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Unbiased Beta Despite Biased Data: Some Elementary Results

In many valuations, the cost of equity is determined on the basis of the CAPM. The dominating instrument for estimating the beta factor within this framework is the so-called Market Model. As far as the own beta of the valuation object is concerned, the reliability of the data available for this purpose is often questioned and an alternative tool, in particular a peer group beta, is used. The following article identifies types of data bias that do not affect the outcome of beta estimation – both for an individual company and for a peer group. The results urge caution against a hasty rejection of the object beta and an almost automatic use of peer group betas.

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Tax Purchase Price Allocations in Carve-Out Transactions

Corporates are increasingly using carve-outs for the divestment of non-core businesses in an attempt to streamline their organizational structure and to raise cash proceeds. Carve-out transactions are usually executed on a local level with various share deals and asset deals requiring to allocate the (global) purchase price to the level of local legal entities / businesses and potentially even to the assets / liabilities (so called “tax PPA”). The purpose of this article is to show the steps and timing involved with a tax purchase price allocation (tax PPA). Overall, the paper shows that tax PPAs are a major factor affecting the financial and tax outcome of international carve-out transactions.

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From the Editors

The Impact of Artificial Intelligence on Business Valuations – Points of Reflection

This brief reflection on the impact of Artificial Intelligence (AI) on business valuations will focus on the valuation of unquoted entities. I believe that the use of the tools offered by AI will bring very sig-nificant changes to the business valuation profession. These developments will occur in a relatively short time and will be articulated in two phases. First phase – generation of valuation metrics based on the implementation of machine learning algorithms and initial automated or semi-automated valuation processes. The first attempts in this direction are already underway and stem from the possibility of "predicting" the current capitalization of a listed company with good accuracy, starting from a set of publicly available standardized data (*Koklev,* 2022), to then infer usable parameters, possibly after appropriate adjustments, for valuing unlisted companies (*Jagrič, Fister, Grbenic, Herman*, 2024). The quality of the predictions may be improved by training the algorithms on datasets selected by industry, geographic area, and reference sample size. Second phase – development of integrated valuation models, combining metrics and predictions generated by machine learning with the collection, analysis, and synthesis of unstructured information performed by large language models.

The availability of reliable business valuations, carried out in a very short time and at very low cost, will radically change the circulation of securities and rights representing the capital of unlisted companies and businesses, as well as the rights representing business units and intangible assets.

There are two possible contrasting scenarios that could have consequences for business valuers: The first, pessimistic, foresees the exit from the market of a significant part of the professionals currently involved in business valuations, consequently not so much of the automation of valuation processes, but of the sharp reduction in prices to the final customer. The activity of the professionals who will remain on the scene will consist of monitoring and continuously improving the valuation processes, as well as intervening in pathological cases, where personal expertise will always remain an essential element (for example, in the case of judicial disputes, fraud, etc.). The second, optimistic, is related to the many professional opportunities arising from the capital market benefits of AI-based valuation applications. It is reasonable to assume that as valuations multiply, there will be a greater demand for professional skills to critically understand the results and derive insights to improve cor-porate performance and business strategies. For valuation professionals, the current outlook suggests that the resulting challenges and opportunities should be addressed now.

We hope you enjoy reading the current EBVM issue and look forward to your feedback.

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Imprint

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Unbiased Beta Despite Biased Data: Some Elementary Results

In many valuations, the cost of equity is determined on the basis of the CAPM. The dominating instrument for estimating the beta factor within this framework is the so-called Market Model. As far as the own beta of the valuation object is concerned, the reliability of the data available for this purpose is often questioned and an alternative tool, in particular a peer group beta, is used. The following article identifies types of data bias that do not affect the outcome of beta estimation – both for an individual company and for a peer group. The results urge caution against a hasty rejection of the object beta and an almost automatic use of peer group betas.

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I. Introduction

Having passed its academic peak, the CAPM is still of outstanding importance in practice for determining the cost of capital in company valuations. Most of the issues and discussions there concern metric problems, especially for small and medium-sized corporations (SMC).

As the CAPM is a single-factor model, attempts to "modify" the CAPM by introducing further factors[1] do not appear to be helpful. Beyond such and similar attempts to explain higher capital costs by other factors, however, serious conceptual problems and questions remain with regard to the classical measurement procedure. Looking at beta, this procedure is still coined by Sharpe´s original "Market Model",[2] a simple linear regression using historical return data.

A classic problem with this approach, to which the following sections of this article are devoted, arises when the valuer expects the prices of the valuation object to be biased in the relevant reference period.[3] Of course, such a judgement is problematic, because the "true" prices or rates of return are unknown stochastic variables, and we just see their historic realizations. Nonetheless, we have to decide whether we are comfortable with the measured data or whether we suspect biases of varying quality. Thus, it is no surprise that the consequences of measurement errors or other data problems on the reliability of beta estimations have been examined under different perspectives. Lagged disturbances and serial correlations,[4] the inconsistent use of market indices[5] or a time varying equity premium[6] are prominent examples for conditions that do not fulfil the data requirements of the Market Model or the logic of the CAPM itself. While previous studies start with the definition of the respective problem and look for the resulting impact on the beta estimation, our contribution starts by the question how the measured value of share prices or returns may deviate from the respective "true value" without disturbing the resulting beta: The following sections II and III identify conditions under which data biases will not distort conventional beta estimates. Thus, if one of these conditions is fulfilled, beta estimates are still unbiased and there is no need to fall back to other alternatives to obtain (supposedly) less biased betas e.g. derived from peer groups.

In practice, however, the usual procedure for suspectedly distorted prices or returns is generally to use a peer group beta. This results in two problems: Firstly, an obvious representation problem and secondly, the distribution of returns/prices of the peer group could deviate from the valuation object's distribution. Section IV therefore applies the approach used in the two previous chapters to this special form of problem handling.

Summarized in section V, the results reveal some important misunderstandings about the nature of biased data and their consequences for beta determination.

II. Deterministic (Functional) Bias

One of the factors responsible for the success of the CAPM is the structural conformity of the beta with the slope factor of a simple regression called the Market Model. Looking at the definition:

$$\beta_k = \frac{\mathrm{Cov}\left(r_k, r_M\right)}{\mathrm{Var}\left(r_M\right)}, \qquad (1)$$

r_k and r_m are the stochastic rates of return of the share $\mathbf{k}$ (our valuation object) and the market portfolio, respectively. The only difference between the theoretical parameter within the CAPM and its empirical estimator within the Market Model is that the latter uses historical realizations of the two returns.

If the share prices are not distorted in relation to the theoretical specifications of the CAPM, an unbiased estimate will be obtained using this method.[7] In other words: Unbiased prices are a sufficient condition for an unbiased estimation of beta:

unbiased price ⇒ unbiased beta

At the same time, this implication does not mean that every form of price bias necessarily leads to a biased beta estimate. Even in the deterministic domain, the opposite holds true e.g. if the following, very simple condition is satisfied. Let $\mathbf{a}$ be a deterministic parameter that biases the "true" price of share $\mathbf{k}$ proportionally like a scaling factor:

$$\hat{P}_{k(a),t} = aP_{k,t} \qquad (2)$$

In general, distorted parameters are denoted by a hat.

Then, there is no effect on $\mathbf{k}$´s rate of return because:

$$\hat{r}_{k(a),t} = \frac{aP_{k,t}}{aP_{k,t-1}} - 1 = \frac{P_{k,t}}{P_{k,t-1}} - 1 = r_{k,t} \qquad (3)$$

Consequently, such a strictly linear bias of the price of $\mathbf{k}$ or the market portfolio or of both will not influence the measurement of $\mathbf{k}$´s beta **because it leaves the argument of the covariance unchanged**.

1 Cf. e.g. Barr/Lohrey, Working with Data: Public Company and Private Company Size Premia, The Value Examiner, March-April (2018): 18, for the size premium within the "modified CAPM Method" and the "Build-Up Method". For critique on an additional country risk premium, see Kruschwitz/Löffler/Mandel, Damodaran's Country Risk Premium: A Serious Critique, Business Valuation Review, vol. 31 (2-3), (2012): 75.

2 Cf. Sharpe, A Simplified Model for Portfolio Analysis, Management Science, vol. 9 (2), (1963): 277.

3 Most discussions regarding potential biases relate to the lack of liquidity of the share concerned, cf. e.g. Ehrhardt/Koerstein/Möller, Betaschätzung bei unregelmäßig gehandelten Aktien, Die Wirtschaftsprüfung, vol. 73 (13), (2020): 768, and Grbenic, Beta Estimation under Thin Trading Conditions, The European Business Valuation Magazine, vol. 2 (2), (2023): 18.

4 Cf. Scott/Brown, Biased Estimators and Unstable Betas, The Journal of Finance, vol. 35 (1), (1980): 49-55.

5 Cf. Bartholdy/Peare, Unbiased Estimation of Expected Return Using CAPM, International Review of Financial Analysis, vol. 12 (1), (2003): 69-81.

6 Cf. Lewellen/Nagel, The Conditional CAPM Does not Explain Asset-pricing Anomalies, Journal of Financial Economics, 82 (2), (2006): 289-314.

7 Cf. Knoll, Value, Price and Beta: Some Clarifications, Corporate Finance, vol. 8 (11-12), (2018): 350 (351-353), for the following analysis.

This simple insight has not yet found its way into the understanding of many players in the valuation scene. As an example, here is a passage from a legal essay, written by a prominent corporate lawyer:

"However, it is correct not to take into account the downward distortion of the company's original beta factor corresponding to an upwardly distorted share price in the context of the capitalized earnings value valuation and to reject the original beta factor as not meaningful ... For unlike the upwardly distorted share price, the downwardly distorted beta factor and the significant increase in the capitalized earnings value necessarily associated with it do not correspond to the actual operating earning power."[8]

Is that true? If speculators or others have driven up the price level by **D%** above the "true" value, what is the consequence for the measured return **r** of the prices **P** used between two measurement points **t** and **t-1**? Compared to unbiased prices, we always get **D%** higher measurement results. Thus, the increase by **D%** causes a scaling factor **a = 1+D%** and reproduces the correct beta as shown in (3). "The downward distortion of the company's original beta factor corresponding to an upwardly distorted share price" does not exist, so all conclusions based on it collapse! Like any formulation, the quote may also show specific traits, but in its invocation of price distortions in order to reject the use of the beta of the valuation object, it is quite characteristic of parts of the legally influenced company valuation in German-speaking countries.

III. Stochastic Bias

So far, so well, but deterministic functional biases are very strong forms of bias. Looking at the relevant data, you are more likely to think about stochastic distortions. Therefore, we will regard this case now.

To further simplify this case, we directly regard the return level and model the stochastic bias by adding a stochastic disturbance term to the rate of return of share **k** only.[9] The formal presentation of this procedure is:

$$\hat{r}_{k(\omega)} = r_k + \omega_k \qquad (4)$$

$\hat{r}_{k(\omega)}$ and ω_k are the biased rate of return and the disturbance term for share **k**, respectively. Contrary to the deterministic proportional bias in chapter II, **now the argument of the covariance is no longer unchanged. Therefore, we must look for a condition under which this change causes no other result for the covariance than the use of the "true" rates of return**.

Inserting (**4**) in (**1**), we get the measured beta in the case of a stochastic bias[10]

$$\hat{\beta}_{k(\omega)} = \frac{Cov\left[r_k + \omega_k, r_M\right]}{Var\left[r_M\right]} = \frac{Cov\left[r_k, r_M\right] + Cov\left[\omega_k, r_M\right]}{Var\left[r_M\right]}$$

$$= \frac{Cov\left[r_k, r_M\right]}{Var\left[r_M\right]} + \frac{Cov\left[\omega_k, r_M\right]}{Var\left[r_M\right]} \qquad (5)$$

and, consequently, a remarkably simple result:

$$\hat{\beta}_{k(\omega)} = \beta_k \Leftrightarrow Cov\left[\omega_k, r_M\right] = 0 \qquad (6)$$

As long as there is no linear dependence between the disturbance term and the market return,[11] we can use the biased returns for estimating share **k**´s beta with the Market Model.

