	18,46	16,60	15,77	20,69	16,45
Total		62,26	67,30	65,01	65,81	65,67
Budapest (BSE)		Participation in BUX at the end of year (%)				
MOL	MOL	27,27	27,32	29,17	26,71	27,46
OTP Bank	OTP	29,46	35,53	32,84	22,73	28,77
Richter Gedeon	RICHTER	18,61	16,26	17,76	26,01	22,95
Total		75,34	79,11	79,77	75,45	79,18
Ljubljana (LJSE)		Participation in SBI20 at the end of year (%)				
Krka	KRKG	13,26	15,52	16,88	15,98	13,5
Mercator	MELR	16,44	13,41	9,53	11,29	12,41
Petrol	PETG	11,01	14,5	14,87	13,98	15,94
Sava	SAVA	17,94	10,81	14,02	13,49	9,73
Total		58,65	54,24	55,3	54,74	51,58
Zagreb (ZSE)		Participation in CROBEX at the end of year (%)				
Adris grupa	ADRS	7,17	7,68	10,23	10,89	12,92
Atlantska plovidba	ATPL	3,75	3,26	9,38	6,81	8,72
Dalekovod	DLKV	3,04	4,87	5,07	4,38	4,89
Institut IGH	IGH	1,40	1,68	5,24	4,34	2,86
Jadroplov	JDPL	1,55	1,26	0,96	0,55	0,61
Končar	KOEI	2,35	4,27	3,26	3,42	3,42
Privredna banka	PBZ	17,73	19,81	2,63	2,06	2,51
Podravka	PODR	5,62	6,75	4,67	6,49	5,61
Tankerska plovidba	TNPL	5,82	5,88	2,08	1,24	1,16
Uljanik plovidba	ULPL	1,44	1,13	1,72	2,09	2,22
Total		49,86	56,58	45,25	42,27	44,92
Banjaluka (BLSE)		Participation in BIRS at the end of year (%)				
Banjalučka Pivara	BLPV	13,30	4,85	1,60	0,81	5,92
Birač	BIRA	12,45	15,45	6,55	2,89	3,13
Boksit Milići	BOKS	4,92	2,84	2,41	2,27	1,49
Metal Gradiška	METL	1,13	1,14	1,41	1,07	1,21
Rafinerija ulja Modriča	RFUM	17,95	15,61	4,98	2,58	2,46
Telekom Srpske	TLKM	20,00	19,27	20,00	20,00	20,00
Tržnica Banja Luka	TRZN	3,49	3,37	5,91	8,40	7,23
Vitaminka	VITA	1,76	4,53	1,14	1,29	1,15
Total		75,00	67,06	44,00	39,31	42,59
Sarajevo (SASE)		Participation in SASX-10 at the end of year (%)				
BH Telecom	BHTSR	20,00	20,00	20,00	20,00	20,00
Bosnalijek	BSNLR	7,75	8,02	6,89	10,84	9,51
Energoinvest	ENISR	14,81	7,66	11,74	13,27	6,51
JP Elektroprivreda BiH	JPESR	20,00	20,00	20,00	20,00	20,00
Total		62,56	55,68	58,63	64,11	56,02

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