An Analytical Approach to Comparing Actual Vs. Fundamental "Price-to-Sales" and "Enterprise Value-to-Sales" Ratios on the European Stock Market

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Abstract:

This study is focused on the "price-to-sales ratio" (P/S) and the "enterprise value-to-sales ratio" (EV/S), which are used in relative valuation, in the analysis of companies' performance, as well as in the analysis of different sectors and of the market. Special attention is paid to certain important requirements, related to the correct interpretation of market and sector averages of these ratios nowadays, including against the background of their historic levels.

The identification, justification and use of the proper market ratios requires in-depth knowledge of their essence and of the fundamentals which drive their levels. In this connection, the logic of the fundamental "price-to-sales" (P/S) and the "enterprise value-to-sales" (EV/S) ratios is explained.

These two fundamental ratios for the European stock market are calculated and compared with the actual P/S and EV/S. The results of the study indicate that the current levels of the actual P/S and EV/S of the European stock market are much higher than the levels suggested by fundamentals.

Keywords: stock markets, relative valuation, market ratios, P/S ratio, EV/S ratio, fundamentals

JEL: G12, G15, G23, G32

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1. Introduction

Market ratios, also called ratios of market performance, are one important group out of the several groups of ratios for financial analysis of public companies (Brigham and Gapenski, 1994). The feature which distinguishes this group of ratios is that the numerator of each of them is the market price per share (P_0), or, alternatively the enterprise value of the company (EV). Therefore, they are called market ratios. This specific feature of market ratios provides the opportunity to use them in several aspects:

- for the analysis of the performance of companies, whose shares are publicly traded;
- for the analysis of the market and of different sectors, including for comparing among different markets and sectors;
- in the relative valuation of other companies, which is also popular as multiples valuation, etc.

Another specific feature of market ratios makes them especially useful in the above three aspects. This is the fact that they are a kind of "standardized prices" of stocks, which make different companies, sectors and markets comparable with each other (Damodaran, 2012).

According to Damodaran (2012), there are a few reasons for the popularity of relative valuation methods: that they are quick, easy to implement, easy to explain, they normally yield results, which are close to current market prices. The truth, however, is that the above advantages also contain the prerequisites for the disadvantages of relative valuation methods. Quite often, applying relative valuation, analysts and appraisers arrive at totally wrong price, because of ignoring key variables. The stocks are normally overpriced when the market overprices the comparable companies and vice versa. The lack of transparency about key variables makes relative valuation very sensitive to manipulation (Damodaran, 2012).

These are a part of the reasons why relative valuation methods are very convenient and very much wanted during bull markets. In such conditions most stock market players, such as investment bankers, consultants, and others, are interested in valuation results, which are close to market prices, thus justifying the respective transactions. Commissions are earned only if deals are finalized. Given the expectations for continuously rising stock prices, most players seem satisfied with such results (until the moment when the bubble bursts out). This copes perfectly with multiples valuation, which yield overpriced stocks in the conditions of an overpriced market. The relatively neutral DCF valuation models are often neglected in such situations. In this way the stock bubble is kind of "legalized" in the eyes of the public (Nenkov, 2010). In this connection some valuation experts say that the most important question when reviewing a valuation is not which methods are used, but who paid for the valuation (Damodaran, 2008).

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Many analysts contend that the multiples valuation methods are easy to implement, but according to Koller, Goedhart and Wessels (2015) in reality it is just the opposite. A well elaborated multiple analysis requires a lot of the same efforts and adjustments as with the traditional DCF analysis. The disadvantages of the market ratios, which were discussed in terms of relative valuation, need to be accounted when used in the other two directions as well – for company analysis and for the analysis of the sectors and of the stock market.

2. "Price-to-Sales" (P/S) and "Enterprise Value-to-Sales" (EV/S) Ratios

O'Shaughnessy (2005) qualifies the **price-to-sales (P/S) ratio** as the best of all market ratios. Fisher (2008) calls it "almost perfect measure of popularity". The P/S is a measure of the value of company's equity, relative to its sales. As there are many investors who like high P/S ratios, there are also investors, who buy at low P/S ratios, since they believe they have a bargain (O'Shaughnessy, 2005).

The price-earnings (P/E) and the price-to-book (P/BV) ratios continue to be very popular as they used to be in the past, but during the latest two or three decades the analysts extended the circle of ratios used, including the P/S ratios. It is very attractive to investors and analysts for several reasons. In the first place, while P/E ratios are often negative, the P/S ratio is available even for the worst-performing companies, as well as for the start-up companies. There is virtually no bias of average P/S, resulting from the exclusion of loss making companies. In the second place, P/S is quite independent of the alternative accounting practices, unlike P/E and P/BV (Damodaran, 2012). In the third place, P/S ratios are normally more sustainable in time than P/Es (Reed, 2011). The latter are very volatile because of the effects of the operating and financial leverage, and the resulting serious volatility of earnings per share by year (Molodovsky, 1953; Thalassinos and Liapis, 2013).