To demonstrate this effect, we present a strongly simplified example. We regard 12 measurement periods with the following parameter values:

Table 1: Numbers of the example

t	$r_{M,t}$	ω_t	$r_{k,t}$	$\hat{r}_{k(\omega),t} = r_{k,t} + \omega_t$
1	7	0.8	6	6.8
2	3	1.8	3	4.8
3	4	-0.2	5	4.8
4	-3	-0.2	-1	-1.2
5	2	-1.2	1	-0.2
6	-4	1.8	-2	-0.2
7	6	0.8	5	5.8
8	7	-0.8	3	2.2
9	5	0.0	3	3.0
10	-3	-0.8	-1	-1.8
11	0	-0.8	0	-0.8
12	4	0.0	2	2.0
$Cov[r_m,*]$		0	9.5455	9.5455
$Var[r_m]$	15.6970	Beta	0.6081	0.6081

8 Decher, Die Bedeutung des Börsenkurses für die Unternehmensbewertung bei Strukturmaßnahmen: Eine Reise über vier Stationen, Die Aktiengesellschaft, vol. 68 (4), (2023): 106 (114), translation of the German original.

9 Scott/Brown, Biased Estimators and Unstable Betas, The Journal of Finance, vol. 35 (1), (1980): 49 (50) use an additional stochastic disturbance term (with a zero mean) to the market return as the starting point for their incorporation of econometric problems into the Market Model. In valuation practice, the argumentation is completely different: Most criticism based on distorted prices/returns is formulated only in relation to the share in question and, therefore, corresponds to an otherwise unbiased pricing – perhaps because the critics assume that a biased return in one company within the market portfolio does not distort the whole market return in a measurable dimension. Thus, we focus directly on k and forego severe restrictions on the additional term (like the zero mean in Scott/Brown).

10 Cf. for the calculation e.g. Henze, Stochastik für Einsteiger, 11th ed. 2017: 166.

11 If we can assume that the parameters are jointly normally distributed, they must be independent without any restriction, cf. e.g. Wooldridge, Introductory Econometrics, 6th ed. 2016: 668.

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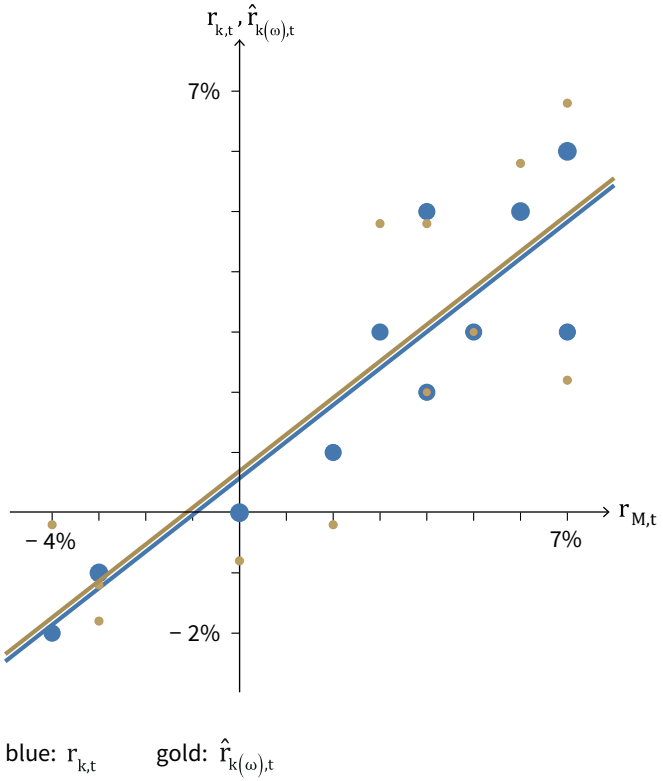
You can interpret the figures as monthly values rounded (for the sake of simplicity) to the nearest thousandth for all variables independent of ω and to the nearest basis point for the others.[12]

Figure 1 shows the different relationships graphically. The horizontal axis scales the market return, the vertical axis $r_{k,t}$ and $\hat{r}_{k(\omega),t}$. The dots for the different pairings between the market return and the other parameters are completed by corresponding linear regression lines. As expected from the calculated betas, both regression lines are parallel – the line of the measured returns runs slightly higher than the line of the unbiased returns, since the mean of ω_t is slightly greater than zero. This or any other vertical difference between the parallel lines is irrelevant for the calculated beta value that is mathematically the slope factor of the regression line.

Figure 1: Data points and linear regressions



IV. Peers

Although there are other methods that are closer to the theoretical core of the CAPM,[13] in practice beta is mainly determined using the Market Model for a peer group if distorted returns for the share of the valuation object are suspected. The main problem of this procedure is certainly the identification of suitable peers. We do not want to present all the criteria discussed in practice and literature, but just refer to a requirement formulated by *Ziemer*.[14] As the CAPM itself defines assets just by their stochastic properties, *Ziemer* demands that a peer´s share should have the same distribution function for its rate of return as the valuation object. Looking at a peer group, this condition must be fulfilled by all its members. The correspondence to the formal implication in section II is straightforward, but we have seen that this is a sufficient condition and there are harmless injuries of the requirement.

Consequently, one can try to transfer the effects described in sections II and III on peer betas by interpreting "biased" not as a current divergence of share k´s return distribution from its "true" value, but as the normal divergence between the rate of return of the peer corporation and the "true" rate of return of share k.

In order to find suitable peers in practice, comparability criteria generally apply that are based on assumed drivers of the operating business rather than a direct estimate of risk measures or distribution functions. While it is already daring to assume a sufficient operational similarity, it is almost utopian to find sufficient statements on econometric details like covariance matrices in practice![15] Nevertheless, the importance of peer group betas in practice justifies a closer look at how the described fault tolerance can be applied to them.

1. Pure-Play Beta

Seen from a technical perspective, the transfer is quite simple if there is just one peer used to estimate the desired beta. More than 40 years ago, *Fuller* and *Kerr* introduced this "Pure-Play Technique" under the special perspective on divisional cost of capital.[16] At the same time, the identification problem described is becoming more important. Already before *Fuller/Kerr's* contribution, the rarity of perfect matches had been noted and subsequently confirmed time and again.[17] Even the greatest optimists today will not claim that two companies are identical in reality. For this reason in particular, "Pure-Play Beta" has not gained any major significance beyond its use for divisions. The positive aspect of easy technical transferability of the approach is therefore more than compensated for by the fact that it is largely irrelevant in practice. Nevertheless, it is helpful for the following presentation to write the corresponding equations for the share of one single peer p by adding p to the equation number.

$$P_{p,t} = aP_{k,t} \qquad (2p)$$

which again causes irrelevance results like in (3). Furthermore,

12 The different rounding levels help to fulfil condition (6) exactly. For practical purposes, a small deviation from zero does not matter as long as its effect on the calculated beta is beyond the regularly displayed two decimal places.

13 Cf. Knoll/Kruschwitz, Anmerkungen zum Problem der Geld-Brief-Spanne für Betaermittlung und Renditeerwartung, Corporate Finance, vol. 13 (7-8), (2022): 221.

14 Cf. Ziemer, Quantitative Bestimmung der Verzerrung des Beta-Faktors durch Rückgriff auf gefilterte Peer-Group, Journal of Banking Law and Banking, vol. 24 (1), (2012): 50.

15 In Germany, valuation reports mainly show the t-value of the estimated beta and the coefficient of determination of the regression, although both are not very helpful and can be converted into each other, cf. already Knoll/Ehrhardt/Bohnet, Kleines Beta – kleines Bestimmtheitsmaß: großes Problem?, CFO aktuell, vol. 1 (5), (2007): 210.

16 Cf. Fuller/Kerr, Estimating the Divisional Cost of Capital: An Analysis of the Pure-Play Technique, Journal of Finance, vol. 36 (5), (1981): 997.

17 Cf. Bower/Jenks, Divisional Screening Rates, Financial Management, vol. 4 (3), (1975): 42 (47), and Herget, Strategic Resource Allocation Using Divisional Hurdle Rates, Planning Review, vol. 15 (1), (1987): 28 (30) as examples before and after Fuller/Kerr´s proposal.

the stochastic bias is presented in

$$r_p = r_k + \omega_p \qquad (4p)$$

with the same consequences as (4).

If we look at the minor application of Pure-Play Beta, it must be assumed that obviously nobody believes in (2p) and (4p). We will soon see that this has an unpleasant consequence.

2. Peer Group

The missing 1:1-identity is probably the most important reason for the victory march of peer group betas in practice, although it is of course completely unclear why the average of a set of biased data should result an (approximately) unbiased estimate. Not surprisingly, we will reveal other real and supposed problems of this procedure in the following.

a) 1/Π-Calculations

These problems are ultimately related to the fact that instead of a single stochastic variable, the average of a group of such variables must be considered. For the sake of simplicity, we assume the use of an unweighted average of all peer group betas, which is at least common in practice.[18]

Let us begin with the Ziemer-criterion. Its transformation for a group of Π peers is straightforward: The distribution function of an equally weighted linear combination of the peer returns must be identical to that of share k. If $F(x)$ is the distribution function with the argument x, and r represents the rates of return, we should get:

$$F\left(r_k\right) = F\left(\frac{1}{\Pi}\sum_{p=1}^{\Pi} r_p\right) \qquad (7)$$

That is, for expected value and variance:[19]

$$E\left[r_k\right] = E\left[\frac{1}{\Pi}\sum_{p=1}^{\Pi} r_p\right] = \frac{1}{\Pi}\sum_{p=1}^{\Pi} E\left[r_p\right] \qquad (8)$$

$$Var\left[r_k\right] = Var\left[\frac{1}{\Pi}\sum_{p=1}^{\Pi} r_p\right] = \frac{1}{\Pi^2}\sum_{p=1}^{\Pi}\sum_{q=1}^{\Pi} Cov\left[r_p, r_q\right] \qquad (9)$$

Looking at this, we must remember that the return distributions of the different peers will not be identical – otherwise each peer must have the same return distribution as the valuation object and a "grouping" would lose its main sense. Beside the mean-condition (8), condition (9) will only be fulfilled by chance, if at all, since we are not aware of any case in which a short list of possible peers was created with a view to a covariance matrix.

Do things look better for not sufficient, but necessary conditions?

Looking at the deterministic bias, we go from (2p) to:

$$\frac{1}{\Pi}\sum_{p=1}^{\Pi} P_{p,t} = aP_{k,t} \qquad (2\Pi)$$

What seems to be comparatively harmless here represents an essential requirement for possible changes to a peer group that fulfills (2Π). You may only add or exclude companies whose price is itself the multiple of P_k. In the case of an exclusion of an arbitrary chosen peer Π the average of the remaining peers must itself be equal to $aP_{k,t}$ or formally

$$\frac{1}{\Pi - 1}\sum_{p=1}^{\Pi-1} P_{p,t} = aP_{k,t} \qquad (10)$$

and then the same must hold for $P_{\Pi,t}$, because otherwise (2Π) would be false.[20] The proof for an extended peer group is analogous.

This is the unpleasant consequence announced in section IV.1: If you identify such a company, you can use the Pure-Play Technique and no longer need a group. Conversely, if you are convinced that no such company exists, and looking at the end of section IV.1 most people seem to be convinced, 2Π is a really demanding condition!

Finally, the possibility that the average price of the reduced or extended peer group is also proportional to $P_{k,t}$ but by another scaling factor than the average price of the original peer group is not really a convincing argument either: The joint occurrence of (2Π) and (10) is extremely unlikely and has never been addressed in valuation reports.

Transferring the stochastic bias (4) of section III to a peer group is a little tedious. First, we have to transfer equation (4p) on the whole peer group:

$$r_\Pi = \frac{1}{\Pi}\sum_{p=1}^{\Pi} r_p = \frac{1}{\Pi}\sum_{p=1}^{\Pi}\left(r_k + \omega_p\right) = r_k + \frac{1}{\Pi}\sum_{p=1}^{\Pi}\omega_p \qquad (4\Pi)$$

and a corresponding beta:

$$\beta_\Pi = \frac{Cov\left[r_k + \frac{1}{\Pi}\sum_{p=1}^{\Pi}\omega_p, r_M\right]}{Var\left[r_M\right]} = \frac{Cov\left[r_k, r_M\right] + Cov\left[\frac{1}{\Pi}\sum_{p=1}^{\Pi}\omega_p, r_M\right]}{Var\left[r_M\right]}$$

$$= \frac{Cov\left[r_k, r_M\right]}{Var\left[r_M\right]} + \frac{\frac{1}{\Pi}\sum_{p=1}^{\Pi} Cov\left[\omega_p, r_M\right]}{Var\left[r_M\right]} \qquad (5\Pi)$$

Obviously, we have an analogue independence condition for the average of the disturbance terms within the peer group as for share k in (6). We are convinced that this argument has never been used in practice as the main criterion for a peer group composition to estimate beta.

