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Predictability of Stock Returns in Central and Eastern European Countries

Abstract:

Stock return predictability in highly developed countries has both empirical and theoretical justification in financial literature. The article aims to answer the question if market valuation ratios that relate share prices to various accounting quantities have any predictive power for long-term stock index returns on investments in capital markets of some Central and Eastern European countries, namely the Czech Republic, Hungary, Poland, and Russia. Heteroskedasticity and autocorrelation-consistent estimators with a small-sample degrees of freedom adjustment were used in regressions to track the overlapping data problem and small sample bias. The results of an investigation show that some of these ratios, such as price to a ten-year moving average of real earnings, commonly known as the cyclically adjusted price earnings (CAPE) ratio, price to estimated profits, market to book value and price to sales revenues have a strong predictive power for cumulative returns mainly over long horizons. On the other hand, price to one-year earnings, dividend yield or price to cash flow ratios prove to be quite poor predictors. Following the arguments of behavioural finance, we conclude that the evidence obtained in the study proving a fairly significant link between current values of market ratios and future cumulative returns indicates a certain degree of ineffectiveness of the analysed markets during the examined period.

Keywords:

stock return predictability, market ratios, CEE countries

JEL:

F30, G15

1. Introduction

According to the standard version of the efficient market theory developed in the 1960s and 1970s, stock prices are not predictable, the expected capital market returns are constant in time, so there is no good or bad time to enter the market. Thus, valuation ratios such as the dividend yield, price to earnings ratio or market to book value should have no ability to forecast movements in stock prices. Various simple efficient-markets models of financial markets, however, imply that these ratios should be useful in forecasting future dividend growth, future earnings growth, or future productivity growth (Campbell, Shiller, 2001). A growing body of statistical evidence for the ability of different valuation indicators and macroeconomic variables to predict future returns has led theorists to change that oversimplified view. Stock return predictability was simply related to changes in the expected rate of return for stocks, i.e. the fundamental pricing discount factor, which in turn reflect the rational response of agents to time-varying investment opportunities, possibly driven by cyclical variation in risk aversion. Along these lines, stock return predictability was incorporated into leading asset pricing models (e.g., Campbell, Cochrane, 1999; Bansal, Yaron, 2004), and it is now claimed that the efficient market theory may be consistent with predictability. An alternative explanation of stock price predictability comes from behavioural finance. It is based on the assumption that markets respond to information that should not lead to movements in prices in an efficient market. Numerous examples of market inefficiencies and many explanations of why they happen were offered. It is not unusual for stock market investors to behave irrationally, to use various heuristics for decision making, to follow emotions, to display herd behaviour involving euphoria or deep pessimism that make information more difficult to understand; on top of that, investors also have a problem with gaining access to information. As a result, frequent periods when the stock market overreacts to new data are followed by periods of correction.

The predictability of stock returns in the US and other highly developed countries has been examined using various market ratios and macro variables in numerous studies. Most of these studies have concluded that returns, mainly the long-term ones, are partly predictable. According to Shiller (2014), it is easy to understand why short-term forecastability of asset prices should in some sense be unlikely: if investment returns were substantially forecastable from day to day, it would be too easy to get rich by trading on these forecasts. This notion was formalised by Sims (1984), who defined ‘instantaneous unpredictability’ by the requirement that the R^2 of the prediction from time t to time $t + s$ goes to zero as s goes to zero. He showed under certain regularity conditions that if prices are not instantaneously unpredictable, then simple rapid-trading schemes could achieve unbounded profits, which undoubtedly cannot match reality.

The aim of the article is to answer the question whether it is possible to forecast stock returns in the aggregate stock markets in the chosen Central and Eastern European (CEE) countries with the usage of a wide group of valuation ratios considered in the literature. The study was conducted on the indices of the broad market. The research uses Bloomberg's data on the MSCI indices (Morgan Stanley Capital Index) and aggregated annual dividends per share for these indices from the period between the end of 1994 and the end of 2019.¹ A wide range of MSCI indices have been calculated by the American investment bank Morgan Stanley since 1970. The indices we use here cover approximately 85% of the country's equity universe. They are very useful for international comparisons because they apply the same methodology for all countries. They are particularly useful for the analysis we perform because dividends per share are calculated and published for all of them. Moreover, longer time series for some valuation ratios are available for MSCI indices than for most popular indices calculated by national stock exchanges. The research hypothesis tested assumes that the current values of indices in relation to selected aggregate fundamental and accounting quantities (e.g.: profits, book value of equity, dividends, sales, and cash flows) explain a significant part of the volatility of future index returns. The research question is also whether the explanatory power of these market ratios increases when the time horizon of future cumulative returns gets longer, similar to what has been observed in other studies for developed countries. The research method is based on the estimation of linear regression parameters of future cumulative rates of return on indices over various time horizons in relation to the current values of market ratios. Due to the problem of overlapping periods in the data, heteroscedasticity and autocorrelation consistent estimators of the covariance matrix were used.

