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THE PE RATIO AND THE PREDICTED EARNINGS GROWTH – THE CASE OF POLAND

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Abstract

We examine the components of equity returns on the Polish capital market. To analyse the underlying complexity of returns we took into consideration the model designed by Leibowitz (1999). This model captures three factors: dividend yield, expected growth in earnings and expected change in price-to-earnings (PE) ratio. We applied this model to analyse the average discount/premium not only to particular shares but to market averages as well. Firstly, we examined the variation of PE across the companies (as adapted from Penman (1996)) to analyse the average rate of return and their striking distance of individual stocks from a 'normal' level. Then we checked the transitory earnings in the portfolios of high PE, whereby a fall in current earnings relative to sustainable level of earnings leads to a transitory high PE ratio. We expect that the effect of transience in current year earnings can be significant. Lastly, we analysed the individual companies in order to check what percentage of companies give a "correct" signal about future prospects.

Keywords: cost of capital, PE ratio, transitory earnings.

JEL classification: G12, G32.

Introduction

The relation between earnings and share prices, in the form of profit-earnings ratio, gains investors' attention by tying expected financial performance with stock market performance. The objective of this article is to scrutinize the components of shareholders' rate of return with respect to change in earnings and change in market performance. Additionally, the analysis will capture an overall market performance, thus identify the determinants of returns from the market portfolio.[1]

In this article we chose the normative approach which yields a benchmark. The reference frame of our analysis is the "normal" price-to-earnings ratio (PE). We found the gap in the literature concerning the measurement of the transitory effect of the PE changes of individual stocks traded on emerging markets. Our aim is twofold: (1) to observe the change of the PE ratio and give at least some weight to the mean-reversion theory that when stock prices are high relative to fundamental value indicator (earnings), then they will fall in the future to more "normal" historical levels, and (2) since we focused on a sample of all companies listed on the particular market we are able to determine the overall return on the market, *i.e.* it's cost of equity. After the literature review presented in section two, we present the derivation and underlying assumption of "normal" PE in section three. Then, we try to monitor the changes in the key valuation parameters to identify the factors influencing investors' return in the company's business cycle. The normal data used as a benchmark will therefore be helpful to assess the actual data as the performance that company actually realizes. In the last part of the analysis the effect of transience in current earnings is predicted by the size of the PE ratio. The "correct" signal is when the change in the company's earnings is consistent with the implication of the valuation model used in this article (*i.e.* high level of PE indicates the increase in future earnings and vice versa).

1. PE ratio as a predictor of future excessive returns

The PE ratio effect as a predictor has been documented since Nicholson (1960) observed that companies with low PE ratios subsequently yield higher returns than do high PE companies. This difference is known as the value premium. Numerous studies confirm the presence of large positive value premium through time. A plausible explanation of this phenomenon is that it

[1] For a discussion and application of the market portfolio see Fernandez et al. (2013).

provides compensation for the extra riskiness of shares. The CAPM beta does not increase as the PE decreases, so the risk must reside in other risk measures (Basu, 1977).[2]

According to Dreman and Lufkin (1977) sector-specific fails to explain the value premium, and more complex multifactor models were unable to support stocks outperformance. However, a successful attempt to decompose the companies' PE ratio in different components (annual market-wide PE ratio, the sector, the company size and idiosyncratic influences) is presented in Anderson and Brooks (2006). Using the data of UK companies between 1975 and 2003 they applied the modified PE ratio (with weights) based on the regression analysis performed with each component exerts on the ratio. The difference in returns between the portfolios of low and high PE ratios doubled under Anderson and Brooks (2006) weighting procedure.

The Campbell and Shiller (2001)[3] sample captured the S&P Index between 1871 and 2000. They examined the volatility of the PE ratio and found that a range of changes lies between 8 and 20 with a mean of 14.5. After the price-to earnings ratio rose above its long-term average, it tended to fall subsequently and *vice versa*. An increase in the PE ratio can occur in two ways: through slower growth in earnings or faster growth in stock prices. They found that the main reason for an increase in the PE ratio is a faster stock price growth. Particularly, Campbell and Shiller (2001) noted a significant negative correlation between the PE and subsequent stock price changes. According to the employed methodology the earnings were smoothed by taking an average of real earnings over the past ten years (Shiller PE). The price-smoothed-earnings ratio had little ability to forecast future growth in smoothed earnings while the reported R^2 statistics were 1% over one year and 5% over ten years. However, the ratio was found to be a good predictor of ten-year growth in stock prices, with an R^2 statistic of 30%. Hansen and Tuypens (2004) used a similar methodology and found that PE might result in a downward biased proxy for expected future returns. They suggested using a moving average of the log of 1 plus the earnings price ratio when forecasting long-run returns. The empirical results for the S&P 500 confirmed the superiority of their approach to existing ones.