18 Sometimes the median is used together with or instead of the unweighted mean.

19 Cf. for the general formulas concerning the calculations of mean and variance for a linear combination of stochastic variables Auer/Rottmann, Statistik und Ökonometrie für Wirtschaftswissenschaftler, 4th ed. (2020): 241. The simple notation is based on the fact that we use an unweighted average of the peers.

20 Equating (2Π) and (10) and solving for $P_{\Pi,t}$ gives $aP_{k,t}$.

b) Sequential irrelevance

The previous sections do not provide good news for the use of peer groups. The problems mentioned are real, but surprisingly they are discussed almost nowhere. Another irritating aspect is also barely presented.

According to the elementary beta calculation, a regression between the linear combination of the equally weighted peer returns and the market return r_M would have to be carried out and the slope coefficient determined in this way used as an estimator of the beta sought:

$$\frac{\mathrm{Cov}\left[\frac{1}{\Pi}\sum_{p=1}^{\Pi} r_p, r_M\right]}{\mathrm{Var}\left[r_M\right]} = \frac{1}{\Pi}\cdot\frac{\mathrm{Cov}\left[\sum_{p=1}^{\Pi} r_p, r_M\right]}{\mathrm{Var}\left[r_M\right]} = \frac{1}{\Pi}\cdot\frac{\sum_{p=1}^{\Pi}\mathrm{Cov}\left[r_p, r_M\right]}{\mathrm{Var}\left[r_M\right]} \quad (11)$$

In fact, the regressions are performed for the individual peers and then an equally weighted mean of the different betas is determined as the estimator.

This procedure leads to the following estimate:

$$\frac{1}{\Pi}\sum_{p=1}^{\Pi}\frac{\mathrm{Cov}\left[r_p, r_M\right]}{\mathrm{Var}\left[r_M\right]} = \frac{1}{\Pi}\cdot\frac{\sum_{p=1}^{\Pi}\mathrm{Cov}\left[r_p, r_M\right]}{\mathrm{Var}\left[r_M\right]} \quad (12)$$

As the results are identical, this time we are dealing with a just supposed problem. It remains to be seen how many users are aware of this fact, which is ultimately based on the linearity property of the mean-operator.

V. So what?

The starting point of our presentation was quite simple: Is it possible to get unbiased beta estimates with the common Market Model although the data used are biased? The answer is clear: yes!

This conclusion only applies to certain types of biases and therefore valuers must always check what type of bias may be affecting their data. If the basic version of the Market Model no longer seems appropriate, there are a number of alternative methods. Since peer group betas are then used most frequently, we examined them more closely with regard to the previously identified irrelevant data biases. The results are sobering, because regardless of the fact that the derived requirements can hardly be fulfilled, peer groups are never formed in practice with them in mind.

Therefore, the message for listed valuation objects is that alternative methods should be considered before using a peer group for beta estimation, and sometimes even using the basic version of the Market Model may be the lesser of two evils.[21] ◆

21 Cf. Knoll, op. cit. (fn. No. 7): 353. The literature on methods and problems of beta estimation has grown considerably in recent years. An overview of this would go beyond the narrow scope of this article.

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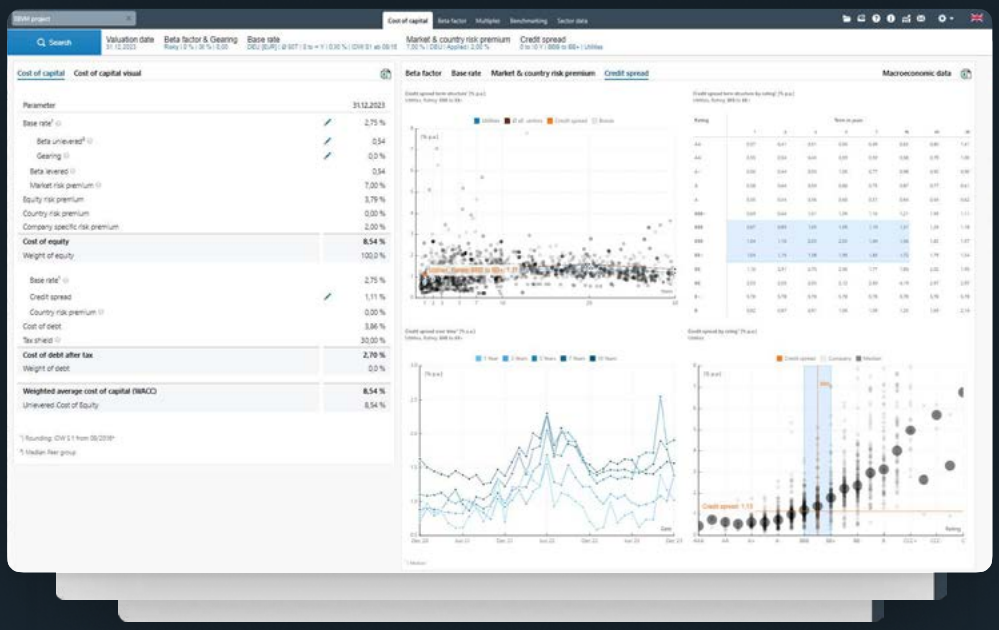

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The author expresses his own views.

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Tax Purchase Price Allocations in Carve-Out Transactions

Corporates are increasingly using carve-outs for the divestment of non-core businesses in an attempt to streamline their organizational structure and to raise cash proceeds. Carve-out transactions are usually executed on a local level with various share deals and asset deals requiring to allocate the (global) purchase price to the level of local legal entities / businesses and potentially even to the assets / liabilities (so called “tax PPA”). The purpose of this article is to show the steps and timing involved with a tax purchase price allocation (tax PPA). Overall, the paper shows that tax PPAs are a major factor affecting the financial and tax outcome of international carve-out transactions.

I. Introduction

The purpose of this paper is to discuss the allocation of the purchase price in complex carve-out transactions.[1] The purchase price in carve-outs is typically negotiated for the total transaction perimeter. Thus, it presents a global (aggregate) purchase price for transactions spanning across different jurisdictions. However, carve-out transactions are usually executed on a local level with various local share deals and asset deals ensuring – in combination with each other – the transfer of the total transaction perimeter. As a result, the seller is required to allocate the global purchase price to the level of local legal entities / businesses and potentially even to the level assets / liabilities to be compliant with the stipulations of the respective share and asset purchase agreement ("SAPA") and with tax regulations. This exercise is referred to as tax purchase price allocation ("tax PPA").

Ultimately, the tax PPA determines the tax burden associated with carve-out transactions. Given the cash effectiveness of the tax consequences, a pre-deal tax PPA is typically performed by the seller to assess the envisaged transaction from a tax standpoint already in the pre-signing phase. The results from the pre-deal tax PPA can serve as an important input factor for the tax structuring / optimization performed by the seller. Upon closing, the tax PPA is used for the derivation of the respective purchase prices underlying the various local transactions. Further, the results from the final tax PPA are used for statutory accounting purposes. Thus, tax PPAs are a major factor affecting the financial and tax outcome of international carve-out transactions.

Tax PPAs are gaining further in importance. Corporates are increasingly using carve-outs for the divestment of non-core businesses in order to streamline their organizational structure and to raise cash proceeds[2], in particular in times of challenging macroeconomic conditions. Given the decline of M&A activity in 2023, large corporates have been spending more resources reviewing their portfolios for potential sales. This is expected to increase the number of non-core asset sales via carve-out transactions in 2024.[3]

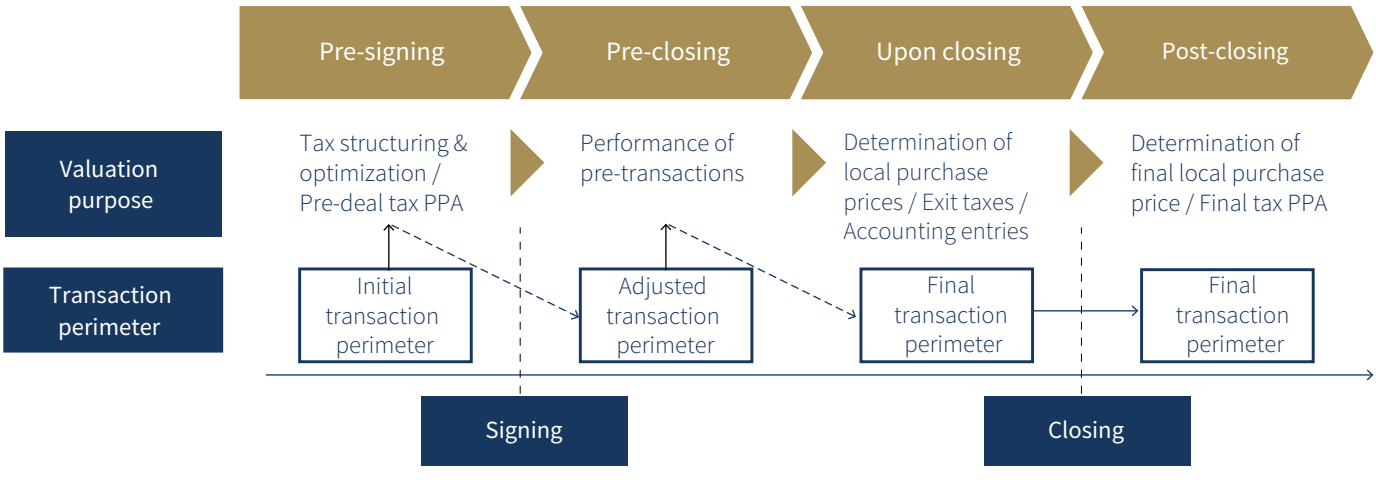
This paper contributes to the (practitioner) literature on valuations in carve-outs by focusing on the purpose and timing of tax PPAs in international carve-out transactions. The insights presented in this paper should be relevant to corporate M&A, tax and accounting managers as well as to their tax, legal and valuation advisors working on carve-out transactions.

The paper is organized as follows. The next section describes the main purposes of the tax PPA along the carve-out transaction timeline. The main steps performed within the tax PPA, i.e. the allocation of the global purchase price to the local level are described in Section 3. Guiding valuation principles in tax PPAs are discussed in Section 4. Section 5 concludes the paper.

II. Timing and purposes of tax PPAs

Tax PPAs can serve multiple purposes depending on timing and stage of the carve-out transaction. Figure 1 shows an indicative timeline of carve-out transactions with the purposes of tax PPAs evolving along the pre-signing, pre-closing and the post-closing stage.

Figure 1: Indicative timeline tax PPAs



1 There are different types of corporate divestments, see e.g. Brauer/Hollasch/Niemeyer/von Rüden, Carve-out, in: Schalast/Raettig (editor), Grundlagen des M&A-Geschäftes, 2nd ed. 2019: 291f. This paper focuses on transactions where the carve-out business is fully transferred to the buyer in a private market transaction whilst ensuring its continued operation. As a result, the seller receives (cash) proceeds from the sale and no remaining share in the carve-out business is held by the seller after the transaction.

2 See Damodaran, Beyond cash dividends, buybacks, spin offs and divestitures, for a discussion on the reasons for carve-out transactions (2001); https://pages.stern.nyu.edu/~adamodar/pdfiles/papers/beydiv.pdf, (last access 28.05.2024).

3 S&P, See the Big Picture: 2024 M&A Outlook, 17.11.2023, www.spglobal.com/marketintelligence/en/news-insights/blog/the-big-picture-2024-ma-industry-outlook (last access 28.05.2024); Bain, Global M&A Report 2024, www.bain.com/globalassets/noindex/2024/bain_report_global_m_and_a_report_2024.pdf, (last access 28.05.2024).

Pre-signing

In a pre-signing phase, the seller – based on an initial determination of the transaction perimeter – typically aims to optimize the transaction structure from a tax standpoint, essentially aimed at minimizing tax risks. Thereby, the allocation of the purchase price per target share (share deal) / target business (asset deal) can help to assess the potential tax effects on a local level resulting from the envisaged carve-out transaction. At this stage of the transaction, however, the allocation exercise will be necessarily of preliminary nature. Therefore, it can be referred to as "pre-deal tax PPA". This is mainly due to the preliminary nature of

- the global (aggregate) purchase price;
- the transaction perimeter;
- the financial data underlying the transaction.