The possibility of forecasting long-term returns on indices is of practical importance from the point of view of long-term investors. Many countries, including those in Central and Eastern Europe (CEE), foster long-term savings in pension funds, which are usually invested in broad market portfolios. It is also important for stock market analysts performing fundamental valuation of assets when estimating the expected market rate of return (market risk premium). In general, investors have always been using the simplest possible forecasting methods based on market ratios that relate stock prices to various fundamental variables. The question is whether there is a statistically sound basis for such practices. The article contributes to the investigation in this field in relatively young and poorly explored CEE stock markets.

1 The analysis does not cover the period of the COVID-19 pandemic because quite serious disturbances both in financial markets and in companies' fundamentals caused by government restrictions imposed on economies and subsequent reflection in response to launched public support and stimulation policies would bias the results of our study.

2. Literature review

Although some controversy remains, predictability of stock returns, mainly the long-term ones, with the usage of various market ratios appears quite well established in the United States and other industrialised countries. The wave of such studies in the US surged after the Internet bubble burst in the early 2000s, but some research had been done before.

Fama and French (1988) show that the dividend yield predicts one-fourth of the successive four-year returns but the ratio is not useful in predicting the short-term returns (over next month, quarter or one year). Some evidence for the predictive power of such valuation ratios as the dividend yield, market-to-book and price-to-earnings ratios for the subsequent one-year returns was also provided by Cole, Helwege, and Laster (1996). Campbell and Shiller (1998; 2001) proved that the dividend yield is a good predictor of future average returns over long time horizons and quite poor over the short term. They also found that the ratio of price to a ten-year moving average of real earnings, commonly known as the cyclically adjusted price earnings (CAPE) ratio, which simultaneously filters noise in earnings and estimates corporate profitability over a business cycle, is a better predictor than the dividend yield. Cochrane (2007) provided statistical evidence for long-run return predictability based on the dividend to price ratio. Trevino and Robertson (2002) demonstrated that investing in higher P/E ratio stocks in the US leads to lower long-term returns for holding periods of five years or more. Weigand and Irons (2007) corroborated that higher P/E ratios, both based on one-year trailing earnings and ten-year smoothed earnings, are followed by lower long-term returns. The prognostic properties of CAPE were also confirmed by Philips and Ural (2016). The authors present new construction techniques that make it robust to a wide range of accounting and index construction biases, as well as to changing equity market fundamentals. The study also shows that using accounting-flow variables such as cash flow and sales revenues in place of earnings and cyclically adjusted earnings can effectively supplement, and even enhance, CAPE's market return forecasts. More recent studies that confirm the usefulness of Shiller's CAPE for stock return forecasts are Keimling (2016) and Radha (2018) for highly developed countries, or Klement (2012; 2015), also for emerging markets. Finally, Philips and Kobor (2020) simplify the CAPE methodology by separating the filtering of noise from the detection of cyclicity in earnings. They filter noise by discarding the worst quarter's earnings in each year, allowing them to use one year's earnings instead of ten-year ones, and proxy temporal variation in profit margins using the sales-to-price ratio. They combine the output of two models, one based on earnings and the other on sales, to create a robust forecast of ten-year forward returns.

On the other hand, there is also a number of studies in which the predictive power for stock returns of such widely used ratios as the dividend yield or price-to-earnings and price-to-book value have been proven unreliable. Goyal and Welch (2003; 2008) find that return forecasts based on dividend yields, dividend-payout ratios, earnings-price ratios, book-market values, and a number of other variables do not work out of sample. In a recently updated and expanded version of their research, they conclude that the predictive performance of most variables remains disappointing (see: Goyal, Welch, Zafirov, 2021). Contrary to what is usually suggested in research, Ang and Bekaert (2007) show that dividend yields predict excess returns only over short horizons and do not have any long-horizon predictive power. However, Robertson and Wright (2006) suggest that the weaknesses of the dividend yield as a predictor may be due to mismeasurement. For the representative investor, share repurchases, as well as cash- or bond-financed acquisitions, and new issues play an identical role in transferring cash from firms to shareholders (or vice versa in the case of new issues) as dividends. They show that an alternative cash-flow yield that includes also these non-dividend cash flows to shareholders has strong and stable predictive power. Finally, the results of the investigation by Bhargava and Malhotra (2006) adjusted for statistical issues such as autocorrelation, heteroscedasticity, unit roots, and non-stationarity, suggest that P/E ratios have no impact whatsoever on subsequent yields.