Giannetti (2007) studied the predictive ability of the PE ratio for the S&P 500 Index between 1994 and 2004. He examined the linear market-timing model, which relates the stock's returns to the previous PE ratios and the latest change in the ratio. He found strong evidence for market timing ability for unconstrained (i.e. leveraged and short-selling) strategies.

As it can be noted the studies on PE predicting power are limited for emerging markets. This may be due to the relatively short history of these markets and data availability. Klement

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[2] Modares et al. (2008) find for the Teheran Stock Exchange from 2001 and 2004 significant results showing that PE ratio explains part of the excess returns calculated on the basis of the CAPM model.

[3] Campbell, Shiller (2001) which is the revision of Campbell and Shiller (1998).

(2012) used a relatively short data series and tried to determine the ability to predict the real return per annum up to 10 years. In the case of emerging markets he found the predictive power of the Shiller PE weak, mostly because of the big differences in relationship between the Shiller PE indicator and subsequent rates of return (overall R^2 for subsequent cumulative 10 years return is 0,11 and for subsequent cumulative 5 years returns is 0,18). In the literature review section we focus on the formal connection between the PE ratio and companies' earnings level on an annual basis.

Additionally, Klement (2012) expresses the intuition that the degree of market integration is the key factor, because when the analysis is performed on the stand-alone basis it is characterized by better explanatory power. For this reason we find the empirical verification of the Polish case desirable, because it may shed some light about the information efficiency of the market considered still as an emerging one.[4]

2. The valuation model approach to PE ratio decomposition

In this section we present two approaches of PE decomposition which explain equity returns (k) using a limited set of variables in a different time framework. Since the empirical analysis uses annual data each model represents two extremes of the investment analysis: infinite number of years and one year explanation.

The normal PE ratio originates from the dividend valuation model. It requires an assumption that cash flow to shareholders is equal to dividends paid by the company. This is actually a very strong assumption, which allows for reconciliation of the dividend valuation model with the earnings valuation model.[5] The extended interpretation helps in exploring the basic properties of the "normal" PE ratio. The classic dividend growth model (Gordon, 1962) could be re-stated as follows:

$$PE = \frac{(d)}{(k-(1-d)ROE)} \tag{1}$$

where:

d – dividend pay-out ratio,

k – cost of equity,

ROE – return on equity.

[4] As www.msci.com.

[5] For instance the residual income model and its different forms starting with Feltham and Ohlson (1995), then the EKM model (Edward et al., 1987) and lastly the famous EVA model formulated by Stewart (1991).

The interpretation of the PE ratio is complicated by two hidden assumptions in the valuation model. First, the ratio depends on the expected changes in three factors: expected yield on equity (k), realized return on equity (ROE) and profits distribution (d). Second, there is no difference between dividends and cash flow to shareholders. In the general case when *ROE* equals *k*:

$$PE = \frac{1}{k} \tag{2}$$

The equation above shows the "normal" level of the PE ratio, which arises when the company operates in a highly competitive industry where the cost of equity is equal to the realized return (and the other assumptions hold as well). In this case a value is neither created nor destroyed. The "normal" PE ratio is used as a benchmark to the observed fluctuations in the ratio's level. Therefore, the "normal" PE ratio will represent the state of equilibrium, when a company earns a sustainable level of earnings. The "actual" level of the PE ratio will be at maximum when the earnings are at the lowest level relative to its normal level. This means that in the depth of the business cycle, the PE ratio will be maximized. The reverse interpretation holds for companies at the peak of their business cycle.

The price component in the PE ratio reflects the expectation of a future performance not only towards a company's earnings, but the level of risk and competitive advantage period as well. The change in the PE ratio is fundamental if investors revise their expectations about the trend in earnings growth, the level of a company's total risk and sources of competitive advantage.[6]

The framework of the analysis will change if one analyses the determinants of the PE ratio from one year to the next. The core of this approach is the model which captures the total shareholder return. For that reason, the assumption of cash flow to equity being equal to dividends is no longer valid. The total shareholder return decomposition recognizes the dividend factor as a dividend yield. Additional drivers of shareholder return are two growth rates: the growth in earnings, and the growth in the PE ratio. The decomposition developed by Leibowitz (1999) uses forward PE ratios. In order to recognize the drivers of total shareholder returns the equation's reformulation uses a trailing PE ratio:

$$TSR = k = \frac{D_1}{P} + \left(1 + g_E\right)\left(1 + g_{PE}\right) - 1 \tag{3}$$

[6] The insightful analysis of competitive advantage in the dividend valuation model was presented by Durand (1992) and Danielson (1998).

where:

TSR – total shareholder return,

D_1 – next period dividend,

P – current share price,

g_E – growth in earnings = $(E_1/E_0) - 1$,

g_{PE} – growth in PE ratio = $(PE_1/PE_0) - 1$.

