ENHANCING THE ADJUSTMENTS OF MARKET MULTIPLES FOR BETTER OPERATING EFFICIENCY

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Abstract: The study focuses on one of the specific applications of the market approach. The market approach is a valuation method whereby the fair market value of the target company is determined by reviewing comparable companies with similar operational and financial characteristics. The International Valuation Standards (2017) require that a valuer should make adjustments to the selected market multiples. Kasarova, Pramatarska and Lazarova (2009) and Todorov (2015) propose a method for adjusting market multiples for country risk and efficiency when the market approach is applied to emerging markets. We enhance their adjustment approach by removing its inherent restrictions.

Keywords: market approach, amrket multiples, enterprise valuation.
JEL: G12, G30.

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Introduction

Trading multiples are the core of the market approach methods to enterprise valuation. This approach is based on the trade-off principle whereby a rational buyer would not buy an asset at a price greater than the lowest price asked for an asset with equivalent utility. In Economics, this principle is known as the Law of One Price (LOOP). It states that in a perfectly efficient market, two identical assets must sell for the same price.

Market multiples are used by investors, financial analysts, and valuers to estimate the fair value of a stock or share. For example, the numerator of the multiple can be the price at which the stock is trading and its denominator is usually an accounting metric taken from the financial statements of the

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target enterprise. To ensure comparability between numerator and denominator, the value of the accounting metric is also calculated per share. The most commonly used accounting metrics are the net operating income, the net profit, the book value of equity, and, less frequently, the operating profit[2] and the cash flows.

As Baker and Ruback (1999) point out, the valuation method of multiples has advantages. Implicit in the multiple is a forecast of future cash flows and an estimate of the appropriate discount rate. The method of multiples avoids the problems in applying the discounted cash flow techniques of selecting a theoretical model of the appropriate discount rate and estimating it using historical data. Baker and Ruback (1999) appropriately point out that if a truly comparable publicly traded firm or transaction were available, if the basis of substitutability could be determined, and if the multiple could be estimated reliably, then the method of multiples would be clearly superior to discounted cash flow analysis.

Baker and Ruback's (1999) note is important, because the Law of One Price is valid only for homogenous assets. In practice, however, such assets are very difficult to find and the related metrics must be adjusted to make them comparable and excessive adjustments may lead to unreliable valuation. This is why the International Valuation Standard 105 "Valuation Approaches and Methods" requires a critical comparative analysis of qualitative and quantitative similarities and differences between the comparable assets and the subject asset.

Many researchers in the field of valuation argue that the panel of comparable enterprises should have similar operational and financial characteristics with the evaluated enterprise. This selection approach is known as fundamental because it uses fundamental factors, such as profitability, growth rate and risk exposure for selection of comparable enterprises. Proponents of the approach are Boatsman and Baskin (1981), Bhojraj and Lee (2002), Herrmann and Richter (2003), Dittmann and Weiner (2005), Goedhart, Koller and Wessels (2005). An alternative to the fundamental approach is the sectoral approach. According to its proponents Alford (1992), Bhojraj, Lee and Oler (2003), Damodaran (2006), Schreiner and Spremann (2007), Henschke and Homburg (2009), Nel, Bruwer, and Le Roux (2013a,b), comparable enterprises selected from the same industry will have the same characteristics as the subject enterprise.

We do not share the approach of Kasarova, Pramatarska and Lazarova (2009) and Todorov (2015) to the fundamental approach to selection of comparable enterprises. They propose a method for adjusting market

[2] i.e. the Earnings Before Interest and Taxes (EBIT).

multiples for country risk and efficiency when the market approach is applied to emerging markets. We see opportunities for enhancing and simplifying this approach by removing its inherent constraints.

Literature Review

The underlying criterion is industry affiliation, as it is assumed that businesses in the same sector would have similar profit growth rates, risk characteristics and accounting policies. Although the most popular industry classification standard used by financial analysts and investment bankers is The Global Industry Classification Standard (GICS), the access to its databases is subscription-based and this is why academic research is based on the Standard Industry Classification (SIC). Bhojraj, Lee, and Oler (2003) investigated the application of four industry classifications to enterprise valuation using market multiples to prove the advantages of the Global Industry Classification Standard (GICS).