A number of studies present evidence that stock returns are predictable using macro variables. Lettau and Ludvigson (2001) proved that fluctuations in the wealth-consumption ratio, represented by deviations from the cointegrating relation between consumption, asset holdings and labour income, are strong predictors of U.S. quarterly real stock returns and excess returns over a Treasury bill rate. They capture a considerably larger fraction of the variation in returns than the dividend yield or dividend-earnings ratio. Santos and Veronesi (2006) show that a ratio of labour income to consumption is a good predictor of U.S. returns. Investigating US and G7 annual data, Rangvid (2006) showed that the ratio of share prices to output (GDP) captures a substantial fraction of the variation in future returns. Gajdka and Pietraszewski (2020a) provided further evidence studying the stock markets in Central and Eastern Europe and using also industrial production besides GDP as a measure of aggregate output.

The predictive power of other macro variables has also been tested. Ang and Bekaert (2001) found that stock returns in France, Germany, Japan, the UK and the US are predictable over short horizons by the short-term interest rate, and this rate works much better than the dividend yield or earnings yield. Rapach, Wohar, and Rangvid (2005) examined a wide range of macro variables as predictors of the next month stock

returns in twelve industrialised countries with rather disappointing results. They concluded that interest rates are the most consistent and reliable predictors of stock returns and inflation rate also appears to play a certain role in some countries.

The international aspect of stock returns predictability has also been investigated. Rapach, Strauss, and Zhou (2013) provided evidence that lagged U.S. returns predict returns in numerous non-U.S. industrialised countries substantially better than the countries' own economic variables, including lagged nominal interest rates and dividend yields.

The issue has also been studied for the emerging market economies but the evidence is quite scarce yet. Kheradyar, Ibrahim, and Nor (2011) proved that the financial ratios can predict next month stock returns of Malaysian stock exchange companies. Their study reveals as well that the market-to-book ratio has higher predictive power than the dividend yield and earnings yield. Bannigidadmth and Narayan (2015) found evidence of sectoral short-term return predictability (for sectoral indices) over market return predictability by tracking financial ratios in India. Indrayono (2019) showed for Indonesia that returns can be predicted using the price-book-value ratio. A few studies on the predictability of returns with selected market indicators have also been conducted in Poland. Sekuła (2016) examined the effectiveness of using fundamental data expressed, inter alia, in market valuation ratios (such as book-to-market value or price-to-profits) noting the statistically significant predictive power of the book-to-market value ratio for portfolios returns. Gajdka and Pietraszewski (2020b) provided some evidence for the predictive power of various market ratios for stock returns in Poland at the aggregate level. In turn, Prusak (2008) and Kuciński (2013) investigated the usefulness of market ratios to assess the investment attractiveness of listed companies, obtaining heterogeneous results in this respect. These studies, however, concerned a very short investment horizon, up to one year, while, as already mentioned, the rates of return are usually considered to be predictable primarily over longer time horizons.

3. Data and methods

The main aim of the underlying research was to determine how informative the market value ratios are about the expected returns in the stock markets of four CEE countries: the Czech Republic, Hungary, Poland, and Russia. The basic methodology that many authors used in their insights to this problem (e.g. Campbell, Shiller, 2001; Rangvid, 2006; Robertson, Wright, 2006; Domian, Reichstein, 2009; Keimling, 2016) was applied here. The relationship between a given valuation ratio and future cumulative index returns was examined in the form of the following regression equation:

$$r_{t,h} = \alpha + \beta_h z_t + e_t, \quad h = 1, 3, 5, 10,$$

where z_t is the natural logarithm of the predictor variable at time t and $r_{t,h}$ denotes the real h -years-ahead logarithmic index return at the time t over four different time horizons: one-, three-, five- and ten-year.

The following valuation ratios were considered as predictors of future rates of return: price to profit for the last four quarters (P/E), price to profit forecast for the next four quarters (BEst P/E), price to average profit for the ten prior years (CAPE), annual dividend rate (D/P), market-to-book value (P/BV), price to sales revenues for the last four quarters (P/S), and price to cash flow for the last four quarters (P/CF).