The investor's return comprises an income factor and growth factor. The income factor is represented by the dividend yield. The growth component is presented jointly by a growth in earnings and a growth in the PE ratio. A simultaneous analysis of a dividend yield and realized growth in earnings provides information about earnings' reinvestment rates. If the PE ratio is constant the earnings growth will be equal to the retained earnings yield, which could be translated into share price growth. The constant earnings growth scenario was described in a section about "normal" PE ratio. If both earnings and the PE ratio shift the combined change in growth rates additionally changes by $g_E \times g_{PE}$.

An alternative decomposition of equity returns is used in Ohlson's (1995) model which connects the PE ratio together with the price-book value, and ROE ratios assuming a long-lasting but finite investment horizon.[7] Ohlson (1995) made an underlying assumption that in competitive economic environment returns on equity are above the cost of capital only temporary. The 'persistence parameter' measures the sustainability of abnormal earnings. If a company expects abnormal earnings then the price-to-book value should be interpreted along with the price-to-book value.

Based on similar assumptions Easton (2004) assumed a two stage earnings growth model. He observed the rate of returns creating the portfolios of companies with different PEG ratios (the PE divided by the expected earnings growth). This ranking implicitly assumes that earnings growth will not change beyond the (short) earnings forecast horizon. He provided a means of simultaneous estimation of the expected rate of return and the change in the earnings growth beyond the short forecast horizon. The empirical analysis proved that the expected rate of returns based on the PEG ratio were downward biased and the bias was greater for firms with lower short-term earnings growth rates, higher PE and higher ratio of price-to-book value while the bias was lower for larger firms and firms with a higher standard deviation of returns. Estrada (2005) proposed a new tool that adjusts the PE ratio not only for growth but risk as well (PERG).

[7] See Walker (1997) for a more advanced review of the Ohlson (1995) model.

He examined the sample of 100 US companies between the period of 1975–2002 and found that the portfolio based on the PERG ratio outperforms the portfolios based on the PEG and PE ratio.

3. Data description

In this study we utilize the annual data provided by the Warsaw Stock Exchange (WSE) in its Statistic Bulletin. To collect the sufficient number of observations we considered the data for the longest available time period, i.e. 2001–2012. The chosen sample spans the episodes of market booms and crashes which allowed us to eliminate the problem of time specificity. For every listed company we investigated the growth in earnings ($g_E = (E_1/E_0) - 1$) and PE ratio (PE_1). The number of reported companies in the analysed years was the following.

Table 1. Number of reported companies

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Number of companies	221	211	197	194	220	246	265	333	369	373	426	437

Source: own study.

This gives the total of 3,492 observations. However, for our analysis we can use the companies that reported the positive earnings in a minimum of two subsequent years. We also eliminated the observations where the implied TSR (according to the equation 3) differs from the value reported by the WSE by more than 2.0%. These discrepancies may arise due to changing financial reporting standards. Finally, we left 589 observations and we created an unbalanced panel.

4. Results

We started our investigation by looking at the variability of the yearly PE ratios across Polish companies and over the sample period. We ranked the PE ratios by size and then grouped the companies into deciles, where the 1st decile means the companies with the highest value of the ratios. We reported the median values for the deciles as well as for the whole dataset.

In the analysed period the average rate of return on equities in Poland was 8.23% per annum (calculated as the logarithmic rate of return on the WSE WIG index). Table 2 shows the "normal" rate of return implied by the PE ratio. It is worth mentioning that, the implied cost of capital for the median (7.25%) is in the region of the market index portfolio return.

Table 2. Median PE ratios (PE) in Poland over the period 2001–2012

PE portfolios	Median PE ratio	Implied ‚normal' cost of capital (%)
Full dataset	*13.8*	*7.25*
1st decile	69.85	1.43
2nd decile	28.8	3.47
3rd decile	21.8	4.59
4th decile	16.8	5.95
5th decile	13.8	7.25
6th decile	11.8	8.47
7th decile	10.2	9.80
8th decile	8.35	11.98
9th decile	6.4	15.63
10th decile	4.1	24.39

Source: own study.