The main disadvantage of the P/S and EV/S ratios is that they may lead to determining high value of a company with growing revenues, even if this company works at loss. To have high intrinsic value, the company should generate high profits and cash flows. In this connection, it is extremely important to ensure that the comparable companies have similar profitability ratios and cash flows with the valued company. The P/S is the ratio between the market price per share and the sales per share:

$$\frac{P}{S} = \frac{Price\ per\ share}{Sales\ per\ share}$$

Alternatively, the P/S can also be presented as the ratio between market value of equity (market capitalization) and sales:

$$\frac{P}{S} = \frac{Market\ value\ of\ equity\ (market\ capitalization)}{Sales}$$

Another drawback of the P/S is that it is incorrectly defined – there is no compliance between numerator and denominator. The denominator is an enterprise indicator, which depends only on company's operations and is not influenced by financial leverage. The numerator is an equity indicator, which is a function of both of operations and capital structure. This way, when comparing companies with different capital structure, the P/S can lead to the wrong conclusions.

To overcome this drawback of P/S, an alternative sales-based market ratio is recommended – the enterprise value-to sales ratio (EV/S). It is the ratio between enterprise value and sales:

$$EV/S = \frac{Enterprise\ value}{Sales}$$

According to Damodaran (2002), the enterprise value (EV) is equal to:

$$EV = Market\ value\ of\ equity + Market\ value\ of\ debt - Cash$$

This should correspond to the market value of the operating assets of the company. It does not include financial and other non-operating assets. The above formula reflects the earlier definition provided by Damodaran. In more recent publications (Damodaran, 2012) the same author gives a little bit different definition, as follows:

$$EV = Market\ value\ of\ equity + Book\ value\ of\ debt - Cash$$

This second definition should be accepted as more sustained. The main argument for this is that when calculating equity market value, it is normal to deduct the book value of debt from enterprise value. This is the amount due to creditors. For example, when the company has high default risk, the market value of bonds goes down significantly below their face value. If we deduct this low market value of debt, we arrive at equity value, which is overpriced. The market value of debt relates to bond holders and potential buyers of debt on the secondary bond markets. This is the value at which bondholders could sell their bonds. But the principle due by a company to its bondholders should equal their book value, regardless of the current market value of bonds. Finally, it makes sense to use book value of debt in the formula for EV.

Another important issue related to the above definition of EV concerns the scope of "cash". In our view this should not be limited to cash in banks, but should also include investments in different financial and other non-operating assets. The EV, defined in this way, is indeed the equivalent of the operating value of the company.

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The interpretation of EV is not unanimous by different authors. Koller, Goedhart and Wessels (2013) have a little bit different understanding about enterprise value. They define it in an alternative way, as the function of certain positions in the asset side of the balance sheet, as follows:

> Operating value (value of operations)
> + Value of financial assets
> + Value of non-consolidated interest in other companies
> + Excess cash
> = Enterprise value (EV)

Obviously, these authors have in mind the value of the company as a whole, including both operating and non-operating assets. For this value Damodaran uses the term Firm Value (Damodaran, 2013).

Identifying EV with operating value is more justified in terms of ensuring comparability between the numerator and denominator of the EV/S. The sales (S) in the denominator are the function predominantly of the operating assets of the company. They do not include revenue from financial and other non-operating assets. In this connection, it is sustained that the numerator is equal to the value of operating assets only, which corresponds to the definition of enterprise value, given by A. Damodaran. Further in this study we stick to this interpretation of enterprise value (EV).

3. P/S and EV/S Ratios on the European Capital Market

Table 1 contains summarized data about the P/S and EV/S ratios of companies on the developed capital markets of Europe (only countries with developed capital markets are included) for the post-crisis period 2010-2016. The summarized values are determined for annual samples of about 6000 companies on average. Both ratios do not vary significantly by years, with average P/S of 0.98 and average EV/S of 2.12. One of the first impressions is that EV/S is more than twice higher than P/S, which is very large difference. This could eventually be explained with a relatively high financial leverage for European companies. The average net margin for the period is 5.13% and the average operating margin is 8.79%.

Table 1: *P/S and EV/S ratios for Europe for the period 2010 – 2016.*

Year	Number of Companies	P/S	Net Margin	EV/S	Operating Margin
2010	4818	0.97	5.91%	2.26	9.19%
2011	5204	0.72	6.21%	2.07	9.33%
2012	6022	0.85	4.31%	2.02	8.89%
2013	6073	1.04	4.44%	2.07	8.83%

2014	6532	1.01	5.58%	2.03	8.71%
2015	6568	1.13	4.75%	2.20	8.35%
2016	6655	1.13	4.74%	2.17	8.24%
Average	**5982**	**0.98**	**5.13%**	**2.12**	**8.79%**

Source: http://pages.stern.nyu.edu/~adamodar/ (Value Line, Bloomberg and Capital IQ).