The global purchase price is still subject to negotiation between the parties. In fact, the global purchase price will vary till the closing date (e.g. until the level of net working capital ("NWC") is finally determined). Changes to the transaction perimeter may also still occur in the pre-signing phase of the transaction, depending on the structuring of the transaction and/or on negotiations with the purchaser. The financials underlying the pre-deal tax PPA are based on pre-closing data which are subject to adjustments (true-ups) as of the closing date. Also, structural measures such as the repatriation of cash from the carve-out objects can affect the financial data underlying the valuation. As a result, regular updates of the tax PPA are required to reflect e.g. changes in the transaction perimeter or new financial information. The preliminary nature lasts until the true-up is calculated on the final data as of the closing date.

Signing

After signing, the purchaser will request to receive information on the pre-deal tax PPA. Depending on the stipulations of the respective SAPA, the purchaser is entitled to receive the valuation results of the (pre-deal) tax PPA once the signing of the transaction has occurred.[4] As is the case for the seller, the local purchase prices and the resulting value allocation across jurisdictions will be used by the purchaser in order to assess the transaction / tax structure and to prepare for the transfer of the target.

Pre-closing

In order to achieve the desired transaction structure, the seller may perform so-called pre-transactions. Such pre-transactions can occur either before signing or in the period between signing and closing.[5] Pre-transactions can arrive in multiples forms. For example, they can relate to the internal transfer of shares within the carve-out perimeter.[6] Also, they can relate to the transfer of a target business from a mixed entity – where the remaining business is not in the scope of the carve-out – to another entity which belongs to the scope of the carve-out. Alternatively, the target business is internally transferred to a NewCo which is then transferred to the external purchaser as target share. The pre-transactions will be executed based on the values derived from the tax PPA for the respective shares / businesses.

Upon Closing

The closing of the carve-out transaction is executed by various local share or asset transfers between the seller and the purchaser. To facilitate such transfers, the respective purchase price on local level is required as an input for the local share purchase agreement (share deal) or business transfer agreements (asset deal). The purchase price on local level will be determined based on the tax PPA.

Upon closing of the transaction, the tax department of the seller will use the purchase price per target share / target business in order to estimate exit taxes resulting from the single local transactions. Similarly, the accounting department of the seller will use the local purchase prices to prepare the respective booking entries for the statutory accounts.

It must be noted that this exercise is distinct to the accounting PPA that is performed by the acquirer as required e.g. by international financial reporting standards such as IFRS 3. The accounting PPA is typically performed at the consolidated level for financial reporting purposes and will allocate the global purchase price across the (fair value of) assets and liabilities acquired. The tax PPA, however, is performed at the local level of the legal entity.[7]

Post-closing

In the post-closing period, any adjustments required to reflect the closing date as valuation date will be recorded in the final tax PPA. Adjustments will be necessary, for example, for any change in the global purchase price as it will affect the local purchase prices of the various target shares and target businesses. An important point to consider here are the closing balance sheets. These will only be prepared after the closing date, i.e. when the local transactions have already been executed. To account for any differences in the estimated closing balance sheets and the actual closing balance sheets, an update of the tax PPA is typically performed in the post-closing period.

III. Steps of tax PPAs

The overall purpose of tax PPAs is to allocate the purchase price which has been negotiated between the buyer and the seller to the various target shares (share deals) and target businesses (asset deals). Thus, the purchase price is an essential input factor for any tax PPA exercise. Typically, the purchase price in carve-out transactions (just like any other M&A transaction) is negotiated on an Enterprise Value ("EV") level, i.e. on a cash-free, debt-free basis.[8] Since this is done on a group (consolidated) level comprising the total carve-out business, in an

4 M&A practice shows that this is typically to be provided within 60 or 90 days after signing the SAPA.

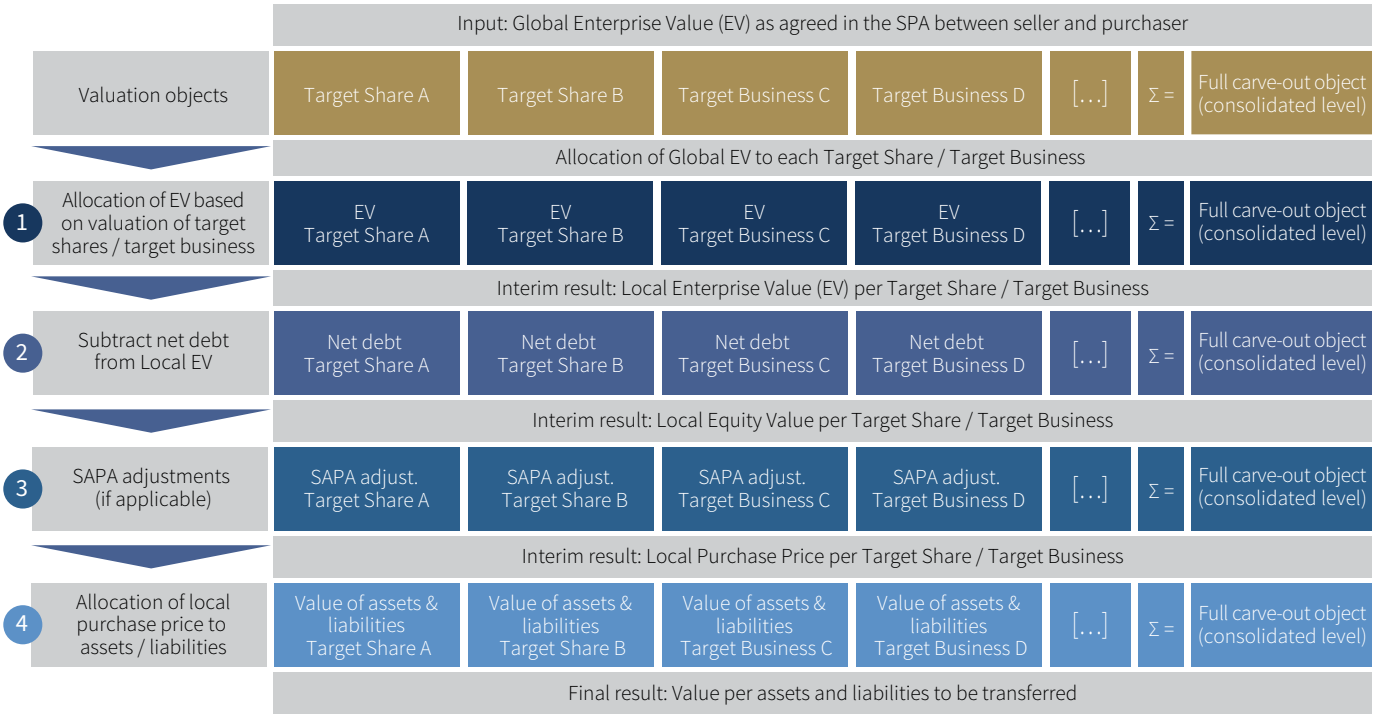
5 Depending on whether such pre-transactions are permitted by the stipulations of SAPA.

6 It must be, of course, cautiously checked whether transfer of shares internally within the carve-out object are in line with the SAPA or will require additional approval by the purchaser.

7 There are further differences between the PPA for accounting and for tax purposes, e.g. regarding the underlying value concept. The focus of this paper, however, is on the purpose, timing and steps of the tax PPA.

8 See e.g. Nestler, Bewertung im M&A Geschäft, in: Schalast/Raettig, op. cit. (fn. No. 1): 511f.

Figure 2: Steps of tax PPAs



international transaction this can be referred to as "Global EV". Using the Global EV as a starting point, the main steps of tax PPAs are shown in Figure 2 (simplified).

1. In a first step, the Global EV is allocated to local share deals and asset deals by performing a valuation of each local target share and target business.[9] This valuation can serve as a measure of the so-called "Local EV". The Local EV allows to gauge the relative value contribution of each target share and target business to the Global EV.
2. In a second step, the local Equity Value per target share and target business is derived by subtracting local net debt from the Local EV. Thereby, net debt items associated with the carve-out objects and specific SAPA stipulations on the EV / Equity Value bridge are considered. Net debt allocable to carve-out objects can be comprised of several items such as external financial debt, internal debt (within the carve-out perimeter), pension provisions etc.
3. In a third step, the local purchase price per target share and target business is derived by adjusting local Equity Values for any further financial items which must be reflected in the EV / Equity Value bridge as per the purchase price definition of the SAPA. Importantly, the sum of all local purchase prices must consistently tie back to the global purchase price.
4. In a fourth step, the local purchase price is allocated to the assets and liabilities transferred in the course of the carve-out.

The relevance and order of the single allocation steps mentioned above may, of course, vary across transactions depending on the specific circumstances including the carve-out structure, local regulations such as tax reporting requirements as well as stipulations in the respective SAPA. For example, the requirement to allocate the purchase price to the asset level may arise for US tax reporting purposes for certain asset deals or share deals being elected as asset deal under Section 338 of the Internal Revenue Code ("IRC"). In such cases, Section 1060 of the IRC requires sellers and purchasers to allocate the purchase price among the assets purchased or sold based on the fair market value of those assets. Further, in many carve-out transactions the seller and the purchaser will agree on the allocation principles and methodology in the SAPA. The stipulations of the SAPA will serve as an important input for the tax PPA. In order to fully understand the financial and tax implications of such allocation principles, it is advisable to consult with tax and valuation experts already when drafting the SAPA.

IV. Valuation principles underlying tax PPAs

From describing the different steps of a tax PPA, the natural question arises on the guiding principles underlying the valuation of each local target share and target business. When selecting the appropriate valuation standard / method, several aspects must be considered.

Fist, the valuation objects are typically spread across multiple jurisdictions. Since the carve-out transactions are performed on local level, it must be carefully checked which valuation principles used for the allocation from global EV to local EV are accepted on local level. For instance, in Germany IDW S 1 is a valuation standard focusing on business valuations issued by the Institute of Certified Auditors in Germany (IDW). It is generally accepted by tax authorities and therefore of high importance, especially in regulated areas like valuations for

9 Principles underlying such a valuation are discussed in the next Section.

tax purposes.[10] In the US, relevant stipulations for tax-related valuations are published by the Internal Revenue Service ("IRS") administering and enforcing US federal tax law. IRS Revenue Ruling 59-60 requires the determination of a fair market value. In line with the US valuation practice, the use of the DCF method and the multiple method is acceptable. In the DCF method, the terminal value (TV) can be based on an average computed across the Gordon Growth formula and an exit multiple.[11] Further, the multiple method is fully accepted as a stand-alone valuation methodology. In addition, there are certain jurisdictions where the valuation is required to be performed by a local registered appraiser or appraisal organization. Prominent examples in this context are China and India.

Second, different valuation objects can be typically identified in a carve-out. Valuation objects may differ e.g. in their functional profile such as entrepreneur, limited risk distributor, financing entity or pure holding company. Depending on the functional profile of the valuation object, different valuation methods may be appropriate. For example, operating companies such as entrepreneur or limited risk distributor are commonly valued using the income approach. This, of course, assumes the availability of carve-out specific historical and prospective financial data. The creation of such data can present a major challenge in the carve-out exercise.

Third, the breakdown of the purchase price to the level of assets and liabilities may require the application of specific valuation methods. For instance, specific valuation methods have been developed for the valuation of intangible assets such as customer relationships, trademarks, technology etc. Any residual value between the value of the business and the value of net assets is recorded as goodwill. Depending on jurisdictions, goodwill and intangibles are amortizable for tax purposes creating a tax amortization benefit (i.e., future taxes saved through amortizing the goodwill and intangibles).

Thus, the specific circumstances of a carve-out transaction must be taken into account, as different valuation standards and methods may apply depending on valuation purpose and/or jurisdiction.[12]

V. Conclusion

This paper is concerned with the allocation of the purchase price (so-called tax PPA) in international carve-out transactions. Depending on the stage of the transaction, valuation results from the tax PPA can serve multiples purposes including tax structuring in a pre-signing period, the performance of pre-transactions in a pre-closing period as well as the derivation of local purchase prices for the execution of local share deals and asset deals as of closing of the transaction. Upon closing, the tax department of the seller will use the purchase price per target share / target business in order to estimate exit taxes resulting from the single local transactions. As a result, the tax PPA is a major factor affecting the financial and tax outcome of international carve-out transactions.