The study used monthly data series on the levels of MSCI indices – in the Total Return version with dividend payouts included – and market ratios for these indices, sourced from Bloomberg, in the following periods: June 1996 – December 2019 for the Czech Republic and Hungary, January 1995 – December 2019 for Poland and January 1996 – December 2019 for Russia. According to the information provided by the Morgan Stanley bank in the specification of these indices, they cover approximately 85% of the country's equity universe. Linear correlation coefficients between monthly quotations of MSCI indices and most popular indices calculated by national stock exchanges, namely, PX for the Czech Republic, BUX for Hungary, WIG for Poland and MOEX for Russia in the analysed period are 0.95, 0.99, 0.99, 0.83, respectively. This means that MSCI indices carry quite similar information about the stock market condition as the most popular indices calculated by national stock exchanges. From our point of view, however, they have the advantage that the available time series for several market ratios are longer.

The data used in regressions are sensitive to the 'overlapping period' problem. For instance, when annual returns are calculated month by month, eleven out of twelve months are the same months as in the case of the previous one-year return. This leads to the presence of a moving average in the residuals, biases their variance estimator, and causes the underestimation of OLS standard errors (Hansen, Hodrick, 1980; Kirby, 1997). The ways of solving the problem have been widely discussed in the literature (e.g., Nelson, Kim, 1993; Stambaugh, 1999; Harri, Brorsen, 2009). Various statistical techniques have been proposed to obtain unbiased standard errors and t-statistics, including heteroskedasticity-and-autocovariance-consistent (HAC) estimators using a Newey-West adjustment to correct the estimated standard errors, that have gained widespread popularity (Newey, West, 1987; Hansen, Hodrick, 1980; Hodrick, 1992). In the study, the p -values for the test of the null hypothesis $H_0 : \beta_h = 0$ – are reported using both Newey-West (NW) (with the Bartlett kernel) and Hansen-Hodrick (HH) (with the truncated-uniform kernel) HAC standard errors adjusted to small-sample bias (by making a small-sample degrees of freedom correction).

4. Results and discussion

Tables 1 to 4 present the results of regressions of future cumulative total returns on indices against market ratios for the Czech Republic, Hungary, Poland, and Russia.

Table 1. Regression results for future total returns on MSCI Czech Republic over different time horizons

x	h	Obs.	Correlation	β_h	p -values			R^2
					OLS	NW	HH	
P/E	1	247	-0.118	-0.1036	0.0651	0.4153	0.5499	0.014
P/E	3	223	-0.141	-0.0788	0.0357	0.3090	0.4697	0.020
P/E	5	199	-0.199	-0.0852	0.0047	0.0835	0.2214	0.040
P/E	10	139	-0.300	-0.0773	0.0003	0.0706	0.2002	0.090
Best P/E	1	165	-0.121	-0.0925	0.1219	0.5209	0.6343	0.015
Best P/E	3	141	-0.340	-0.0816	0.0000	0.0395	0.1019	0.116
Best P/E	5	117	-0.435	-0.0629	0.0000	0.0069	0.0399	0.190
Best P/E	10	57	-0.610	-0.0467	0.0000	0.0000	0.0032	0.372
CAPE	1	193	-0.127	-0.0620	0.0774	0.4392	0.5803	0.016
CAPE	3	169	-0.269	-0.0779	0.0004	0.0104	0.0510	0.072
CAPE	5	145	-0.417	-0.0752	0.0000	0.0004	0.0079	0.174
CAPE	10	85	-0.938	-0.1038	0.0000	0.0000	0.0000	0.881
P/D	1	255	-0.209	-0.0433	0.0008	0.0048	0.0319	0.044
P/D	3	234	-0.067	-0.0084	0.3050	0.4018	0.5442	0.005
P/D	5	211	0.032	0.0033	0.6473	0.8351	0.8812	0.001
P/D	10	157	0.382	0.0220	0.0000	0.0001	0.0033	0.146
P/BV	1	271	-0.364	-0.2142	0.0000	0.0019	0.0245	0.133
P/BV	3	247	-0.622	-0.2157	0.0000	0.0000	0.0001	0.387
P/BV	5	223	-0.794	-0.2193	0.0000	0.0000	0.0000	0.630
P/BV	10	163	-0.927	-0.1315	0.0000	0.0000	0.0000	0.859
P/S	1	271	-0.338	-0.2054	0.0000	0.0062	0.0353	0.114
P/S	3	247	-0.575	-0.2099	0.0000	0.0000	0.0017	0.331
P/S	5	223	-0.780	-0.2298	0.0000	0.0000	0.0000	0.609
P/S	10	163	-0.921	-0.1469	0.0000	0.0000	0.0000	0.848
P/CF	1	226	0.287	0.0885	0.0000	0.0023	0.0105	0.082
P/CF	3	213	0.242	0.0425	0.0004	0.0912	0.1853	0.059
P/CF	5	189	0.456	0.0593	0.0000	0.0002	0.0044	0.208
P/CF	10	129	-0.002	-0.0002	0.9781	0.9881	0.9912	0.000