It is logical to ask the question what is the purpose of the above review of the P/S and EV/S ratios. This is done with a reason. An important prerequisite for the correct use of market ratios is to find out which values are low or high, and which are normal for the market. The analysts should know the typical levels of market ratios on different stock markets both at present and from historical perspective. This requires that analysts are familiar to what extent the average values themselves might be distorted by individual extremely high or low ratios of certain companies in the samples (Stickney, 1996' Arvanitis *et al.,* 2012). This can cause significant distortion of the average, when the samples contain a small number of companies, as is the case with the Bulgarian capital market, for example. There are too many such cases (Nenkov and Bathala, 2008).

It is also curious to ask why net margin and operating margin are included as important data in the table. Both indicators measure the profitability of sales. The net margin is the so-called companion variable for the P/S ratio, which pretty much explains the changes in its values. Respectively, the operating margin is the companion variable for the EV/S ratio, and has the most serious impact on its values (Damodaran, 2002). This will be further explained during the study.

4. Fundamental Model of the P/S Ratio

The correct use of the P/S ratio goes through serious analysis of the average ratios from a sample, before they are applied as multiples for valuation or as indicators for assessment of the performance of companies, sectors and markets. This analysis includes, among other things, comparing current average P/S of a sample with the average P/S in other sectors or markets for the same period, as well as comparing them with historic average P/S. Another perspective of the analysis of the actual market ratios, including P/S, is the comparison with their corresponding fundamental ratios, which are derived directly from fundamentals. While actual market ratios indicate the price at which a company's stocks are traded, fundamental ratios indicate the price at which a company's stocks should be traded. Unfortunately, this perspective of the analysis is performed quite rarely in reality, which is a serious prerequisite for the distortion of many valuations and analyses.

Only after the above aspects of the analysis we could know whether the respective market ratios of the comparable companies (peer companies), or of the sample, are normal, representative, and have economic sense, to be used in a specific valuation or analysis.

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To find out which variables drive the fundamental P/S, we must get familiar with its theoretical or fundamental model. It is derived from the Gordon's constant growth dividend model. For this purpose, the current dividend per share in the dividend model is expressed as the function of the earnings per share (EPS) and the payout ratio (1-b). After this the current earnings per share (EPS) are expressed as the function of the net margin and current sales per share (SPS), as follows:

$$EPS_0 = Net\ margin \times SPS_0$$

Finally, we divide both sides of the transformed equation by the current sales per share to arrive at the one-stage fundamental model for P/S (Damodaran, A., 2012):

$$\frac{P}{S} = \frac{Net\ margin \times (1 - b) \times (1 + g)}{r - g}$$

Where:
    P/S = fundamental price-to-sales ratio,
    b = foreseen plowback ratio,
    (1–b) = foreseen payout ratio,
    r = cost of equity,
    g = expected growth rate of dividends per share.

If we express the plowback ratio **(b)** as a function of the return on equity **(ROE)** and the expected growth rate **(g)**, the model becomes as follows:

$$\frac{P}{S} = \frac{Net\ margin \times (1 - g/ROE) \times (1 + g)}{r - g}$$

One of the advantages of this variant of the model is that it can be used to determine the P/S of non-public companies, which do not pay dividends. It also becomes clear from the model that the price-to-sales ratio of a company with a very low or zero growth rate is determined by the differential between net margin and cost of capital. If the net margin is higher than the cost of equity, the price per share should be higher than the sales per share. And vice versa, if the net margin is lower than the cost of equity, the price per share should be lower than the sales per share.

The more reliable model to use is the two-stage fundamental P/S model. It is more appropriate for companies with temporary high growth, which cannot be sustained forever. The starting point for deriving this fundamental model is the two-stage dividend discount model. Under this model, future dividends are grouped in two sub-periods: high growth period and stable (sustainable) growth period.

Again, the EPS_0 are expressed as the function of sales per share (SPS_0) and net margin, after which both sides of the equation are divided by the sales per share,

because of which we arrive at the two-stage fundamental model of P/S (Damodaran, 2002):

$$\frac{P}{S} = \frac{\text{Net margin} \times (1 - b_1) \times (1 + g_1) \times \left[1 - \frac{(1 + g_1)^n}{(1 + r_1)^n}\right]}{r_1 - g_1} +$$

$$+ \frac{\text{Net margin} \times (1 - b_2) \times (1 + g_1)^n \times (1 + g_2)}{(r_2 - g_2) \times (1 + r_1)^n}$$

Where:
P/S = fundamental price-to-sales ratio,
(1–b_1) = payout dividend during high-growth period,
(1–b_2) = payout dividend during stable-growth period,
g_1 = expected growth rate of EPS during high-growth period,
g_2 = expected growth rate of EPS during stable-growth period,
r_1 = cost of capital during high-growth period,
r_2 = cost of capital during stable-growth period,
n = number of years of high-growth period.