Allocation principles and methodology are usually laid out in the SAPA underlying the transaction. In many cases the starting point of tax PPAs is related to the EV that has been negotiated between the seller and the purchaser for the total carve-out object. The core analysis within the tax PPA is concerned with the allocation of the EV to the local share deals and asset deals, based on the valuation of each target share and target business. Since carve-out transactions are executed on the local level, the valuation principles underlying the valuation of each target share and business are typically based on valuation standards accepted on a local level, e.g. by local tax authorities. ◆

10 See Kohl/König, Die Bedeutung der Grundsätze nach IDW S 1 für die Ableitug gemeiner Werte, Die Wirtschaftsprüfung, No. 23 (2018): 1525-1530.

11 See e.g. Bassemir, The role of valuation in carve-out transactions, M&A Review, No. 12 (2022): 460-465.

12 See e.g. Broekema/Perepechko/Rabel, On the Role of Business Valuation Standards from the Perspective of End-users, BewertungsPraktiker, No. 3 (2021): 65-104, for an overview of different (international) valuation standards.

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General

To derive the provided betas and multiples, only companies from the Eurozone have been considered. The included companies have been grouped on an industry level and on a sub-industry level based on the Global Industry Classification Standard (GICS). In each issue of the journal, aggregates for all eleven main industries and one individually selected sub-industry will be shown. Due to the special characteristics of companies operating in the financial industry (high leverage, leverage as part of the operating business, high dependency on the interest rate level, etc.), we only provide levered betas and equity-based multiples for that industry.

All presented values are based on raw data and raw calculations. They have carefully been checked and evaluated but have not been audited nor have individual values been verified. Certain results may be misleading in your setup or specific context. All results should be critically evaluated and interpreted. The data and usage are at your own risk.

Data source

All data has been obtained from the KPMG Valuation Data Source. The data source provides access to cost of capital parameters from more than 150 countries and sectors as well as peer-group-specific data from over 16,500 companies worldwide. The data covers the period from 2012 to the present. The data is updated monthly and is accessible from anywhere around the clock.
See www.kpmg.de/en/valuation-data-source for details.

Eurozone Cost of Capital Parameters as at 31 May 2024

The typified, uniform risk-free rate based on AAA-rated government bonds currently lies at 2.5% for the Eurozone. It is derived from yield curves based on Svensson parameters and results published by the European Central Bank. The overall long-term market return for the Eurozone is estimated at around 8%, leading to a market risk premium of 5.5%. Estimations of the market return rely on historical returns, as well as on forward-looking return estimates and risk premiums based on Eurozone companies with current market share prices and earnings forecasts from financial analysts.

Betas

Levered, debt and unlevered betas are calculated over an observation period of a single five-year period (monthly returns) and for five one-year periods (weekly returns).

Raw levered betas are obtained from a standard OLS regression, with stock returns being the dependent variable and stock market index returns (S&P Eurozone BMI Index) being the independent variable. Stock and index returns are total returns, thus including dividends, stock splits, rights issues, etc. (if available). Levered betas below zero and above three are treated as outliers and are excluded.

Unlevered betas have been estimated based on Harris-Pringle, assuming uncertain tax shields and including debt beta:

$$\beta_u = \beta_L \frac{E}{E+D} + \beta_D \frac{D}{E+D},$$

where $ß_U$ = unlevered beta, $ß_D$ = debt beta, D = net debt, E = market value of equity. Debt betas rely on a company's individual rating on a given date. Monthly rating-specific levels of debt betas are extracted from a broad market analysis. Net debt consists of total debt (incl. lease liabilities) + net pensions + minority interest + total preferred equity - total cash - short-term investments. In accordance with the observation period, parameter averages of debt beta, net debt and market equity over the individual periods are applied when unlevering levered betas. Unlevered betas below zero and above two are treated as outliers and are excluded.

Table 1: Median Levered Industry Betas for five single 1y-periods and one 5y-period

31 May 2024	Median Levered Betas								
	1-Year, weekly returns							5-Year, monthly returns	
Industries	Comps incl. (Average*)	6/2019 to 5/2020	6/2020 to 5/2021	6/2021 to 5/2022	6/2022 to 5/2023	6/2023 to 5/2024	Average*	Comps incl.	6/2019 to 5/2024
Industrials	*261*	0.98	0.94	0.80	0.89	0.86	0.89	*241*	1.12
Consumer Discretionary	*176*	1.01	0.93	1.03	0.93	0.90	0.96	*157*	1.19
Health Care	*131*	0.78	0.57	0.66	0.78	0.82	0.72	*120*	0.74
Financials	*144*	1.05	1.09	0.96	0.91	0.72	0.95	*137*	1.11
Utilities	*50*	0.80	0.71	0.46	0.61	0.74	0.66	*47*	0.69
Materials	*85*	1.01	0.85	0.86	0.97	0.90	0.92	*81*	1.16
Real Estate	*91*	0.82	0.70	0.54	0.83	0.76	0.73	*82*	0.88
Communication Services	*88*	0.75	0.79	0.57	0.74	0.52	0.67	*82*	0.88
Information Technology	*152*	0.95	0.68	0.88	0.99	0.85	0.87	*142*	1.02
Consumer Staples	*76*	0.58	0.46	0.67	0.49	0.40	0.52	*73*	0.59
Energy	*34*	0.98	1.08	0.35	0.80	0.47	0.74	*33*	0.87

Table 2: Median Industry Equity-Ratios for five single 1y-periods and one 5y-period

31 May 2024	Median Equity-Ratios								
	1-Year							5-Year	
Industries	Comps incl. (Average*)	6/2019 to 5/2020	6/2020 to 5/2021	6/2021 to 5/2022	6/2022 to 5/2023	6/2023 to 5/2024	Average*	Comps incl.	6/2019 to 5/2024
Industrials	*274*	68.9%	79.3%	79.5%	77.3%	76.3%	76.2%	*246*	77.7%
Consumer Discretionary	*184*	63.3%	81.7%	79.3%	73.1%	75.2%	74.6%	*156*	72.8%
Health Care	*143*	98.4%	98.9%	97.2%	90.2%	95.4%	96.0%	*128*	97.0%
Utilities	*51*	52.8%	57.4%	61.3%	58.3%	57.3%	57.4%	*47*	59.8%
Materials	*86*	69.3%	77.4%	76.4%	74.9%	75.4%	74.7%	*81*	75.0%
Real Estate	*98*	48.9%	51.6%	50.7%	41.4%	44.4%	47.4%	*89*	47.2%
Communication Services	*95*	68.4%	80.1%	81.8%	74.2%	69.2%	74.7%	*85*	76.3%
Information Technology	*162*	96.5%	98.9%	96.8%	96.3%	97.1%	97.1%	*145*	96.8%
Consumer Staples	*82*	66.4%	77.0%	72.1%	65.0%	70.4%	70.1%	*76*	71.2%
Energy	*38*	62.9%	61.7%	76.1%	81.7%	85.5%	73.5%	*35*	67.7%

Table 3: Median Unlevered Industry Betas for five single 1y-periods and one 5y-period

31 May 2024	Median Unlevered Betas								
	1-Year, weekly returns							5-Year, monthly returns	
Industries	Comps incl. (Average*)	6/2019 to 5/2020	6/2020 to 5/2021	6/2021 to 5/2022	6/2022 to 5/2023	6/2023 to 5/2024	Average*	Comps incl.	6/2019 to 5/2024
Industrials	*251*	0.77	0.74	0.64	0.72	0.63	0.70	*232*	0.90
Consumer Discretionary	*165*	0.79	0.76	0.79	0.74	0.68	0.75	*147*	0.91
Health Care	*119*	0.67	0.53	0.51	0.65	0.64	0.60	*109*	0.59
Utilities	*50*	0.55	0.51	0.37	0.45	0.52	0.48	*47*	0.51
Materials	*84*	0.76	0.77	0.69	0.80	0.69	0.74	*79*	0.86
Real Estate	*85*	0.57	0.57	0.39	0.52	0.53	0.52	*76*	0.60
Communication Services	*85*	0.63	0.60	0.49	0.62	0.48	0.56	*79*	0.68
Information Technology	*147*	0.94	0.67	0.85	0.89	0.79	0.83	*132*	0.94
Consumer Staples	*74*	0.60	0.45	0.53	0.45	0.37	0.48	*70*	0.51
Energy	*32*	0.83	0.92	0.35	0.62	0.45	0.63	*31*	0.76

Source: KPMG Valuation Data Source, see www.kpmg.de/en/valuation-data-source
**Average = Arithmetic Mean*

Table 4: Median Levered Subindustry (Information Technology) Betas for five single 1y-periods and one 5y-period

31 May 2024	Median Levered Betas								
	1-Year, weekly returns							5-Year, monthly returns	
Subindustry: Information Technology	Comps incl. (Average*)	6/2019 to 5/2020	6/2020 to 5/2021	6/2021 to 5/2022	6/2022 to 5/2023	6/2023 to 5/2024	Average*	Comps incl.	6/2019 to 5/2024
IT Services	*44*	0.92	0.64	0.81	0.93	0.84	0.83	*40*	1.01
Communications Equipment	*10*	0.93	0.77	0.64	0.60	0.17	0.62	*11*	0.84
Semiconductors & Semiconductor Equipment	*19*	1.22	1.14	1.31	1.49	1.29	1.29	*19*	1.33
Electronic Equipment, Instruments & Components	*31*	0.96	0.74	0.81	0.75	0.94	0.84	*31*	1.13
Software	*44*	0.85	0.58	0.84	0.99	0.74	0.80	*38*	0.93
Technology Hardware, Storage & Peripherals	*4*	1.20	0.94	0.94	0.78	1.15	1.00	*3*	1.08

Table 5: Median Subindustry (Information Technology) Equity-Ratios for five single 1y-periods and one 5y-period

31 May 2024	Median Equity-Ratios								
	1-Year							5-Year	
Subindustry: Information Technology	Comps incl. (Average*)	6/2019 to 5/2020	6/2020 to 5/2021	6/2021 to 5/2022	6/2022 to 5/2023	6/2023 to 5/2024	Average*	Comps incl.	6/2019 to 5/2024
IT Services	*46*	93.2%	96.3%	90.5%	93.5%	90.5%	0.93	*42*	92.6%
Communications Equipment	*11*	89.9%	94.6%	94.7%	98.6%	98.2%	0.95	*11*	94.6%
Semiconductors & Semiconductor Equipment	*21*	100.1%	101.3%	101.7%	102.7%	99.2%	1.01	*20*	100.3%
Electronic Equipment, Instruments & Components	*33*	89.5%	96.1%	90.1%	90.5%	90.5%	0.91	*31*	93.1%
Software	*47*	101.0%	100.8%	99.1%	99.9%	101.6%	1.00	*38*	100.7%
Technology Hardware, Storage & Peripherals	*4*	84.2%	84.6%	80.3%	79.7%	68.3%	0.79	*3*	80.0%

Table 6: Median Unlevered Subindustry (Information Technology) Betas for five single 1y-periods and one 5y-period

31 May 2024	Median Unlevered Betas								
	1-Year, weekly returns							5-Year, monthly returns	
Subindustry: Information Technology	Comps incl. (Average*)	6/2019 to 5/2020	6/2020 to 5/2021	6/2021 to 5/2022	6/2022 to 5/2023	6/2023 to 5/2024	Average*	Comps incl.	6/2019 to 5/2024
IT Services	*43*	0.91	0.64	0.78	0.92	0.75	0.80	*39*	0.94
Communications Equipment	*10*	0.93	0.79	0.55	0.59	0.41	0.65	*10*	0.87
Semiconductors & Semiconductor Equipment	*18*	1.27	1.12	1.24	1.28	1.06	1.19	*16*	1.22
Electronic Equipment, Instruments & Components	*29*	0.92	0.66	0.77	0.80	0.79	0.79	*27*	0.93
Software	*42*	0.93	0.58	0.87	0.97	0.69	0.81	*37*	0.90
Technology Hardware, Storage & Peripherals	*4*	0.79	0.85	0.73	0.67	1.10	0.83	*3*	0.80

Source: KPMG Valuation Data Source, see www.kpmg.de/en/valuation-data-source
**Average = Arithmetic Mean*

Multiples

Multiples are computed based on actuals (based on the annual report) and forecasts (based on consensus estimates by analyst) for the trailing year and the forward +1 year. Trading multiples for Sales, EBITDA and EBIT are each derived by dividing a companies' enterprise value (market capitalization plus net debt) by its sales, EBITDA or EBIT. Earnings multiples are derived by dividing a companies' market capitalization by earnings (net income). The market-to-book ratio is derived by dividing a companies' market value of equity by its book value of equity. Multiples below zero and above 500 are treated as outliers and are excluded. ◆