Source: the author's own elaboration

Table 2. Regression results for future total returns on MSCI Hungary over different time horizons

x	h	Obs.	Correlation	β_h	p -values			R^2
					OLS	NW	HH	
P/E	1	258	-0.077	-0.0587	0.2138	0.5580	0.6538	0.006
P/E	3	234	0.057	0.0215	0.0214	0.5725	0.6750	0.003
P/E	5	217	0.148	0.0438	0.0292	0.1796	0.3052	0.022
P/E	10	163	0.179	0.0232	0.0222	0.3829	0.5136	0.032
Best P/E	1	164	-0.174	-0.2511	0.0260	0.3160	0.4265	0.030
Best P/E	3	140	-0.026	-0.0185	0.7506	0.8249	0.8788	0.001
Best P/E	5	116	-0.307	-0.1492	0.0008	0.0526	0.1812	0.095
Best P/E	10	56	-0.662	-0.1135	0.0000	0.0000	0.0000	0.439
CAPE	1	193	-0.017	-0.0113	0.8092	0.9053	0.9312	0.000
CAPE	3	169	-0.193	-0.0660	0.0121	0.2438	0.4186	0.037
CAPE	5	145	-0.571	-0.1146	0.0000	0.0000	0.0016	0.326
CAPE	10	85	-0.900	-0.0900	0.0000	0.0000	0.0000	0.810
P/D	1	271	-0.084	-0.0580	0.1697	0.5221	0.6295	0.007
P/D	3	247	-0.093	-0.0328	0.1469	0.4341	0.5746	0.009
P/D	5	223	-0.166	-0.0368	0.0128	0.1162	0.2642	0.028
P/D	10	163	0.128	0.0132	0.1041	0.5095	0.6265	0.016
P/BV	1	271	-0.308	-0.2245	0.0000	0.0095	0.0448	0.095
P/BV	3	247	-0.422	-0.1563	0.0000	0.0000	0.0018	0.178
P/BV	5	223	-0.440	-0.1026	0.0000	0.0000	0.0012	0.194
P/BV	10	163	-0.527	-0.0725	0.0000	0.0000	0.0014	0.277
P/S	1	271	-0.301	-0.2264	0.0000	0.0120	0.0520	0.091
P/S	3	247	-0.503	-0.1931	0.0000	0.0000	0.0001	0.253
P/S	5	223	-0.533	-0.1277	0.0000	0.0000	0.0000	0.284
P/S	10	163	-0.605	-0.0831	0.0000	0.0000	0.0001	0.366
P/CF	1	271	-0.122	-0.0846	0.0439	0.3458	0.4752	0.015
P/CF	3	247	-0.231	-0.0828	0.0002	0.0498	0.1447	0.053
P/CF	5	223	-0.299	-0.0701	0.0000	0.0035	0.0338	0.089
P/CF	10	163	0.270	0.0026	0.7872	0.9209	0.9418	0.073

Source: the author's own elaboration

Table 3. Regression results for future total returns on MSCI Poland over different time horizons