Boatsman and Baskin (1981) compare the accuracy of two selection methods using the P/E market multiple for valuation of enterprises whose shares are traded on the regulated market. The first method is based on selection of comparable enterprises from the same industry, and the second method, in addition to the selection following the first method, performs a second selection from the sample based on the average annual profit growth rate over a period of 10 years. The results of their study show that the second method is more accurate.

Kim and Ritter (1999) argue that the discounted cash flows method is not accurate when applied to valuation of initial public offerings. They believe that despite its sound theoretical grounding, the method is unreliable when applied for valuation of stocks on initial public offering due to the uncertainty associated with the estimation of future cash flows and discount rates and point out that in such cases the market approach is most relevant.

Kim and Ritter (1999) found out that, within a given industry, fundamental indicators vary widely both for listed stocks and initial public offerings, which results in unreliable predictability. The precision of valuation of initial public offerings could be enhanced if market multiples are adjusted for differences in growth rate and profitability.

Cheng and McNamara (2000) found out that the P/E and P/B multiples are highly accurate for enterprise valuation adjusted for industrial affiliation and return on equity. Their study showed that a combination of P/E and P/B is more accurate that either multiple applied individually. The accuracy of such

a combination could be enhanced when it is adjusted for both return on equity and industrial affiliation.

Bhojraj and Lee (2002) prove that there is a strong and stable correlation between profitability, growth rate and risk with the EV/S and PB multiples. They find that specific company variables are more important than sectoral affiliation and enterprise value.

The study of Liu, Nissim, and Thomas (2002) reveals the extent to which different value drivers can be indicative for forward earnings, of the degree of similarity between the comparable and the subject enterprise, along with growth rate and risk. The results confirm that accounting accruals increase the accuracy of valuation compared to cash flows. Operating and/or net financial results are more useful indicators than revenue and cash flows.

Nel, Bruwer and Le Roux (2013, 2014) focus on an emerging market - the Johannesburg Stock Exchange. Their results show that multiples based on earnings as a value factor are most accurate for valuation using market multiples. The best valuation accuracy is achieved for peer selection based on a combination of return on equity and growth rate drivers.

Rubio - Martín (2019) prove that the enterprise size is an important control factor because it incorporates an important imperfection about capital market efficiency, viz. that the ratios of largest versus smallest enterprises perform differently with the same economic conditions. Thus, ratios and therefore prices of small companies in capital markets could rise more than those of large ones when in a context of growth, profitability variables increase and required return decreases, even being overvalued in moments of economic expansion. However, in recessions, small companies' ratios would decrease more than what is "rational" comparatively to the largest one, starting an undervaluation process. Therefore, financial analysts and valuers must take into account the size of the valuated enterprise to the size of the Rubio - Martín (2019) analogues, proving that the size of the entity is an important controlling factor because it reflects a very important characteristic of the capital markets - their imperfection. This is reflected in the following: market factors and prices for small-sized enterprises are higher and higher than those of large-sized enterprises as profits and profitability grow. This overestimation of small businesses has been seen in an environment of economic growth. In a recession, the opposite process is observed - an underestimation. There is a greater decline in prices and market factors for small-sized enterprises than for large ones. Therefore, financial analysts and

valuers must take into consideration the size of the subject enterprise when they select the peer group.[3]

The empirical results discussed above undoubtedly prove the need to adjust the market multiples of the peer group before applying them to the accounting accrual of the subject enterprise. Valuers should adjust the calculated multiple for the operating and financial characteristics of the subject enterprise. According IVS 105, such key valuation metrics are return on equity, profit growth, risk and size of the enterprise.