5. Fundamental Model of the EV/S Ratio

Considering that the numerator of the EV/S is the operating value of the company, the DCF enterprise valuation model is the most appropriate for deriving the fundamental model of this ratio. If the case is about a mature company, with assumed stable growth rate until infinity, its enterprise value should be equal to the capitalized free cash flow to investors (FCFI). This free cash flow is equal to the net operating profit (NOPLAT), times one minus the retention ratio (1-b), or:

$$FCFI = NOPLAT \times (1\text{-}b)$$

The net operating profit itself can be expressed as a function of the net operating margin and sales:

$$NOPLAT_0 = \text{Net operating margin} \times S_0$$

After substituting for NOPLAT, and dividing both sides by the sales from current year (S_0), we arrive at the one-stage fundamental model for EV/S:

$$\frac{EV}{S} = \frac{\text{Net operating margin} \times (1 + g) \times (1 - b)}{WACC - g}$$

Where:
EV/S = fundamental enterprise value-to-sales,

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b = retention (reinvestment) ratio,
WACC = weighted average cost of capital,
g = expected growth rate of NOPLAT.

In this case the net operating margin is calculated as the ratio of current NOPLAT to current sales. From the above equation we can see that the enterprise value-to-sales ratio is a growing function of the net operating margin and the growth rate **(g)** and a decreasing function of the reinvestment rate **(b)** and the weighted average cost of capital **(WACC)**. After expressing the reinvestment rate **(b)** as a function of the return on invested capital **(ROIC)** and the growth rate **(g)**, the model acquires the following shape:

$$\frac{EV}{S} = \frac{\text{Net operating margin} \times (1 + g) \times (1 - g/ROIC)}{WACC - g}$$

It becomes clear from the model that for a company with a growth rate close to or equal to zero, the EV/S should be determined by the differential between net operating margin and WACC. The model also shows that for a given level of the growth rate **(g)**, the higher the ROIC, the higher the EV/S.
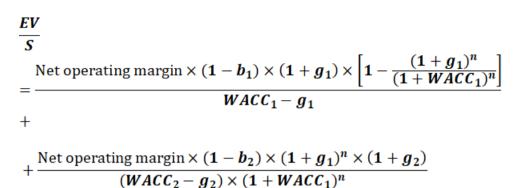
The two-stage fundamental model of EV/S can be derived from the two-stage DCF enterprise valuation model, where the future is divided into two sub-periods - an explicit forecast period and after it. From the DCF model we know that, other things being equal, the free cash flow to investors (FCFI) for each year is equal to that part of NOPLAT, which is not retained and reinvested, and can be expressed as in the case with the one-stage model:

$$FCFI = NOPLAT \times (1 - b)$$

We assume that there is one and the same growth rate for the years of the explicit growth period - g_1, and another constant growth rate after the explicit forecast period - g_2. We can also express $NOPLAT_0$ as a function of sales and the net operating margin:

$$NOPLAT = Net\ operating\ margin \times Sales$$

After that we divide both sides of the equation by sales (S_0), and arrive at the two-stage fundamental model of the EV/S:

$$\frac{EV}{S}$$

$$= \frac{\text{Net operating margin} \times (1 - b_1) \times (1 + g_1) \times \left[1 - \frac{(1 + g_1)^n}{(1 + WACC_1)^n}\right]}{WACC_1 - g_1}$$

$$+$$

$$+ \frac{\text{Net operating margin} \times (1 - b_2) \times (1 + g_1)^n \times (1 + g_2)}{(WACC_2 - g_2) \times (1 + WACC_1)^n}$$

Where:
  EV/S = fundamental enterprise value-to-sales,
  b_1 = reinvestment rate for NOPLAT during the explicit forecast period,
  b_2 = reinvestment rate for NOPLAT after the explicit forecast period,
  g_1 = expected growth rate of NOPLAT during the explicit forecast period,
  g_2 = expected growth rate of NOPLAT after the explicit forecast period,
  $WACC_1$ = weighted average cost of capital during the explicit forecast period,
  $WACC_2$ = weighted average cost of capital after the explicit forecast period,
  n = number of years of the explicit forecast period.

The sales-based market ratios, even though a function of several variables, are mostly influenced by the profit margin – the net margin for P/S and the net operating margin for EV/S. Different sectors and businesses have different profit margins, which suggests different P/S and EV/S for these businesses. Companies in businesses with high margin should have high sales-based ratios and vice versa. A low profit margin directly leads to lower P/S and EV/S, but it has also indirect effect in the same direction, because it reduces the growth rate **(g)**.