<i>x</i>	<i>h</i>	Obs.	Correlation	β_h	<i>p</i> -values			<i>R</i> ²
					OLS	NW	HH	
P/E	1	287	0.046	0.0207	0.4338	0.6743	0.7361	0.002
P/E	3	263	0.291	0.0597	0.0000	0.0133	0.0751	0.085
P/E	5	239	0.477	0.0688	0.0000	0.0000	0.0030	0.227
P/E	10	179	0.241	0.0126	0.0012	0.0315	0.1145	0.058
Best P/E	1	164	-0.194	-0.2792	0.0130	0.1544	0.2316	0.038
Best P/E	3	140	-0.500	-0.2230	0.0000	0.0000	0.0006	0.250
Best P/E	5	116	-0.413	-0.1073	0.0000	0.0226	0.0711	0.170
Best P/E	10	56	-0.559	-0.0816	0.0000	0.0009	0.0094	0.313
CAPE	1	154	-0.522	-0.6103	0.0000	0.0074	0.0531	0.273
CAPE	3	130	-0.763	-0.2769	0.0000	0.0000	0.0000	0.582
CAPE	5	106	-0.806	-0.1822	0.0000	0.0000	0.0000	0.650
CAPE	10	49	-0.968	-0.1251	0.0000	0.0000	0.0000	0.937
P/D	1	279	-0.028	-0.0104	0.6285	0.8333	0.8699	0.001
P/D	3	258	0.139	0.0231	0.0255	0.3913	0.5487	0.019
P/D	5	235	0.069	0.0079	0.2930	0.5661	0.6782	0.005
P/D	10	179	0.246	0.0117	0.0009	0.1519	0.2955	0.061
P/BV	1	288	-0.349	-0.3709	0.0000	0.0069	0.0387	0.122
P/BV	3	264	-0.470	-0.2325	0.0000	0.0000	0.0001	0.221
P/BV	5	240	-0.470	-0.1694	0.0000	0.0000	0.0001	0.221
P/BV	10	180	-0.771	-0.1043	0.0000	0.0000	0.0000	0.595
P/S	1	288	-0.313	-0.3209	0.0000	0.0086	0.0411	0.098
P/S	3	264	-0.518	-0.2449	0.0000	0.0000	0.0001	0.269
P/S	5	240	-0.638	-0.2031	0.0000	0.0000	0.0000	0.407
P/S	10	180	-0.726	-0.0849	0.0000	0.0000	0.0000	0.527
P/CF	1	263	-0.120	-0.0566	0.0510	0.2380	0.3600	0.015
P/CF	3	239	-0.548	-0.1228	0.0000	0.0001	0.0027	0.300
P/CF	5	215	-0.382	-0.0605	0.0000	0.0037	0.0290	0.146
P/CF	10	155	-0.425	-0.0270	0.0000	0.0004	0.0101	0.180

Source: the author's own elaboration

Table 4. Regression results for future total returns on MSCI Russia over different time horizons

<i>x</i>	<i>h</i>	Obs.	Correlation	β_h	<i>p</i> -values			<i>R</i> ²
					OLS	NW	HH	
P/E	1	276	-0.035	-0.0202	0.5616	0.8706	0.9020	0.001
P/E	3	252	-0.513	-0.1105	0.0000	0.0000	0.0000	0.263
P/E	5	228	-0.565	-0.0803	0.0000	0.0000	0.0000	0.319
P/E	10	168	-0.163	-0.0093	0.0344	0.2777	0.4295	0.027
Best P/E	1	161	-0.166	-0.2135	0.0356	0.3971	0.5288	0.028
Best P/E	3	137	-0.325	-0.1585	0.0001	0.0162	0.0599	0.106
Best P/E	5	113	-0.498	-0.1106	0.0000	0.0002	0.0025	0.249
Best P/E	10	53	-0.647	-0.1278	0.0000	0.0000	0.0000	0.418
CAPE	1	109	0.146	0.1621	0.1284	0.4620	0.6245	0.021
CAPE	3	85	-0.213	-0.1335	0.0504	0.1014	0.2496	0.045
CAPE	5	61	-0.899	-0.2707	0.0000	0.0000	0.0000	0.808
CAPE	10	-	-	-	-	-	-	-
P/D	1	276	-0.136	-0.0625	0.0239	0.5409	0.6532	0.019
P/D	3	252	-0.423	-0.0762	0.0000	0.0000	0.0050	0.179
P/D	5	228	-0.211	-0.0267	0.0013	0.1027	0.2121	0.045
P/D	10	168	0.235	0.0132	0.0022	0.0730	0.1577	0.055
P/BV	1	276	-0.035	-0.0209	0.5713	0.8312	0.8620	0.001
P/BV	3	252	-0.372	-0.0848	0.0000	0.0476	0.1194	0.138
P/BV	5	228	-0.480	-0.0724	0.0000	0.0049	0.0258	0.231
P/BV	10	168	-0.446	-0.0263	0.0000	0.0002	0.0068	0.199
P/S	1	276	-0.071	-0.0371	0.2353	0.7048	0.7708	0.005
P/S	3	252	-0.481	-0.0930	0.0000	0.0024	0.0183	0.231
P/S	5	228	-0.575	-0.0734	0.0000	0.0000	0.0011	0.330
P/S	10	168	-0.337	-0.0169	0.0000	0.0159	0.0821	0.114
P/CF	1	216	-0.170	-0.1330	0.0123	0.3042	0.4552	0.029
P/CF	3	192	-0.281	-0.1101	0.0000	0.0435	0.1242	0.079
P/CF	5	168	-0.517	-0.1378	0.0000	0.0000	0.0005	0.267
P/CF	10	108	-0.807	-0.1076	0.0000	0.0000	0.0000	0.652