Adjustment of market multiples

The application of unadjusted market multiples for valuations using the market valuation approach is not recommended. Both the scientific publications and the regulations in this field recommend that they should be adjusted to reflect the operational and financial characteristics of enterprises. Valuers should consider a number of quantitative and qualitative factors whether or not they have decided to use market multiples valuation method. In this regard, Kasarova, Pramatarska, and Lazarova (2009) propose a model for comparative company valuation that takes into account the influence of various factors, among which *country risk* plays an important role.

Measuring the country risk

Country risk comes from a company's operations in a given country and the changes in this country's economy that may have adverse effects on the company's operating profits or assets located in the country. Factors such as control over foreign currency transactions and transfers, devaluations, regulatory changes, political turmoil, and even insurrections or civil wars may affect the risk exposure of the company's operations. Although country risk is often used as synonymous to political risk, it is a more general term, which usually refers only to risks affecting all companies operating in a given country.

The proposed adjustments for and the country risk premium are for the systematic country risk. This clarification is very important in terms of investors' possibilities to diversify some risks. Non-systematic risks are not taken into account in calculating the discount rate. *It should reflect only the*

[3] According to Rubio – Martín (2019), there is a direct correlation between market multiples as a dependent variable and profitability but an inverse correlation between market multiples and financial leverage and changes in operating capital. These findings do not contradict the results from the other studies discussed above.

systematic risks and result in a risk premium only for the exposure to systematic risks, because specific risks can be diversified.

Pereiro (2002, p. 278) cites a research paper published by Damodaran (1996), which demonstrates the negative impact of country risk on the P/E market multiple. The lower the risk, the higher the multiple, and vice versa. Pereiro proposes two approaches for country risk adjustment. The first approach is to use a correction factor, which is the ratio between the average value of a market multiple for the country in which the assessed company operates and the average value of a market multiple for the country of the peer company. Pereiro (2002, p. 300) uses the P/E multiple of the main stock exchange index in the emerging market and the P/E multiple of NYSE as a correction factor to adjust the two multiples.

The second approach is to use of regression analysis, which is actually the approach used by Damodaran (1996). It is based on the assumption that the market factor is a linear function of many factors, including the country risk. We are not adherents to this approach because its implementation requires a large sample of data to produce statistically valid results. Moreover, it requires a selection of an appropriate method for calculating the regression parameters while the frequently used least squares method is not fit for the purpose.

Kasarova, Pramatarska, and Lazarova (2009) consider the effect of the adjustment of market multiples for country risk measured in terms of various indicators. They follow Pereiro's approach (2002, p. 300) using a adjustment coefficient which is the ratio of the country risk indicator of the country of the peer company to that of the country of the assessed company. The adjusted market multiple is equal to the ratio between the market multiple and the adjustment coefficient, as shown in equation *(1)*.

$$(1) \qquad P/M^{c}_{adj} = \frac{P/M}{AC_{country}},$$

where:

P/M^{c}_{adj} is the market multiple adjusted for country risk;

P/M – is the unadjusted market multiple;

$AC_{country}$ – is the adjustment coefficient for country risk.

The country risk adjustment coefficient is calculated using equation *(2)* as a ratio of the economic freedom index of the peer country to the economic freedom index of the assessed country.

(2) $$AC_{country} = \frac{CR_{assessed}}{CR_{peer}}$$

$CR_{benchmark}$ – credit risk of the peer country (benchmark) according to the Index of Economic Freedom;
$CR_{assessed}$ – credit risk of the assessed country according to the Index of Economic Freedom.

For equations *(1)* and *(2)* we follow the same adjustment logic but use other abbreviations compared to the equations of Kasarova, Pramatarska, and Lazarova (2009), i.e. we use P/M for Price/Multiple and AC for Adjustment Coefficient in order to highlight the inverse correlation between the market multiple and the country risk index discussed by Periro (2002). In order to demonstrate that lower country risk exposures result in higher market multiple values, we transform the above two equations into equation *(3)*.

Higher values of the country risk indicator mean less exposure to risk and vice versa. Therefore, if the country risk of the assessed company is higher than that of the peer company, this means that the assessed comp-any has a lower risk exposure and the country risk adjustment coefficient will have a value greater than 1 and the market multiple will be higher. Conversely, if the country risk indicator of the country of the assessed company has a value lower than that of the country of the peer company, then the country risk is higher. Thus, for high levels of country risk, the adjustment coefficient will be less than 1 and the market multiple will be lower.