However, this does not necessarily mean that all companies with low net margin or net operating margin would be with poor financial results and not creating value. Many companies rely on high turnover, which very often is at the expense of low operating margin. They bet on being the leaders in the market by volume of sales. Others bet on high margin, trying to be the price leaders. Not always the latter are better off than the first. This depends on the effect which the selected strategy has over the value creation process. Value creation itself depends on the spread between the return on invested capital (ROIC) and the cost of capital (WACC), at the enterprise level, and respectively on the spread between the return on equity (ROE) and the cost of equity (r), at the equity level. This is the moment to note that each of the two sales-based market ratios is influenced also by another variable, which does not show up in the above fundamental models of P/S and EV/S. In this connection it is useful to express ROIC and ROE in the following way:

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$$ROIC = \frac{NOPLAT}{Invested\ Capital} = \frac{NOPLAT}{Sales} \times \frac{Sales}{Invested\ Capital} =$$
$$= Net\ Operating\ Margin \times Capital\ Turnover$$

$$ROE = \frac{NI}{Equity} = \frac{NI}{Sales} \times \frac{Sales}{Equity} =$$
$$= Net\ Margin \times Equity\ Turnover$$

The two equations indicate that the variable in question at the enterprise level is **capital turnover** ratio and at the equity level it is **equity turnover** ratio. Normally businesses with low margin have higher turnover of both invested capital and equity. This compensates the low profit margin, leading to ROIC and ROE which are high enough. This explains how companies with low profit margins can also create economic value added.

The fact that the net margin is the leading (companion) variable, which has significant impact on the values of the P/S ratio is confirmed by different studies. For example, one very simplified regression of P/S against net margin for companies in sector "production of machines and equipment" on the Bulgarian Stock Exchange in 2006 establishes strong positive correlation and a relatively high determination ratio (R^2) of 0.68. The same strong positive correlation is established between EV/S and the operating margin, with coefficient of determination (R^2) of 0.78 (Nenkov, 2015). In other words, in this case both margins explain the changes in the two market ratios to a very high extent.

Damodaran makes annual regressions for each of the main market ratios against a group of independent variables. They also confirm the high weight of the profit margins in explaining the changes of P/S and EV/S.

6. Fundamental P/S ratio for the European stock market

For the calculation of the average fundamental P/S for the European stock market we can use average values of the key variables which determine it. We can start with the one-stage model, as a simpler one. Besides the average net margin for Europe of 5.13% for the period 2010-2016 (Table 1), some other input variables for Europe are also needed, such as: cost of equity (r), return on equity (ROE) and retention rate (b). The last two variables are necessary for determining forecasted growth rate (g).

It turns out that the selection of the appropriate values for each of the above variables itself is a challenge. This refers most of all to the cost of equity, since there is no consensus about its true value. There are quite a few different methods for determining it. For example, when calculating cost of equity as the sum of risk free rate and risk premium, it can be calculated at least in three variants: historic arithmetic average, historic geometric average, and implied (current) cost of equity.

The cost of equity is not the subject of discussion in this study. In this case we select the average cost of equity (r) for Europe for the latest four years (2013-2016) of 9.84%.

The situation is not very different with selecting the proper return of equity (ROE). The issue is about what is the ROE, which is the most representative to be used as the basis for forecasting future ROE – whether this should be the current ROE from the most recent year or the average for the latest several years. Each option provides values, that in most cases are quite different from each other. These differences have serious impact on the estimated fundamental P/S ratios. The current ROE for 2016 is 7.36% (without financial companies), while the average ROE for the period 2010-2016 is 7.93%. What is more, usually data in different databases are different, which additionally makes it difficult to decide on which specific value to choose for the respective input variable. In this case we use the average ROE for the post-crisis period (2010-2016) of 7.93%. We also use the average plowback (retention) ratio for 2016 for companies in Europe **b** =41.79%.

Finally, the input variables for applying the one-stage model are:

Net margin = 5.13%
Plowback (retention) ratio **b** = 0.4179
Cost of equity **r** (RRR$_E$) = 9.84%
Growth rate **g** = 3.31% (ROE × b = 7.93% × 0.4179 = 3.31%)

Table 2 shows the calculated by the model average fundamental P/S ratio. It is equal to **0.47** and is about half the actual average P/S for the European market of 0.98, as shown in Table 1. The low value of the fundamental (theoretical) P/S should be explained with the relatively low net margin of 5.13%. Given the much lower fundamental P/S, a conclusion can be made that the level of the actual average P/S for Europe is not justified.