Source: the author's own elaboration

As can be seen from Tables 1–4, there are differences, sometimes quite significant, between countries and particular indicators, but some general conclusions can also be drawn.

First of all, most coefficients at market ratios have negative signs, which means that high (low) share prices relative to some fundamental quantity (earnings, book value, sales, etc.) anticipate low (high) index cumulative returns, i.e. a slow rise or fall in prices causing the ratio to return to average values in the long run. This is consistent with the assumed logic of the dependence underlying the examined forecasting properties of these ratios and the results of other studies cited in Section 2 of the article. There are some exceptions, such as the price to one-year earnings ratio in Poland and in Hungary or the reverse of dividend yield in relation to longer-horizon index returns for each country. However, it should be noted that the research used total rates of return on indices including dividends, and not only growth rates of prices. Low dividend yields today (high levels of price-to-dividend ratio) may partially forecast higher dividend yields in the future, which results in a positive impact on future total rates of return.

Secondly, the predictive properties of most indicators are better for long-term returns (five or ten-year ones) than for shorter-term returns (one-to-three-year ones), which confirms the hypothesis presented in the introduction and is consistent with the research results for highly developed countries. Thirdly, quite high values of R^2 in the cross-section of estimated regressions are noticeable, for some indicators reaching even 0.8–0.9 for ten-year stock returns.

The poor performance of the price to one-year trailing earnings can be explained by the specificity of the accounting profit category, its susceptibility to accounting manipulations and the changes of which from period to period do not always reflect changes in the actual condition of an enterprise. It is significant how these results contrast with exceptionally good forecasting properties recorded for Shiller's ratio of price to a ten-year moving average of earnings (CAPE) which simultaneously filters noise in earnings and smooths out business cycle fluctuations, and quite good for the price to estimated profits (BES P/E), although for these indicators the number of observations at our disposal is significantly lower than for the others, therefore the results obtained should be approached with some caution. Accounting manipulations and significant changes in one-year profits can also explain the observed contrast between the performance of the P/E ratio and the performance of market-to-book value, which is one of the best predictors of future index returns across all time horizons (except Russia, where it works well only over long horizons).

Surprisingly good results, especially in the Czech Republic and Poland, were also obtained for the price-to-sales ratio, which has not received as much attention in the studies on stock returns predictability as other most commonly used market indicators: the price to profit, price to book value and dividend yield ratios. On the other hand, the ratio of price to cash flow, another accounting-flow variable, did not perform particularly well, with the exception of Poland and Russia over longer time horizons (five and ten years).

Finally, attention should be paid to the differences in the assessment of the significance of the regression parameter for different estimators: the ordinary least squares estimator (OLS) and both heteroscedasticity and autocorrelation consistent estimators, i.e. Newey-West (NW) and Hansen-Hodrick (HH). In some cases, the OLS estimator underestimates the variance of the random component and the standard error, therefore the resulted p -value is underestimated and may lead to wrong statistical conclusions. The HH estimator usually provides results with a higher p -value than the corresponding NW estimator, i.e. we are dealing with a more restrictive approach to stating the significance of the regression parameter.

5. Conclusions

The research has shown that in the analysed countries of Central and Eastern Europe there are statistical grounds for the thesis that current values of market ratios relating the market value of stock indexes to the values of fundamental variables can be useful in predicting future cumulative rates of return. The capital markets in these countries are relatively young, they were created or reactivated in the early 1990s after the fundamental changes of the political and economic system in these countries introducing the market economy. Therefore, studying the phenomena observed in the capital markets of developed countries in these markets and comparing the results may lead to interesting conclusions about the degree of development and efficiency of these markets.