(3) $$P/M^{c}_{adj} = P/M \times AC_{country} = P/M \times \frac{CR_{assessed}}{CR_{peer}}$$

Adjustment for operating and financial efficiency

Kasarova, Pramatarska, Lazarova (2009, p. 14) and Todorov (2015) propose market multiple adjustment coefficients that are similar to those suggested by Periro (2002) regarding the adjustment for non-systemic risks in estimating synthetic multiples.

Kasarova, Pramatarska, and Lazarova (2009, p. 14) adjust the levels of efficiency of the assessed and the peer companies using the following technique. First, they determine the individual profitability ratios (ROE, ROA, ROS) of the assessed company and for each of the selected peers. Then they calculate three adjustment coefficients for adjusting the return on equity ($К_{К1}$), the return on assets ($К_{К2}$) and the return on sales ($К_{К3}$) as shown in equation *(4)*.

$$\text{Кк}_1 = \frac{ROE_{assessed}}{ROE_{peer}}$$

(4) $$\text{Кк}_2 = \frac{ROA_{assessed}}{ROA_{peer}},$$

$$\text{Кк}_3 = \frac{ROS_{assessed}}{ROS_{peer}}$$

където:
$ROE_{assessed}$ – return on equity of the assessed company;
ROE_{peer} – return on equity of the peer company;
$ROA_{assessed}$ – return on assets of the assessed company;
ROA_{peer} – return on assets of the peer company;
$ROS_{assessed}$ – return on sales of the assessed company;
ROS_{peer} – return on sales of the peer company.

Equation *(5)* is the general adjustment coefficient (ОКкр), which is the product of the three adjustment coefficients and is calculated for each peer company as:

(5) $$\text{ОКкр} = \text{Кк}_1 \text{x} \text{Кк}_2 \text{x} \text{Кк}_3$$

The market multiple of the assessed enterprise is adjusted with the general adjustment coefficient to make the assessed company comparable to the selected peers.

Todorov (2015) also intuitively accepts the idea market multiples should be adjusted but uses adjustments coefficients based on the theoretical models of each multiple (P/E, P/B and P/S.) The constituent factors of P/E and P/B are the return on equity (ROE), the net profit growth rate (g), and the cost of equity (R_e), i.e. risk exposure. These factors, together with the net profit margin (NPM) determine the P/S multiple. Thus, Todorov (2015) calculate the adjustment coefficient for each multiple of every peer. Equation *(6)* is the adjustment coefficient for P/E and P/B, since they are affected by the same factors. The adjustment coefficient for P/S is calculated using equation *(8).*

(7) $$\text{К}_1 = \frac{ROE_a}{ROE_{peer}} \text{x} \frac{g_a}{g_{peer}} \text{x} \frac{R_E^{peer}}{R_E^a}$$

(8) $$\text{К}_2 = \frac{NPM_a}{NPM_{peer}} \text{x} \frac{ROE_a}{ROE_{peer}} \text{x} \frac{g_a}{g_{peer}} \text{x} \frac{R_E^{peer}}{R_E^a},$$

where:
K_1 – adjustment coefficient for the P/E and P/B multiples;
K_2 – adjustment coefficient for the P/S multiple;
ROE_a – return on equity of the assessed company;
ROE_{peer} – return on equity of the assessed company;
g_a – net profit growth rate of the assessed company;
g_{peer} – net profit growth rate of the peer company;
NPM_a – net profit margin of the assessed company;
NPM_{peer} – net profit margin of the peer company;
R_e^a – cost of equity of the assessed company;
R_e^{peer} – cost of equity of the peer company.

Todorov (2015) uses the above equations to calculate the adjustment coefficients for the market multiples and thus to determine the market value of the assessed enterprise.