Table 7: Median Industry Multiples

31 May 2024	Sales			EBITDA			EBIT			Earnings			Market to Book-Ratio		
Industries	Trailing	Fwd. +1	Comps incl.	Trailing	Fwd. +1	Comps incl.	Trailing	Fwd. +1	Comps incl.	Trailing	Fwd. +1	Comps incl.	Trailing	Fwd. +1	Comps incl.
Industrials	1.1	1.0	*239*	7.2	6.4	*214*	12.0	10.2	*226*	13.6	11.7	*214*	1.7	1.6	*219*
Consumer Discretionary	0.9	0.9	*158*	7.4	6.2	*135*	12.3	9.8	*147*	13.6	10.8	*133*	1.8	1.6	*149*
Health Care	2.7	2.5	*110*	9.8	8.8	*74*	15.6	13.0	*75*	16.8	16.3	*68*	2.3	2.0	*87*
Financials	n/m	n/m	*n/a*	n/m	n/m	*n/a*	n/m	n/m	*n/a*	8.2	8.0	*112*	1.0	0.9	*108*
Utilities	3.3	2.7	*46*	8.7	8.3	*44*	14.0	13.3	*45*	14.1	14.0	*45*	1.5	1.4	*44*
Materials	1.1	0.9	*76*	6.6	6.0	*68*	11.7	9.8	*73*	12.6	10.5	*70*	1.3	1.2	*69*
Real Estate	12.2	11.8	*69*	18.2	17.3	*64*	21.6	18.0	*68*	12.6	11.4	*61*	0.7	0.7	*60*
Communication Services	1.4	1.4	*76*	6.3	5.8	*64*	11.8	11.6	*68*	11.9	11.5	*61*	1.6	1.6	*66*
Information Technology	1.2	1.1	*141*	9.2	7.7	*116*	14.5	12.2	*119*	17.1	15.1	*106*	2.4	2.1	*117*
Consumer Staples	0.8	0.8	*63*	7.7	7.3	*48*	11.9	11.1	*62*	15.2	13.8	*58*	1.3	1.3	*57*
Energy	1.0	1.0	*31*	4.8	4.7	*29*	7.7	7.9	*31*	9.0	8.4	*31*	1.3	1.2	*30*

Table 8: Median Subindustry (Information Technology) Multiples

31 May 2024	Sales			EBITDA			EBIT			Earnings			Market to Book		
Subindustry: Information Technology	Trailing	Fwd. +1	Comps incl.	Trailing	Fwd. +1	Comps incl.	Trailing	Fwd. +1	Comps incl.	Trailing	Fwd. +1	Comps incl.	Trailing	Fwd. +1	Comps incl.
IT Services	0.9	0.9	*42*	8.4	7.1	*36*	12.0	10.4	*39*	15.6	14.0	*35*	2.4	2.2	*36*
Communications Equipment	0.8	0.7	*7*	6.7	7.7	*7*	17.7	12.5	*6*	30.1	16.5	*4*	1.4	1.8	*4*
Semiconductors & Semiconductor Equipment	3.3	2.3	*19*	12.1	10.3	*16*	20.7	13.8	*16*	19.6	15.4	*16*	2.7	2.4	*18*
Electronic Equipment, Instruments & Components	0.7	0.7	*31*	7.4	6.6	*23*	11.8	10.4	*28*	12.9	12.1	*24*	1.2	1.2	*21*
Software	1.5	1.4	*37*	14.1	10.2	*30*	17.9	15.8	*27*	24.7	24.0	*24*	3.0	2.8	*34*
Technology Hardware, Storage & Peripherals	1.3	1.3	*5*	9.3	5.7	*4*	14.7	10.2	*3*	15.9	15.1	*3*	0.6	0.5	*4*

Source: KPMG Valuation Data Source, see www.kpmg.de/en/valuation-data-source
**Average = Arithmetic Mean*

Transaction Multiples

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The computations of the transaction multiples are based on the transaction and company data collected from various M&A databases, with the data being driven to consistency.

We publish transaction multiples for Europe and resulting regression parameters (including transactions of the period *1 April 2021 until 31 March 2024*) for the following multiples:

- Deal Enterprise Value/Sales
- Deal Enterprise Value/EBITDA
- Deal Enterprise Value/EBIT
- Deal Enterprise Value/Invested Capital

The multiples in this issue cover Europe as a total. In the following issues we will provide a regional breakdown into:

- Central and Western Europe, Southern Europe
- Scandinavia and Britain
- Eastern Europe

When using the data (multiples and regression), please consider the following:

- Sectors and resulting sector multiples are formed according to the *NACE Rev. 2 industry classification system.*
- The multiples indicate the Deal Enterprise Value *(DEPV = Market value of total capital corrected)* for a private firm. They are scaled to the levels of value Control Value, Pure Play Value and Domestic Value. Additionally, the multiples do not *include any identifiable Synergistic Values*. When applying the multiples to other levels of value without adjusting the value driver (reference value), respective *Valuation Adjustments* (Minority Discount for Minority Values, Conglomerate Discount for Conglomerates, Regional Premiums for Cross-Border transactions by international acquirors and Strategic Premium for Synergistic acquisitions) must be applied.
- The multiples are computed using transaction data collected from the previous three years. Therefore, the available multiples include transactions of the period *1 April 2021 until 31 March 2024*, with the transactions of the *latest six months given double weight.*
- The reliability of the recorded transaction data and the resulting multiples was analyzed according to the fraction of the transacted share, low and high values of the value driver as well as up-side and down-side percentiles of the observations on multiples; recognized outliers were eliminated.
- Trailing multiples are computed employing the value driver available closest to date of the transaction. Forward multiples are computed using mean and/or median estimates for the forthcoming three to six years after the transaction (not available for Invested Capital).
- The EBITDA multiples and the EBIT multiples are based on companies with only a positive EBITDA or EBIT at date of the transaction.
- The regression assumes a linear relationship between the value driver and the Deal Enterprise Value. Furthermore, it is assumed that the observed Deal Enterprise Values as well as the respective value drivers show no trend over time, making them ready for a cross-section analysis. The error terms are assumed to be normally distributed, having constant variances (homoskedasticity), being independent (no autocorrelation) and showing an expected value of zero.
- The range of the multiples (confidence interval) applies a 95% confidence level, assuming the observed multiples to be normally distributed (after elimination of outliers).
- Sectors with less than 20 observations were ignored.
- The various regions are compounded as follows:
  Central and Western Europe: Andorra, Austria, Belgium, France, Germany, Liechtenstein, Luxembourg, Monaco, The Netherlands, Switzerland
  Southern Europe: Croatia, Cyprus, Gibraltar, Greece, Italy, Malta, Portugal, San Marino, Slovenia, Spain, Turkey
  Scandinavia: Denmark, Finland, Iceland, Norway, Sweden
  Britain: Ireland, United Kingdom
  Eastern Europe: Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kosovo, Latvia, Lithuania, Moldova, Montenegro, North Makedonia, Poland, Romania, Russia, Serbia, Slovakia, Ukraine.

The data is evaluated carefully; however, the author denies liability for the accuracy of all computations.

Notes for application:

n indicates the number of observations (sample size) included in both, the computation of the multiples and the regression. $\bar{x}_a$ indicates the arithmetic mean, $\bar{x}_h$ indicates the harmonic mean

$$\bar{x}_h = \frac{n}{\sum_{i=1}^{n} \frac{n}{x_i}}$$

and $\bar{x}_t$ indicates the truncated mean (10% level = 10 % of the observations sorted in ascending order being eliminated upside and down-side)

$$\bar{x}_t = \frac{\sum_{2}^{n-1} x_i}{n-2}$$

The first quartile Q_1 indicates the boundary of the lowest 25%, the third quartile Q_3 indicates the boundary of the highest 25% of the observed multiples. Using this information, the actually employed multiple may be related to the group of the 25% lowest (highest) multiples observed. Q_2 indicates the median of the observed multiples. The confidence interval reports the range (lower confidence limit to upper confidence limit) of the multiples applying a 95% confidence level. Assuming the multiples observed to be normally distributed, this indicates all multiples lying within these limits. To evaluate the assumption of normally distributed multiple observations, the results of the Jarque-Bera Test for Normality are reported in brackets:

$$JB = n\left[\frac{(skewness)^2}{6} + \frac{(kurtosis-3)^2}{24}\right]$$

Values above the reported 5% significance points reject the null hypothesis of normality, indicating the confidence interval to be less reliable:

n	5%	n	5%	n	5%	n	5%
100	4,29	200	4,43	400	4,74	800	5,46
150	4,39	300	4,6	500	4,82	∞	5,99

The skewness **sk** indicates the symmetry of the distribution of multiple observations. A negative skewness indicates the distribution to be skewed to the left, whereas a positive skewness indicates the distribution to be skewed to the right (a skewness of zero indicates the distribution to be symmetric). The coefficient of variation cv indicates the dispersion of the observed multiples adjusting for the scale of units in the multiples, expressed by the standard deviation as a percentage of the mean. It allows for a comparison of the dispersion of the multiples across sectors. A lower (higher) coefficient of variation indicates a lower (higher) dispersion of the observed multiples and, similarly, a higher (lower) reliability of the sector multiples.

The (linear) regression equation allows for computing the Deal Enterprise Value of a private firm directly from the observed transactions (without using a multiple). Disregarding the error term, it consists of a slope expressed in terms of the value driver employed and a constant (intercept):

$$\hat{y}=\text{DEPV}=\text{slope x value driver}+\text{constant}(+\text{error term})$$

The reliability of the OLS regression equation (goodness of fit) is indicated by the adjusted coefficient of determination:

$$\bar{R}^2 = 1 - (1 - R^2)\frac{n-1}{n-p}$$

(with **p** indicating the number of explaining variables + 1 = 1 + 1 = 2; being sensitive to the number of observations), indicating the variability of the observed multiples that is explained by the regression equation. Unlike the (unadjusted) coefficient of determination, the adjusted coefficient of determination is not limited to the range between zero and one. A higher (lower) coefficient indicates a better (poorer) regression. The standard error of the regression equation similarly indicates the goodness of fit of the regression equation, indicating the degree of similarity between the regression residuals (error terms) and the "true" residuals. A lower (higher) standard error indicates a better (poorer) regression. ◆

Trailing DEPV/Sales (operating), 1 April 2021 until 31 March 2024

NACE Rev. 2 Sector			n
A	01 - 03	Agriculture, forestry and fishing	488
B	05 - 09	Mining and quarrying	2,351
CA	10 - 12	Manufacture of food products, beverages, tobacco products	1,320
CB	13 - 15	Manufacture of textiles, wearing apparel, teather and related products	1,970
CC	16 - 18	Manufacture of wood/products, paper/products, printing	880
CD	19	Manufacture of coke and refined petroleum products	231
CE	20	Manufacture of chemicals and chemical products	2,388
CF	21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	751
CG	22 - 23	Manufacture of rubber, plastic products, other non-metallic mineral products	1,358
CH	24 - 25	Manufacture of basic metals, fabricated metal products	2,775
CI	26	Manufacture of computer, electronic and optical products	3,016
CJ	27	Manufacture of electrical equipment	2,431
CK	28	Manufacture of machinery and equipment	2,528
CL	29 - 30	Manufacture of motor vehicles, trailers, other transport equipment	1,191
CM	31 - 33	Manufacture of furniture, other manufacturing, repair/installation of machinery and equipment	1,320
D	35	Electricity, gas, steam and air conditioning supply	1,186
E	36 - 39	Water supply, sewerage, waste management, remediation activities	440
F	41 - 43	Construction - Buildings, civil engineering, specialized construction activities	3,161
G	45 - 47	Wholesale/Retail trade, repair of motor vehicles and motorcycles	5,877
H	49 - 53	Transportation and storage - Land/pipelines, water, air; warehousing, postal/courier activities	3,301
I	55 - 56	Accommodation and food/beverage service activities	499
JA	58 - 60	Publishing, motion picture/video/television programme production, music publishing, broadcasting	4,154
JB	61	Telecommunications	1,041
JC	62 - 63	Computer programming/consultancy, information service activities	5,512
K	64 - 66	Financial and insurance activities	1,471
L	68	Real estate activities	569
MA	69 - 71	Legal/accounting activities, management consultancy, architectural/engineering activities, technical testing	2,952
MB	72	Scientific research and development	907
MC	73 - 75	Advertising/market research, other professional/scientific/technical activities, veterinary activities	504
N	77 - 82	Rental/employment/security activities, travel agency, facility management, office/business support activities	1,626
P	85	Education	295
Q	86 - 88	Human health and social work activities	821
R	90 - 93	Arts, entertainment and recreation	488
S	94 - 96	Other service activities - repair of computers/personal/household goods, other personal service activities	295