After an inspection of the results one can notice a significant dispersion. The PE and consequently the implied return on equity frequently differ from their "normal" level.

In the next step of our research procedure we verified the transitory behaviour of earnings. It means that for the high PE equities the current earnings growth should be low or even negative whereas the growth in the next year should be abnormally high (Beaver, Morse, 1978; Beaver, 1988).

Table 3. Evidence of temporary fluctuation in PE ratios (PE)

PE portfolios	Median PE ratio	Median earnings growth (%)	
		previous year	current year
Full dataset	*13.3*	*2.12*	*8.63*
1st decile	38.05	–52.02	63.37
2nd decile	25.10	–22.46	32.28
3rd decile	18.9	–14.29	24.78
4th decile	15.65	2.00	2.00
5th decile	12.65	7.11	13.45
6th decile	11.25	16.87	–1.55
7th decile	9.45	14.00	3.48
8th decile	7.45	61.02	–24.39
9th decile	5.30	96.30	–26.89
10th decile	1.70	5,904.97	–94.82

Source: own study.

The results strongly confirm the phenomenon of transience. For the first portfolio (decile) with the highest PE ratio the earnings growth in the current year was highly negative, whereas in the next period it changed into being highly positive. For the last portfolio the results were just the opposite. The effect of transitory earnings is responsible for the extreme values of the PE ratio. The median portfolio was characterized by a stable rate of earnings growth.

Finally, we checked out whether an unusually high (low) PE indicates an unusually high (low) earnings growth in the next period. Similarly to Pennman (1996) we found the significant transience in current year earnings. Considering the level of earnings growth only the high PE ratio means that a company is able to generate abnormally high earnings in the future or else the company is performing poorly. The terms "high" and "low" in Table 4 refer to above or below the median respectively.

Table 4. The relation between PE ratio and earnings growth rate

		Value of earnings growth	
		high	low
PE ratio	high	185 (31%)	110 (19%)
	low	111 (19%)	183 (31%)

Source: own study.

In the case of Poland the PE ratio gives a correct forecast about the earnings growth in nearly two-thirds of the time. The high PE is associated with high earnings growth expectancy (for 31% observations) and the low PE the drop in earnings was expected for the same fraction of companies. Other factors than earnings growth (risk and abnormal earnings growth period) could possibly explain the behaviour of the remaining companies in the sample.

Conclusions

At the beginning of this study the relationship between income-based valuation models and the PE ratio was presented. The analysis of a "normal" PE ratio leads to two possible scenarios:

– no new capital investments in the company results in no earnings growth; in this case the dividend yield is equal to earnings yield,
– the spread between realized and expected return is equal to zero, implying value neutral growth.

In all other situations, the PE ratio will not be constant. Furthermore, the expected return incorporates an assumption about the changes in earnings growth and changes in the PE ratio. Generally, if the earnings fall below the value-neutral growth, then the PE ratio will rise above its "normal" level.

Research made on the Polish stock market confirms these findings showing the transitory effect of earnings. For most of the companies the actual growth rates deviate from a value-neutral growth, therefore one can expect changes in the PE ratio.

In fact, the volatility of the PE ratio is extraordinary. However, can be observed that PE ratios send signals about the expected change in earnings and the signal accuracy increases for the extreme levels of PE ratios. Actually, the PE ratio is associated with the level of a company's earnings in the majority of cases (62%). This finding should have an important meaning for fundamental analysts. It looks like searching the under- and overvalued equities using the PE ratio in the majority of cases does not lead to beneficial results as the Polish market seems to be information efficient with respect to this ratio. Further research should investigate if this outcome formulated for the broad market holds also for its various segments (e.g. low vs. high cap stocks and different price-to-book value).

Another potential empirical verification should focus on whether differences across PE ratio hold over time. If the companies differ consistently then perhaps their ability to achieve a competitive advantage or operate at different risk levels are other important factors.[8] The sectoral analysis would be especially desirable for this purpose. Nevertheless, the research performed on the Polish market shows many similarities to the results observed on well-developed markets.

The delivered outcomes which span more than the last decade exhibit that the median of the PE is very similar to the realized rate of return for the market portfolio. It requires further research in finding any fundamental connections. The "normal" growth rate for a median is similar to the rates observed on different markets, which could be explained by a country's risk premium disappearing, hence, diminishing international arbitrage opportunities.

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[8] Zarowin (1990) found that differences in risk levels on mature markets are less important. It means that, the expected rate of return varies less than earnings performance across companies.

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