The factors used by Kasarova, Pramatarska, Lazarova (2009) and Todorov (2015) to determine the adjustment coefficients are compatible with the view of the proponents of the fundamental approach to peer selection. Moreover, they reflect the idea for adjustment for operational and financial efficiency - each market multiple has a main underlying fundamental factor. If the fundamental factor of the assessed company is higher than that of its peers, then the valuation market multiple will be higher and vice versa - the valuation market multiple will be lower when the fundamental factor of the assessed company is lower than that of the peers. In other words, the market multiple of the peer companies must be adjusted with a certain coefficient equal to the ratio between the fundamental factors of the assessed company and its peers.

A closer look at the adjustment coefficients expressed with equations *(4)* to *(8)* reveals that both methods for calculation of adjustment coefficient have a common feature. They are too restrictive in terms of the assumptions made for the factor values, i.e. the three return ratios of both the assessed and the peer company used by Kasarova, Pramatarska, Lazarova (2009) must have positive values in order to obtain a positive overall correction factor and hence a positive value for the assessed company. The same constraint applies to the adjustment coefficients of the three factors used by Todorov (2015) to ensure that the market value of the assessed company will be positive, as is the economic logic.

If we assume that at the time of valuation any of the peers has a negative net financial result, then ROE, ROA and ROS will have negative values and thus the adjustment coefficients $Кк_1$, $Кк_2$, and $Кк_3$, as well as the general adjustment coefficient (ОКкр) will have negative values as well. This

will result in calculation of a negative market value for the assessed company, since the adjusted market multiple will be negative.

The same assumption applied for Todorov's (2015) adjustment coefficients will result in several possible scenarios. In case of a negative net financial result of the peer company, ROE_{peer} will have a negative value and the resulting K_1 coefficient will be negative as well. When it is applied to positive P/E or P/B, the market multiples adjusted with K_1 will also be negative. Thus, the multiples will contradict the economic logic. Due to the limited scope of our study, we will not consider the other possible combinations of factors that would lead to negative adjustment coefficients and hence to negative market values of the assessed company.

The requirement that all factor values be positive is too restrictive. It can be applied if the valuer, as proposed by Nel, Bruwer and Le Roux (2013, 2014), selects only peers that strictly comply with the going concern principle. In such case all peers in the sample for calculating the market multiple to be adjusted and used for valuation of the assessed company will have positive values for profit growth, return on equity and net profit margin. This requirement would drastically reduce the number of peers in the sample, especially in periods of downward economic cycle, when companies have poorer or even negative financial performance. The valuer would then compromise and include other entities that do not have the same qualitative characteristics as required by IVS 105.

Even if all peers meet the requirement to comply with the going concern principle, i.e. to have positive values of their financial results, profitability, and growth rate, some adjustment coefficient may still have negative values when the assessed company has a negative financial result or profit growth rate. In such case, despite the fact that the fundamental factors of all peers have positive values, the adjustment coefficient will have negative values and the market approach methods will be inapplicable.

The adjusted market multiple we propose is calculated using equation *(9)*. It is expressed as a product of the unadjusted market multiple chosen for valuation of the assessed company and a ratio of the counterpart fundamental factors of the assessed and the peer company.

$$P/M_{adj} = P/M \times \frac{1+F_{assessed}}{1+F_{peer}}, \quad (9)$$

where:
P/M_{adj} – is the adjusted market multiple for operating efficiency;
P/M – is the unadjusted market multiple;
$F_{assessed}$ – is the fundamental factor of the assessed company;
F_{peer} – is the fundamental factor of the peer company.

Equation *(9)* includes only one underlying fundamental factor for any given market multiple. The underlying fundamental factors for each market multiple are shown in Table 1. They were determined using a theoretical model for each market factor (e.g. Damodaran (1996) and Todorov (2015)), and validated by the studies of Bhojraj and Lee (2002), Nel, Bruwer and Le Roux (2013, 2014), and Bernström (2014).