Table 2: *Average fundamental P/S for the European market for 2017 (one-stage model)*

Pace of change of net margin (in %):					10%					
Pace of change of "r" (in %):					10%					

Values Of "r"	Values of Net Margin										
	2.6%	3.1%	3.6%	4.1%	4.6%	5.1%	5.6%	6.2%	6.7%	7.2%	7.7%
	P/S	P/S	P/S	P/S	P/S	P/S	P/S	P/S	P/S	P/S	P/S
4.9%	0.96	1.15	1.34	1.54	1.73	1.92	2.11	2.31	2.50	2.69	2.88
5.9%	0.60	0.71	0.83	0.95	1.07	1.19	1.31	1.43	1.55	1.67	1.79
6.9%	0.43	0.52	0.60	0.69	0.78	0.86	0.95	1.04	1.12	1.21	1.29
7.9%	0.34	0.41	0.47	0.54	0.61	0.68	0.74	0.81	0.88	0.95	1.02
8.9%	0.28	0.33	0.39	0.45	0.50	0.56	0.61	0.67	0.72	0.78	0.84
9.8%	0.24	0.28	0.33	0.38	0.43	0.47	0.52	0.57	0.61	0.66	0.71

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10.8%	0.21	0.25	0.29	0.33	0.37	0.41	0.45	0.49	0.53	0.58	0.62
11.8%	0.18	0.22	0.25	0.29	0.33	0.36	0.40	0.44	0.47	0.51	0.54
12.8%	0.16	0.20	0.23	0.26	0.29	0.33	0.36	0.39	0.42	0.46	0.49
13.8%	0.15	0.18	0.21	0.24	0.27	0.29	0.32	0.35	0.38	0.41	0.44
14.8%	0.13	0.16	0.19	0.22	0.24	0.27	0.30	0.32	0.35	0.38	0.40

Source: *Calculations of the author.*

The values in the table also illustrate the high sensitivity of the fundamental P/S to the combination between **net margin** and **r**. They vary within broad range from 0.13 at the bottom left corner of the table to 2.88 at the upper right corner of the table. This is mainly due to the application of the one-stage model. The extreme values received under this model usually do not have economic sense and should not be taken seriously. The one-stage models for determining the fundamental ratios reproduce the drawbacks of the capitalization models, from which they were derived, such as the Gordon dividend model and its analogues. Because of this, one-stage models easily yield illogical and misleading results for the fundamental ratios. Therefore, it is recommended in most cases to apply the two-stage fundamental models.

From the models above, it became clear that the two-stage model divides the future into two sub-periods: high growth period and stable growth period. More conservative values for the growth rate g_2 should normally be used for the stable growth period. The retention ratio b_2 should be with some moderate value, such as 0.50. Other things being equal, the average ROE in the long run would most likely be equal to the average cost of equity **r**. Therefore, in this case we assume that ROE during the stable growth period will be equal to the cost of equity of 9.53%.

Because of the lack of another available benchmark for the average net margin for Europe in the long run, we use the same average net margin of 5.13% for the period 2010-2016 (from Table 1). We simply assume that it is quite representative and will remain the same during the stable growth period.

Thus, the input variables for the two-stage model are as follows:

Net margin for the first sub-period = 5.13%
Retention ratio for the first sub-period b_1 = 0.4179
Cost of equity for the first sub-period r_1 = 9.84%
Growth rate for the first sub-period g_1 = 3.31%
(ROE × b = 7.93% × 0.4179 = 3.31%)
Continuance of the first sub-period n = 5 years
Net margin for the stable growth period = 5.13% (remains the same)
Retention ratio during the stable growth period b_2 = 0.5
Cost of equity during the stable growth period r_2 = 9.84%
Growth rate during the stable growth period g_2 = 4.92%
(ROE × b = 9.84% × 0.5 = 4.92%)

The specifics in this case is that it is not correct to talk about a high growth period at the beginning. The input assumptions and variables are such, that forecasted growth rate during the first sub-period is somewhat lower than growth rate during the stable growth period.

Table 3: *Average fundamental P/S for the European market for 2017 (two-stage model).*

Pace of change of net margin (in %):					10%					
Pace of change of "r" (in %):					10%					