Trailing DEPV/Sales (operating) Multiples									Trailing Sales (operating) Regression		
$\bar{x}_a$	$\bar{x}_h$	$\bar{x}_t$	Q_1	Q_2	Q_3	95% (JB)	sk	cv	$\hat{y}$ = DEPV (TEUR)	$\bar{R}^2$	se_y
0.90	0.17	0.81	0.28	0.82	1.26	[0,79 ; 1,01] (42,0)	0.88	0.82	$\hat{y} = 1{,}284 \text{ x Sales} - 16.341$	0.96	533,187
1.31	0.24	1.30	0.59	1.28	2.05	[1,26 ; 1,36] (313,8)	0.08	0.58	ŷ = 1,022 x Sales + 1.380.885	0.93	5,876,385
1.07	0.25	0.98	0.30	0.78	1.78	[0,97 ; 1,17] (173,0)	0.72	0.83	ŷ = 1,140 x Sales + 1.101.081	0.60	4,494,080
1.64	0.42	1.66	0.92	1.78	2.30	[1,57 ; 1,70] (259,9)	-0.32	0.49	ŷ = 1,046 x Sales + 1.017.761	0.51	1,245,436
1.05	0.31	0.98	0.34	0.86	1.56	[0,95 ; 1,15] (110,6)	0.70	0.77	ŷ = 1,245 x Sales + 227.888	0.85	1,438,023
1.05	0.26	1.02	0.22	0.92	1.85	[0,86 ; 1,24] (34,7)	0.26	0.76	ŷ = 0,900 x Sales - 2.296.664	0.97	6,176,647
1.67	0.31	1.70	1.17	1.69	2.34	[1,61 ; 1,72] (281,4)	-0.29	0.47	ŷ = 1,831 x Sales - 147.131	0.89	3,567,426
1.43	0.35	1.43	0.75	1.41	2.14	[1,31 ; 1,54] (101,2)	-0.03	0.58	ŷ = 2,135 x Sales - 212.603	0.98	1,566,509
1.06	0.25	0.98	0.37	0.82	1.67	[0,98 ; 1,14] (159,8)	0.67	0.77	ŷ = 2,060 x Sales - 174.620	0.98	1,623,367
1.24	0.08	1.22	0.42	1.14	2.15	[1,18 ; 1,31] (424,4)	0.19	0.70	ŷ = 0,377 x Sales + 685.476	0.35	1,125,907
1.13	0.61	1.05	0.60	0.94	1.48	[1,09 ; 1,17] (289,7)	0.88	0.61	ŷ = 1,083 x Sales - 396.559	0.72	3,736,377
0.94	0.57	0.89	0.62	0.89	1.13	[0,92 ; 0,97] (274,0)	1.73	0.53	ŷ = 1,244 x Sales - 1.313.166	0.67	4,825,172
1.07	0.46	1.00	0.51	0.95	1.40	[1,02 ; 1,11] (199,5)	0.79	0.64	ŷ = 1,038 x Sales + 131.863	0.63	3,336,726
0.88	0.07	0.81	0.39	0.69	1.32	[0,83 ; 0,94] (87,8)	0.93	0.73	ŷ = 0,366 x Sales + 975.764	0.53	5,534,843
1.18	0.25	1.13	0.46	0.96	1.90	[1,08 ; 1,28] (176,7)	0.53	0.74	ŷ = 0,647 x Sales + 708.446	0.73	1,379,566
0.93	0.20	0.85	0.21	0.74	1.34	[0,85 ; 1,01] (143,4)	0.69	0.85	ŷ = 1,106 x Sales + 339.656	0.86	6,586,661
0.73	0.32	0.63	0.26	0.40	1.08	[0,64 ; 0,83] (37,4)	1.29	0.90	ŷ = 0,340 x Sales + 361.949	0.52	1,722,966
0.81	0.05	0.72	0.26	0.71	1.22	[0,77 ; 0,85] (243,0)	1.05	0.84	ŷ = 1,310 x Sales - 293.516	0.69	2,070,767
0.78	0.06	0.66	0.24	0.53	1.08	[0,75 ; 0,82] (534,7)	1.29	0.94	ŷ = 0,894 x Sales - 310.220	0.93	2,619,102
0.93	0.13	0.86	0.48	0.73	1.44	[0,90 ; 0,97] (292,0)	0.91	0.72	ŷ = 0,431 x Sales + 1.979.601	0.41	3,533,848
1.42	0.65	1.40	0.64	1.33	2.19	[1,27 ; 1,58] (70,6)	0.21	0.61	ŷ = 1,033 x Sales + 291.363	0.94	874,223
1.34	0.40	1.31	0.59	1.24	2.10	[1,29 ; 1,39] (568,5)	0.29	0.63	ŷ = 1,699 x Sales + 171.876	0.92	2,287,443
1.50	0.32	1.51	0.75	1.46	2.32	[1,39 ; 1,60] (147,3)	0.01	0.58	ŷ = 1,425 x Sales + 1.945.989	0.93	3,911,024
1.26	0.28	1.22	0.48	1.09	2.00	[1,22 ; 1,31] (769,8)	0.34	0.68	ŷ = 2,101 x Sales - 13.881	0.93	1,006,834
1.22	0.27	1.17	0.47	1.00	1.94	[1,13 ; 1,31] (200,1)	0.43	0.72	ŷ = 0,637 x Sales - 131.075	0.97	1,064,738
1.19	0.31	1.13	0.68	1.09	1.70	[1,06 ; 1,31] (60,4)	0.55	0.68	ŷ = 1,040 x Sales + 14.131	0.83	189,869
1.04	0.25	0.97	0.37	0.85	1.61	[0,99 ; 1,10] (340,1)	0.68	0.77	ŷ = 0,391 x Sales + 391.950	0.38	1,174,602
1.41	0.33	1.41	0.86	1.33	2.04	[1,32 ; 1,51] (112,1)	0.07	0.56	ŷ = 2,237 x Sales - 94.669	1.00	440,432
0.80	0.20	0.71	0.24	0.54	1.30	[0,70 ; 0,90] (52,7)	1.00	0.89	ŷ = 1,662 x Sales - 11.860	0.94	163,279
0.96	0.19	0.87	0.25	0.72	1.56	[0,88 ; 1,04] (193,7)	0.82	0.88	ŷ = 0,343 x Sales + 106.601	0.79	475,832
1.00	0.29	0.93	0.30	0.80	1.54	[0,83 ; 1,17] (37,5)	0.62	0.81	ŷ = 0,636 x Sales + 24.231	0.57	427,846
1.33	0.27	1.34	1.13	1.34	1.75	[1,27 ; 1,39] (59,7)	-0.23	0.47	ŷ = 1,449 x Sales + 29.100	0.96	624,020
1.30	0.37	1.25	0.62	1.06	1.94	[1,15 ; 1,45] (61,7)	0.57	0.66	ŷ = 0,751 x Sales + 165.797	0.70	417,982
0.87	0.33	0.77	0.24	0.50	1.32	[0,70 ; 1,03] (35,9)	1.00	0.92	ŷ = 0,169 x Sales + 202.070	0.79	380,651

Forward DEPV/Sales (operating), 1 April 2021 until 31 March 2024

NACE Rev. 2 Sector			n
A	01 - 03	Agriculture, forestry and fishing	284
B	05 - 09	Mining and quarrying	4,508
CA	10 - 12	Manufacture of food products, beverages, tobacco products	590
CB	13 - 15	Manufacture of textiles, wearing apparel, teather and related products	3,043
CC	16 - 18	Manufacture of wood/products, paper/products, printing	671
CD	19	Manufacture of coke and refined petroleum products	719
CE	20	Manufacture of chemicals and chemical products	4,535
CF	21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	1,964
CG	22 - 23	Manufacture of rubber, plastic products, other non-metallic mineral products	3,011
CH	24 - 25	Manufacture of basic metals, fabricated metal products	3,875
CI	26	Manufacture of computer, electronic and optical products	6,478
CJ	27	Manufacture of electrical equipment	3,075
CK	28	Manufacture of machinery and equipment	5,507
CL	29 - 30	Manufacture of motor vehicles, trailers, other transport equipment	4,235
CM	31 - 33	Manufacture of furniture, other manufacturing, repair/installation of machinery and equipment	2,319
D	35	Electricity, gas, steam and air conditioning supply	3,000
E	36 - 39	Water supply, sewerage, waste management, remediation activities	1,100
F	41 - 43	Construction - Buildings, civil engineering, specialized construction activities	4,922
G	45 - 47	Wholesale/Retail trade, repair of motor vehicles and motorcycles	8,780
H	49 - 53	Transportation and storage - Land/pipelines, water, air; warehousing, postal/courier activities	5,458
I	55 - 56	Accommodation and food/beverage service activities	1,927
JA	58 - 60	Publishing, motion picture/video/television programme production, music publishing, broadcasting	5,582
JB	61	Telecommunications	1,862
JC	62 - 63	Computer programming/consultancy, information service activities	10,954
K	64 - 66	Financial and insurance activities	1,175
L	68	Real estate activities	413
MA	69 - 71	Legal/accounting activities, management consultancy, architectural/engineering activities, technical testing	4,664
MB	72	Scientific research and development	2,496
MC	73 - 75	Advertising/market research, other professional/scientific/technical activities, veterinary activities	284
N	77 - 82	Rental/employment/security activities, travel agency, facility management, office/business support activities	3,794
P	85	Education	365
Q	86 - 88	Human health and social work activities	1,497
R	90 - 93	Arts, entertainment and recreation	467
S	94 - 96	Other service activities - repair of computers/personal/household goods, other personal service activities	274