Table 1

Fundamental factors underlying the market multiples

Market multiple	Factor
Price-earnings (P/E)	*Profit growth rate (g)*
Price-Book value (P/B)	*Return on equity (ROE)*
Price-Sales (P/S)	*Return on sales (m)*
Enterprise value – Sales (EV/Sales)	*Operating sales margin (EBIT%)*
Enterprise value – Earnings before interest and taxes (EV/EBIT)	*EBIT growth rate (g)*

The proposed adjustment for operational and financial efficiency of a market multiple eliminates the restriction inherent in the adjustments proposed by Kasarova, Pramatarska, Lazarova (2009) and Todorov (2015). If a fundamental factor of the assessed enterprise has a negative value, then the multiplicand in equation *(9)* will be less than 1 and the market multiple of the peer will be lower. Thus, due to its worse operational and financial efficiency, the assessed enterprise will have a lower market multiple than the peer enterprise and hence - lower value.

The multiplicand in equation (9) will be less than 1 if the assessed enterprise is less efficient than the peer (e.g. when its profit growth rate is a positive value lower than the peer's profit growth rate.) This inefficiency cannot justify a high market factor, and hence a high market value. Therefore, the numerator will less than 1, which will reduce the value of the multiplicand in equation *(9)* below 1 as well. Thus, the adjusted market multiple will be lower than that of the peer.

If the assessed enterprise has a higher degree of operational and financial efficiency, this would adjust the market multiple of the upwards and the calculated marked value of the assessed enterprise will be higher. This adjustment logic will affect equation *(9)* as follows: the numerator value will be greater than 1 and greater than the value of the denominator and therefore the multiplicand in equation *(9)* will be greater than 1.

Practical example

The merits and demerits of the three approaches to adjusting market multiples for operational and financial efficiency were tested using an actual valuation case. The assessed company is operating in the mechanical engineering sector in Bulgaria[4] and is not listed on a regulated market. The selected peer is Atlas Copco AB - a leading Swedish manufacturer, which is also a customer of the assessed company. Both companies operate in the mechanical engineering sector and manufacture the same types of products - compressors, vacuum equipment, industrial equipment. In terms of size, the two companies do not meet the comparability criterion. The Swedish company has a market capitalization of € 32 billion, while the book value of the Bulgarian company's equity is € 3.2 million. The incomparability between the two companies will help us determine the shortcomings of the approaches used for adjustment of market multiples for operational and financial efficiency.

The information we use for the Swedish company is public and available from the Investor Relations section of its website[5]. The data for the Bulgarian company was taken from its annual financial statements. The analysis covers the period from 2010 to 2018, and the data we present is for 2014, as we calculate the average annual growth rate of profits over a period of 5 years. For each year from 2014 to 2018, we calculate three market multiples (P/E, P/B, and P/S) of the peer enterprise and then adjust them using the three approaches. The adjustment coefficients are calculated for each year using the financial ratios of the peer company and the assessed company and then the market multiples are adjusted accordingly.

Panel A in Table 2 presents the market multiples of the peer company, calculated using the closing prices at the end of the year and the accounting variables from the audited annual financial statements. Panels B and C show the financial ratios of the two enterprises used for calculation of the adjustment coefficients.

[4] The name of the assessed company is not revealed due to confidentiality requirements.

[5] https://www.atlascopcogroup.com/en/investor-relations

Table 2

Market multiples and financial ratios of the assessed company and the peer company

	2014	**2015**	**2016**	**2017**	**2018**
Panel A. Market multiples					
P/E	21.82	21.66	28.29	25.82	15.65
P/B	5.23	5.42	6.34	7.10	6.01
P/S	2.83	2.56	3.32	5.02	2.68
Panel B. Peer company's ratios					
ROE	28.10%	24.16%	27.59%	22.26%	31.70%
ROA	23.99%	25.19%	25.92%	20.89%	38.46%
ROS, NPM	12.99%	11.90%	13.60%	14.78%	17.13%
g	5.19%	3.44%	1.20%	-1.90%	6.22%
σ_{EBIT}	15.98%	12.08%	11.39%	9.34%	10.25%
Panel C. Assessed company's ratios					
ROE	11.70%	10.13%	11.66%	10.04%	9.81%
ROA	9.88%	9.94%	9.27%	7.66%	7.37%
ROS, NPM	12.50%	10.11%	11.80%	9.31%	8.82%
g	14.63%	12.83%	17.87%	6.09%	-0.12%
σ_{EBIT}	19.74%	10.00%	14.13%	15.28%	14.08%

Note: σ_{EBIT} indicates the level of risk exposure.