Values of "r"	Values of **Net Margin**									
	2.6%	3.1%	3.6%	4.1%	4.6%	5.1%	5.6%	6.2%	6.7%	7.2%	7.7%
	P/S	P/S	P/S	P/S	P/S	P/S	P/S	P/S	P/S	P/S	P/S
4.9%	0.58	0.59	0.61	0.62	0.63	0.65	0.66	0.68	0.69	0.71	0.72
5.9%	0.55	0.57	0.58	0.59	0.61	0.62	0.64	0.65	0.66	0.68	0.69
6.9%	0.53	0.54	0.56	0.57	0.58	0.60	0.61	0.62	0.64	0.65	0.66
7.9%	0.51	0.52	0.53	0.55	0.56	0.57	0.59	0.60	0.61	0.62	0.64
8.9%	0.49	0.50	0.51	0.52	0.54	0.55	0.56	0.57	0.59	0.60	0.61
9.8%	0.47	0.48	0.49	0.50	0.51	0.53	0.54	0.55	0.56	0.58	0.59
10.8%	0.45	0.46	0.47	0.48	0.49	0.51	0.52	0.53	0.54	0.56	0.57
11.8%	0.43	0.44	0.45	0.46	0.48	0.49	0.50	0.51	0.52	0.53	0.55
12.8%	0.41	0.42	0.43	0.45	0.46	0.47	0.48	0.49	0.50	0.51	0.53
13.8%	0.39	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.50	0.51
14.8%	0.38	0.39	0.40	0.41	0.42	0.43	0.44	0.46	0.47	0.48	0.49

Source: *Calculations of the author*

The calculated average P/S ratios is only **0.53** (Table 3) and is not sufficiently different from the fundamental P/S calculated through the one-stage model. As a rule, the results received under the two-stage model are much more precise. For most businesses it is normal to forecast return on equity (ROE) for the stable growth period, which is oriented around the level of the cost of equity. This is the most likely scenario in the long run. This combination suggests moderate levels of the fundamental P/S. Under the two-stage model, given a duration of the first period of 5 years, the weight of the cash flows from the stable growth period (the so called "continuing value") is decisive for the present value of stocks. In the applied here two-stage model the net margin and the cost of equity (**r**) change only during the first sub-period, and remain constant during the stable growth period. Therefore the values in Table 3 are not very sensitive to the different combinations between net margin and cost of equity. They vary within a narrow range between 0.38 and 0.72.

This fundamental average P/S of 0.53 is also much lower than the actual average P/S for the European market of 0.98. If we assume that this actual average P/S is

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representative, as well as if the input variables for the calculation of the fundamental P/S are representative, we can make the conclusion that stock prices on the European capital market are almost two times overpriced.

7. Fundamental EV/S ratio for the European stock market

The input variables for the fundamental EV/S are indicators at the enterprise level (or invested capital level), including: net operating margin, weighted average cost of capital (WACC), return on invested capital (ROIC), growth rate of net operating profit (g). We use WACC for the period 2010-2016 of 6.44%. In order to determine the expected growth rate, we use the average value of return on capital (ROC) for the most recent four years (2013-2016) of 4.50%, and the average reinvestment (retention) rate of operating profit (b) for the same period of 58.91%.

Thus, the input variables for the one-stage model for calculating the fundamental EV/S are as follows:

Net operating margin = 8.79%
Reinvestment rate **b** = 0.5891
Weighted average cost of capital **WACC** = 6.44%
Growth rate **g** = 2.65% (ROC × b = 4.50% × 0.5891 = 2.65%)

Table 4: *Average fundamental EV/S for the European market for 2017 (one-stage model).*

Pace of change of net operating margin (in %):						10%				
Pace of change of "WACC" (in %):						10%				

Values of **WACC**	Values of **Net Operating Margin**										
	4.4%	5.3%	6.2%	7.0%	7.9%	8.8%	9.7%	10.5%	11.4%	12.3%	13.2%
	EV/S	EV/S	EV/S	EV/S	EV/S	EV/S	EV/S	EV/S	EV/S	EV/S	EV/S
3.2%	3.26	3.91	4.56	5.21	5.86	6.52	7.17	7.82	8.47	9.12	9.77
3.9%	1.53	1.83	2.14	2.45	2.75	3.06	3.36	3.67	3.97	4.28	4.58
4.5%	1.00	1.20	1.40	1.60	1.80	2.00	2.20	2.40	2.60	2.80	2.99
5.2%	0.74	0.89	1.04	1.19	1.33	1.48	1.63	1.78	1.93	2.08	2.22
5.8%	0.59	0.71	0.83	0.94	1.06	1.18	1.30	1.41	1.53	1.65	1.77
6.4%	0.49	0.59	0.68	0.78	0.88	0.98	1.08	1.17	1.27	1.37	1.47
7.1%	0.42	0.50	0.59	0.67	0.75	0.84	0.92	1.00	1.09	1.17	1.25
7.7%	0.37	0.44	0.51	0.58	0.66	0.73	0.80	0.88	0.95	1.02	1.10
8.4%	0.32	0.39	0.45	0.52	0.58	0.65	0.71	0.78	0.84	0.91	0.97
9.0%	0.29	0.35	0.41	0.47	0.52	0.58	0.64	0.70	0.76	0.82	0.87
9.7%	0.26	0.32	0.37	0.42	0.48	0.53	0.58	0.63	0.69	0.74	0.79

Source: *Calculations of the author.*

The results of the application of the one-stage model are in Table 4. The calculated EV/S of **0.98** is more than twice lower than the actual average EV/S for Europe of 2.12. The other calculated values in the table demonstrate high sensitivity to the different combinations between net operating margin and cost of capital (WACC). This should be explained with the use of the one-stage model and its drawbacks.