According to the neoclassical theory of finance, the ability to predict stock returns is a sign of market inefficiency. And even if new models of capital asset pricing within the neoclassical theory are regarded to be consistent with stock returns predictability, it is more about aggregate market returns (broad market indices rather than individual companies) and directly with the usage of some macro variables such as changes in aggregate consumption, national product or interest rates, and not market ratios, where the index level is referred to fundamental or accounting quantities that characterise enterprises (such as profits, dividends, sales, book value of equity, etc.). It is true that the fundamentals of companies are closely related to the general level of economic activity, and thus to macroeconomic variables, but in this case, the rationale for returns predictability is informal rather than included in the framework of a specified theoretical model. An alternative explanation of stock returns predictability that comes from behavioural finance and suggests there are quite long periods during which stocks can be overvalued or undervalued on the wave of market euphoria or pessimism of investors seems to be more reliable. With this in mind, we can conclude that the evidence obtained in the study proving a fairly significant link between current values of market ratios and future cumulative returns indicates a certain degree of ineffectiveness

of the analysed markets during the examined period, resulting from their relative underdevelopment manifested in insufficient depth, lack of liquidity, unsatisfactory interest from professional market players, etc. Undoubtedly, during the period under study, there was an evolution in this respect, but to confirm this fact with the methodology used here we would need much longer time series and investigation of changes in strength and significance of the aforementioned relationship over time.

The results presented in the paper have all been based on in-sample regressions. It was due to the relatively short history of the analysed markets and, therefore, the short length of the available time series, on the one hand, and long-term cumulative returns that we were interested in, on the other. This makes sense when taking into account the arguments given in Inoue, Kilian (2004) for the use of in-sample tests when searching for predictability in population. Their argument is that out-of-sample analyses suffer from having less power because they are based on a splitting of the full sample into smaller subsamples. Campbell, Thompson (2008) make a related point. Nevertheless, one would often like to know whether a high R^2 in-sample also indicates predictability out-of-sample. Goyal and Welch (2003; 2008) argued that typical variables used to predict short term returns (one-year in their analysis) on the US stock market in-sample (such as the short interest rate, dividend yield, etc.) turned out to be insignificant in out-of-sample evaluations. That makes a point for further research.

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Prognozowalność stóp zwrotu z akcji w krajach Europy Środkowo-Wschodniej

Streszczenie: Prognozowalność zwrotu z akcji w krajach wysoko rozwiniętych ma uzasadnienie zarówno empiryczne, jak i teoretyczne w literaturze z zakresu finansów. Celem artykułu jest uzyskanie odpowiedzi na pytanie, czy wskaźniki wyceny rynkowej, które odnoszą wartości indeksów giełdowych do różnych wielkości księgowych, wykazują się zdolnością prognostyczną w stosunku do przyszłych długookresowych zwrotów z tych indeksów na rynkach kapitałowych w kilku krajach Europy Środkowo-Wschodniej: w Czechach, na Węgrzech, w Polsce i w Rosji. Badanie zostało przeprowadzone według standardowej metodologii z wykorzystaniem analizy regresji liniowej. Ze względu na problem nakładających się okresów (*overlapping periods*) oraz obciążenia dla małych prób w regresjach posłużono się zgodnymi estymatorami heteroskedastyczności i autokorelacji z korektą stopni swobody dla małych prób. Wyniki przeprowadzonego badania dowodzą, że niektóre z tych wskaźników, takie jak stosunek indeksu do dziesięcioletniej średniej ruchomej realnych zysków spółek, powszechnie znany jako wskaźnik ceny do zysków skorygowanych cyklicznie (*cyclically adjusted price/earnings* – CAPE), wskaźnik ceny do prognozowanych zysków, wartość rynkowa do wartości księgowej oraz cena do przychodów ze sprzedaży, mają silną moc predykcyjną dla skumulowanych zwrotów głównie w długich horyzontach czasowych. Z drugiej strony stosunek ceny do rocznych zysków, stopa dywidendy lub cena do przepływów pieniężnych okazują się dość słabymi predyktorami przyszłych zwrotów. Podążając za argumentami z obszaru finansów behawioralnych, wnioskować można, że uzyskane w badaniu dowody świadczące o dość istotnym powiązaniu bieżących wartości wskaźników rynkowych z przyszłymi skumulowanymi stopami zwrotu wskazują na pewien stopień nieefektywności analizowanych rynków w badanym okresie.

Słowa kluczowe: prognozowalność stóp zwrotu z akcji, wskaźniki rynkowe, kraje Europy Środkowo-Wschodniej

JEL: F30, G15

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