The market multiples of Atlas Copco AB are relatively high compared to the industry average for Europe due to the company's higher profit margins and growth rates.[6] If these relatively high multiples are not adjusted, the resulting valuation of the Bulgarian company will be unrealistically high. If we compare the data in panels B and C, we can see that such an adjustment is necessary since the assessed company has several times lower ROE, ROA, and ROS (NPM) ratios and only its profit growth rate is comparable with the same factor of the peer company. This means that its multiples should be much lower. Although the higher rate of profit growth of the Bulgarian company would justify a higher P/E multiple, we should bear in in mind that these growth values are due to the lower volume of its operations.

Since the Bulgarian company is not listed, Todorov's (2015) approach for calculation of the cost of its equity (Re) will not be objective. We use the

[6] Due to publication volume limits, here we do not discuss the related industry multiples and financial ratios. They are available at http://pages.stern.nyu.edu/~adamodar/ New_ Home_ Page/datacurrent.html

standard deviation of earnings before interest and taxes (EBIT) as a risk substitute. In corporate finance, this indicator is a measure of business risk.

Table 3

Adjustment coefficients

	2014	**2015**	**2016**	**2017**	**2018**
Panel A. Kasarova, Pramatarska and Lazarova (2009)					
$К_{к1}$	0.416	0.420	0.423	0.451	0.309
$К_{к2}$	0.412	0.395	0.358	0.367	0.192
$К_{к3}$	0.962	0.850	0.868	0.630	0.515
ОКкр	0.165	0.141	0.131	0.104	0.031
Panel B. Todorov (2015)					
K_1	1.450	1.294	7.818	(2.370)	(0.008)
K_2	1.395	1.099	6.786	(1.492)	(0.004)
Panel C. Kanaryan (2019)					
Adjustment component of P/E	1.090	1.091	1.165	1.081	0.940
Adjustment component of P/B	0.872	0.887	0.875	0.900	0.834
Adjustment component of P/S	0.996	0.984	0.984	0.952	0.929

Table 3 shows the adjustment coefficients calculated using the three approaches. As we already noted, the negative growth rate of the peer in 2017 and of the assessed company in 2018 results in negative values of two adjustment coefficients (K_1 and K_2), which means that this approach is inappropriate. The general adjustment coefficient of Kasarova, Pramatarska and Lazarova (2009) has low values throughout the analysed period. Its lowest value is for 2018. Therefore, it can be expected that the adjusted market multiples will have much lower values than the peer's unadjusted multiples due to the fact that the assessed company has 2 to 3 times lower profitability than the peer.

Todorov's adjustment coefficients (2015), presented in Panel B of Table 3, illustrate the shortcomings of this approach at negative values of one of the variables used for calculation of the adjustment coefficients. The negative average annual growth rates of the assessed company (at the end of 2018) and the peer (in 2017) would result in market multiples which will indicate a negative value of the assessed company.

The adjustment coefficients calculated using our approach produce the expected results. Given the higher profit growth rate of the assessed company throughout the period (except in 2018, when the rate is negative), P/E

multiple is indexed. The other adjustment coefficients are less than 1 due to the lower values of the return on equity and the net profit margin.