The input variables for the two-stage model are determined, following the same logic as for the two-stage fundamental P/S model. We assume that the net operating margin during the stable growth period will remain the same as for the explicit forecast period. For determining the expected growth g_2 we assume that the return on capital (ROC) in the long term will be about the same as the weighted average cost of capital (WACC), and the reinvestment rate of the net operating profit (NOPLAT) is with a moderate value of 0.5.

Thus, the input variable for the model are as follows:

> Net operating margin during the explicit forecast period = 8.79%
> Retention (reinvestment) rate during the explicit forecast period b_1 = 0.5891
> Weighted average cost of capital during the explicit forecast period $WACC_1$ = 6.44%
> Growth rate during the explicit forecast period g_1 = 2.65%
> (ROC × b = 4.50% × 0.5891 = 2.65%)
> **Continuance of the explicit forecast period n = 5 years**
> Net operating margin after the explicit forecast period = 8.79% (remains the same)
> Retention (reinvestment) rate after the explicit forecast period b_2 = 0.5
> Weighted average cost of capital after the explicit forecast period $WACC_2$ = 6.44%
> Growth rate after the explicit forecast period g_2 = 3.22%
> (ROC × b = 6.44% × 0.5 = 3.22%)

Table 5: *Average fundamental EV/S for the European market for 2017 (two-stage model).*

Values	Pace of change of net operating margin (in %):							10%			
	Pace of change of "WACC" (in%):							10%			
Values	Values of **Net Operating Margin**										
of	4.4%	5.3%	6.2%	7.0%	7.9%	8.8%	9.7%	10.5%	11.4%	12.3%	13.2%
WACC									%	%	%
	EV/S	EV/S	EV/S	EV/S	EV/S	EV/S	EV/S	EV/S	EV/S	EV/S	EV/S
3.2%	1.46	1.48	1.49	1.51	1.53	1.55	1.57	1.58	1.60	1.62	1.64
3.9%	1.42	1.43	1.45	1.47	1.49	1.50	1.52	1.54	1.56	1.57	1.59
4.5%	1.37	1.39	1.41	1.43	1.44	1.46	1.48	1.49	1.51	1.53	1.54
5.2%	1.33	1.35	1.37	1.38	1.40	1.42	1.43	1.45	1.47	1.48	1.50

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5.8%	1.29	1.31	1.33	1.34	1.36	1.38	1.39	1.41	1.43	1.44	1.46
6.4%	1.26	1.27	1.29	1.31	1.32	1.34	1.35	1.37	1.39	1.40	1.42
7.1%	1.22	1.24	1.25	1.27	1.28	1.30	1.32	1.33	1.35	1.36	1.38
7.7%	1.19	1.20	1.22	1.23	1.25	1.26	1.28	1.29	1.31	1.33	1.34
8.4%	1.15	1.17	1.18	1.20	1.21	1.23	1.24	1.26	1.27	1.29	1.31
9.0%	1.12	1.13	1.15	1.16	1.18	1.19	1.21	1.22	1.24	1.25	1.27
9.7%	1.09	1.10	1.12	1.13	1.15	1.16	1.18	1.19	1.21	1.22	1.24

Source: *Calculations of the author.*

Table 5 shows that the received average EV/S ratio under the two-stage model is **1.34**. This fundamental EV/S is also much lower than average actual EV/S for the European market of 2.12, which is an indicator that according to the results from two-stage model, the market seems again seriously overpriced. Of course, we again make the provision that the above conclusion is valid only if we accept that the actual average EV/S for Europe is representative, as well as if we accept that the input variables for the calculation of the fundamental EV/S are also representative enough for Europe. The table shows also that because of the change of the net operating margin and the weighted average cost of capital during the explicit forecast period, the fundamental EV/S ratios vary within a narrow range – between 1.09 and 1.64. This is mainly due to the moderate average input variables after the end of the explicit forecast period (or during the stable growth period).

8. Conclusion

The P/S and EV/S ratios provide excellent opportunity for analysis of stock prices and indexes on the main international capital markets, including European developed markets. Besides through the comparison among different markets, and with historic averages, actual P/S and EV/S can be even better analyzed by comparing with the respective fundamental P/S and EV/S for each capital market. The derived fundamental P/S and EV/S ratios on the European stock market are much lower than the actual average ratios. This means that the stock market in Europe seems highly overpriced, judging from these two market ratios. This conclusion, of course, is valid only if the average actual P/S and EV/S are representative for the developed European markets, and also if the input variables for calculating the P/S and EV/S for Europe are representative.

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