Table 4

Adjusted market multiples

	2014	**2015**	**2016**	**2017**	**2018**
Panel A. Adjusted P/E					
Kasarova et al. (2009)	3.60	3.05	3.71	2.69	0.48
Todorov (2015)	31.63	28.02	221.16	(61.18)	(0.13)
Kanaryan (2019)	23.78	23.63	32.95	27.92	14.72
Panel B. Adjusted P/B					
Kasarova et al. (2009)	0.86	0.76	0.83	0.74	0.18
Todorov (2015)	7.58	7.01	49.55	(16.82)	(0.05)
Kanaryan (2019)	4.56	4.81	5.55	6.39	5.01
Panel C. Adjusted P/S					
Kasarova et al. (2009)	0.47	0.36	0.44	0.52	0.08
Todorov (2015)	3.95	2.81	22.56	(7.49)	(0.01)
Kanaryan (2019)	2.82	2.52	3.27	4.78	2.49

Table 4 shows the adjusted values of the three market multiples. The values of the three multiples adjusted following the approach of Kasarova, Pramatarska and Lazarova (2009) are least volatile throughout the analysed period. The much lower profitability of the assessed company than the profitability of the peer has resulted in market multiples with values that are many times lower than the unadjusted multiples. The fact that profitability has positive values throughout the period has resulted in positive values of the adjustment coefficients and, therefore, of the adjusted multiples.

The multiples adjusted using Todorov's (2015) approach are most volatile. The negative average annual growth rates of both the assessed and the peer company resulted in negative values of all three multiples in 2017 and 2018. This makes the market approach inapplicable. The highest values of the three multiples are calculated for 2016. This is due to the much higher rate of profit growth of the assessed enterprise compared to that of the peer. Although the other financial ratios of the Bulgarian company are lower, its higher growth rate cannot be adjusted so as to obtain more normal values of the multiples. The growth rate factor is inherent for the P/E multiple, but in Todorov's (2015) approach it affects the other multiples as well. This is due to the fact that it is used in the calculation of the adjustment coefficients for each of the three multiples.

The values of the multiples adjusted using the approach we propose are close to the values of the unadjusted multiples and are relatively stable over the analysed period. They are neither highly underestimated as those calculated using the approach of Kasarova, Pramatarska, and Lazarova (2009), nor are they significantly overestimated or negative, as in Todorov's (2015) approach.

The adjusted values of the P/E multiple, calculated following our approach pose, differ very slightly from the values of the unadjusted multiple. For 2016, the year of the biggest difference in growth rates, the adjusted P/E multiple is not significantly different from the unadjusted one, although the growth rate of the assessed company is 14.89 times higher than that of the peer. The adjustment method we propose reduces this difference. The adjusted P/E is higher than the unadjusted one with only 16.47%, while in Todorov's (2015) approach, the adjusted P/E is more than 10 times higher than the unadjusted one.

In years of negative profit growth of either the peer company or the assessed company, the adjusted P/E multiple has positive values. When the peer enterprise has a negative profit growth rate, the adjusted multiple is higher than the unadjusted one due to the higher positive profit growth rate of the assessed enterprise. Such is the case in 2017. In 2018, the peer has a positive growth rate and the assessed company's profit growth rate is negative. Our approach lowers the P/E multiple when the assessed enterprise has a negative profit growth rate, as this does not justify a high P/E multiple.

Conclusions

In applying the market approach, IVS 105 requires the valuer to analyse and adjust for possible differences between the peers and the asset being valued. Kassarova, Pramatarska and Lazarova (2009) and Todorov (2015) have developed an approach for adjusting market multiples for country risk and operational and financial efficiency when the market approach is applied to emerging markets. Their approach has a constraint regarding the performance indices of the peers and the assessed enterprise. They should have positive values, which is not always possible. When the fundamental metrics of either the assessed enterprise of its peers have negative values, the adjustment coefficients are economically meaningless. They will result in a negative value of the assessed company, which does not make sense.

We modify the adjustment ratio so that it is not too restrictive and further simplify the adjustment coefficient to reflect the influence of only one underlying factor which is specific to each type of market multiple. This

approach provides more consistent results compared to the other two approaches by neutralizing the effect of extreme values of the fundamental adjustment factors. Our approach is not an intuitive mathematical model as is the approach of Todorov (2015). It would not be appropriate for valuation of start-ups or rapidly growing companies as it would underestimate them. The approach should be further and more thoroughly tested with forecast data of the underlying metrics.

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ISSN 0323-9004

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