Forward DEPV/Sales (operating) Multiples									Forward Sales (operating) Regression		
$\bar{x}_a$	$\bar{x}_h$	$\bar{x}_t$	Q_1	Q_2	Q_3	95% (JB)	sk	cv	$\hat{y}$ = DEPV (TEUR)	$\bar{R}^2$	se_y
1.40	0.52	1.40	0.93	1.35	1.99	[1,24 ; 1,56] (30,2)	0.00	0.55	$\hat{y}$ = 0,456 x Sales + 2.389.557	0.49	3,092,071
0.69	0.35	0.64	0.36	0.55	1.00	[0,68 ; 0,71] (270,7)	1.15	0.67	$\hat{y}$ = 0,451 x Sales + 1.113.819	0.90	7,353,455
1.31	0.52	1.31	0.67	1.28	2.04	[1,20 ; 1,41] (83,1)	-0.02	0.58	$\hat{y}$ = 1,848 x Sales - 2.299.780	0.94	10,180,483
0.96	0.72	0.86	0.61	0.78	1.10	[0,94 ; 0,99] (286,8)	1.74	0.61	$\hat{y}$ = 0,949 x Sales - 369.187	0.82	3,796,651
0.88	0.62	0.77	0.59	0.71	0.87	[0,82 ; 0,94] (98,3)	2.07	0.67	$\hat{y}$ = 0,839 x Sales + 80	0.82	1,527,179
0.59	0.30	0.48	0.36	0.43	0.53	[0,54 ; 0,64] (122,9)	2.21	0.89	$\hat{y}$ = 0,465 x Sales - 826.012	0.91	10,660,014
0.82	0.63	0.76	0.51	0.72	1.01	[0,81 ; 0,84] (627,1)	1.87	0.55	$\hat{y}$ = 0,486 x Sales + 3.250.305	0.76	8,720,570
1.58	0.60	1.59	1.07	1.54	2.14	[1,53 ; 1,63] (219,0)	-0.02	0.44	$\hat{y}$ = 1,073 x Sales + 773.371	0.74	8,234,225
0.89	0.55	0.82	0.50	0.83	1.11	[0,86 ; 0,91] (179,2)	1.23	0.58	$\hat{y}$ = 0,518 x Sales + 634.324	0.87	3,409,941
0.75	0.09	0.69	0.23	0.44	1.40	[0,72 ; 0,78] (498,2)	0.79	0.86	$\hat{y}$ = 0,335 x Sales + 4.156.735	0.08	8,888,695
0.92	0.70	0.85	0.54	0.77	1.16	[0,90 ; 0,93] (416,2)	1.34	0.55	$\hat{y}$ = 0,794 x Sales - 40.014	0.76	4,039,240
0.90	0.67	0.80	0.55	0.72	1.06	[0,87 ; 0,93] (322,5)	1.82	0.62	$\hat{y}$ = 0,621 x Sales + 1.480.308	0.62	6,529,014
0.68	0.12	0.61	0.34	0.55	0.84	[0,67 ; 0,70] (377,3)	1.35	0.70	$\hat{y}$ = 0,475 x Sales + 2.073.688	0.20	7,216,349
0.51	0.09	0.44	0.27	0.40	0.62	[0,50 ; 0,52] (950,8)	2.17	0.82	$\hat{y}$ = 0,228 x Sales + 3.447.310	0.50	7,378,013
0.98	0.47	0.87	0.39	0.77	1.35	[0,93 ; 1,03] (204,2)	1.10	0.76	$\hat{y}$ = 0,506 x Sales + 1.589.939	0.44	3,154,884
0.65	0.35	0.50	0.30	0.38	0.69	[0,61 ; 0,68] (390,7)	2.04	0.98	$\hat{y}$ = 0,412 x Sales + 552.141	0.78	5,624,628
0.39	0.28	0.33	0.22	0.30	0.46	[0,38 ; 0,41] (4.359,7)	4.31	0.87	$\hat{y}$ = 0,334 x Sales + 520.981	0.68	4,777,090
0.61	0.26	0.51	0.24	0.45	0.76	[0,59 ; 0,63] (846,9)	2.12	0.91	$\hat{y}$ = 0,474 x Sales - 25.364	0.68	4,628,759
0.61	0.29	0.51	0.26	0.40	0.78	[0,59 ; 0,62] (1.252,5)	2.00	0.89	$\hat{y}$ = 0,464 x Sales + 106.055	0.54	8,138,657
0.47	0.20	0.34	0.18	0.25	0.44	[0,45 ; 0,48] (954,9)	2.26	1.18	$\hat{y}$ = 0,218 x Sales + 1.102.776	0.37	4,910,036
0.51	0.24	0.38	0.17	0.20	0.50	[0,48 ; 0,55] (203,8)	1.76	1.16	$\hat{y}$ = 0,216 x Sales + 1.342.879	0.18	3,609,473
1.13	0.53	1.06	0.51	0.89	1.68	[1,09 ; 1,17] (665,1)	0.73	0.70	$\hat{y}$ = 0,885 x Sales + 259.178	0.56	7,689,237
1.51	0.49	1.50	0.97	1.44	2.15	[1,45 ; 1,57] (225,3)	0.15	0.50	$\hat{y}$ = 0,673 x Sales + 4.201.278	0.67	8,490,038
1.18	0.55	1.13	0.55	0.94	1.93	[1,15 ; 1,20] (1.492,3)	0.47	0.66	$\hat{y}$ = 1,029 x Sales + 148.685	0.45	6,599,970
1.23	0.36	1.17	0.44	0.92	2.02	[1,12 ; 1,33] (167,7)	0.43	0.73	$\hat{y}$ = 0,179 x Sales + 1.434.003	0.55	6,187,479
0.99	0.56	0.89	0.54	0.81	1.25	[0,87 ; 1,10] (35,1)	1.19	0.72	$\hat{y}$ = 0,258 x Sales + 547.716	0.34	542,647
0.82	0.10	0.76	0.34	0.66	1.22	[0,80 ; 0,85] (345,7)	0.95	0.74	$\hat{y}$ = 0,229 x Sales + 1.977.670	0.16	5,137,902
1.59	0.68	1.57	1.08	1.48	2.13	[1,55 ; 1,63] (269,8)	0.16	0.43	$\hat{y}$ = 1,412 x Sales - 15.882	0.77	4,590,450
1.10	0.61	1.08	0.48	1.05	1.74	[0,97 ; 1,23] (44,8)	0.21	0.62	$\hat{y}$ = 0,590 x Sales + 727.148	0.43	1,115,244
0.59	0.24	0.44	0.17	0.22	0.77	[0,56 ; 0,62] (386,9)	1.79	1.15	$\hat{y}$ = 0,243 x Sales + 1.325.814	0.30	3,627,192
1.07	0.60	0.99	0.48	0.66	1.57	[0,92 ; 1,23] (44,5)	0.86	0.74	$\hat{y}$ = 0,454 x Sales + 867.228	0.84	1,069,897
0.95	0.70	0.97	0.81	0.95	1.20	[0,94 ; 0,97] (72,3)	-0.13	0.34	$\hat{y}$ = 0,436 x Sales + 2.961.762	0.66	1,921,245
1.28	0.55	1.25	0.77	1.16	1.79	[1,20 ; 1,36] (54,0)	0.41	0.48	$\hat{y}$ = 0,695 x Sales + 459.853	0.52	683,279
0.73	0.43	0.70	0.30	0.83	1.01	[0,68 ; 0,78] (26,5)	0.31	0.58	$\hat{y}$ = 0,196 x Sales + 1.709.719	0.12	1,783,781

Trailing DEPV/EBITDA, 1 April 2021 until 31 March 2024

NACE Rev. 2 Sector			n
A	01 - 03	Agriculture, forestry and fishing	252
B	05 - 09	Mining and quarrying	1,744
CA	10 - 12	Manufacture of food products, beverages, tobacco products	998
CB	13 - 15	Manufacture of textiles, wearing apparel, teather and related products	1,100
CC	16 - 18	Manufacture of wood/products, paper/products, printing	649
CD	19	Manufacture of coke and refined petroleum products	392
CE	20	Manufacture of chemicals and chemical products	1,385
CF	21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	816
CG	22 - 23	Manufacture of rubber, plastic products, other non-metallic mineral products	800
CH	24 - 25	Manufacture of basic metals, fabricated metal products	1,374
CI	26	Manufacture of computer, electronic and optical products	2,726
CJ	27	Manufacture of electrical equipment	1,605
CK	28	Manufacture of machinery and equipment	1,900
CL	29 - 30	Manufacture of motor vehicles, trailers, other transport equipment	671
CM	31 - 33	Manufacture of furniture, other manufacturing, repair/installation of machinery and equipment	1,229
D	35	Electricity, gas, steam and air conditioning supply	1,079
E	36 - 39	Water supply, sewerage, waste management, remediation activities	370
F	41 - 43	Construction - Buildings, civil engineering, specialized construction activities	2,845
G	45 - 47	Wholesale/Retail trade, repair of motor vehicles and motorcycles	4,063
H	49 - 53	Transportation and storage - Land/pipelines, water, air; warehousing, postal/courier activities	1,696
I	55 - 56	Accommodation and food/beverage service activities	821
JA	58 - 60	Publishing, motion picture/video/television programme production, music publishing, broadcasting	3,719
JB	61	Telecommunications	1,208
JC	62 - 63	Computer programming/consultancy, information service activities	4,809
K	64 - 66	Financial and insurance activities	1,422
L	68	Real estate activities	810
MA	69 - 71	Legal/accounting activities, management consultancy, architectural/engineering activities, technical testing	2,109
MB	72	Scientific research and development	816
MC	73 - 75	Advertising/market research, other professional/scientific/technical activities, veterinary activities	376
N	77 - 82	Rental/employment/security activities, travel agency, facility management, office/business support activities	1,798
P	85	Education	220
Q	86 - 88	Human health and social work activities	714
R	90 - 93	Arts, entertainment and recreation	397
S	94 - 96	Other service activities - repair of computers/personal/household goods, other personal service activities	236

Trailing DEPV/EBITDA Multiples									Trailing EBITDA Regression		
$\bar{x}_a$	$\bar{x}_h$	$\bar{x}_t$	Q_1	Q_2	Q_3	95% (JB)	sk	cv	$\hat{y}$ = DEPV (TEUR)	$\bar{R}^2$	se_y
7.40	1.47	7.05	3.37	6.78	10.00	[0,46 ; 14,34] (22,0)	0.55	0.67	$\hat{y}$ = 7,175 x EBITDA + 40.099	0.96	753,033
6.62	1.84	5.98	2.88	5.01	9.02	[3,66 ; 9,58] (179,9)	1.02	0.79	$\hat{y}$ = 3,728 x EBITDA + 2.974.658	0.70	11,884,967
9.08	2.76	8.93	4.15	8.39	14.71	[4,49 ; 13,66] (143,7)	0.21	0.62	$\hat{y}$ = 5,518 x EBITDA + 2.116.102	0.49	5,750,923
8.93	5.35	8.78	4.59	8.02	14.29	[5,55 ; 12,31] (157,5)	0.25	0.56	$\hat{y}$ = 5,832 x EBITDA + 967.173	0.66	1,627,255
7.19	2.94	6.73	2.94	5.69	10.63	[2,30 ; 12,09] (77,0)	0.73	0.73	$\hat{y}$ = 5,889 x EBITDA + 88.138	0.90	1,204,125
7.43	3.14	7.05	3.34	5.59	11.20	[1,11 ; 13,75] (45,1)	0.67	0.71	$\hat{y}$ = 5,348 x EBITDA - 597.680	0.89	9,247,027
10.18	3.20	10.14	6.17	10.44	13.88	[7,30 ; 13,06] (157,8)	0.06	0.48	$\hat{y}$ = 5,553 x EBITDA + 3.671.028	0.54	5,204,640
10.87	3.24	11.06	6.48	10.77	15.45	[6,47 ; 15,27] (113,2)	-0.16	0.48	$\hat{y}$ = 6,363 x EBITDA + 1.178.003	0.95	1,928,539
7.33	1.63	6.92	3.42	5.82	10.03	[3,38 ; 11,28] (88,6)	0.73	0.68	$\hat{y}$ = 7,795 x EBITDA + 46.988	0.61	528,694
7.17	0.84	6.75	3.05	6.05	10.23	[3,94 ; 10,40] (160,2)	0.66	0.72	$\hat{y}$ = 4,678 x EBITDA + 396.683	0.81	1,547,184
9.05	6.22	8.70	5.16	8.15	11.85	[7,07 ; 11,02] (300,4)	0.57	0.53	$\hat{y}$ = 12,077 x EBITDA - 1.489.183	0.83	3,731,083
8.04	3.89	7.58	5.03	6.69	10.88	[6,10 ; 9,98] (132,1)	0.93	0.51	$\hat{y}$ = 11,845 x EBITDA - 2.443.338	0.85	3,640,085
8.40	4.20	7.99	4.82	7.22	11.55	[5,60 ; 11,21] (209,7)	0.66	0.62	$\hat{y}$ = 11,348 x EBITDA - 1.232.306	0.75	4,373,010
7.50	0.69	6.81	4.47	5.86	9.28	[2,97 ; 12,03] (57,0)	1.17	0.68	$\hat{y}$ = 2,862 x EBITDA + 1.923.231	0.44	4,385,999
8.38	2.54	8.11	4.43	8.05	11.81	[5,46 ; 11,31] (131,1)	0.33	0.57	$\hat{y}$ = 6,060 x EBITDA + 1.001.313	0.74	1,981,369
7.93	1.87	7.53	2.95	6.03	13.11	[3,32 ; 12,53] (145,8)	0.48	0.73	$\hat{y}$ = 3,367 x EBITDA + 3.262.836	0.55	9,191,898
7.70	4.00	7.46	3.43	8.21	10.58	[2,46 ; 12,94] (41,1)	0.38	0.61	$\hat{y}$ = 13,370 x EBITDA - 317.779	0.97	1,347,017
7.37	0.19	7.04	3.15	6.72	11.07	[5,30 ; 9,44] (287,9)	0.49	0.67	$\hat{y}$ = 10,023 x EBITDA - 86.501	0.74	2,225,321
7.17	2.40	6.63	3.06	5.87	10.00	[5,41 ; 8,92] (412,1)	0.80	0.69	$\hat{y}$ = 4,832 x EBITDA + 584.566	0.84	5,268,261
8.00	1.12	7.59	2.98	7.07	12.43	[4,42 ; 11,58] (225,6)	0.47	0.71	$\hat{y}$ = 1,774 x EBITDA + 2.240.760	0.20	8,352,068
7.26	5.13	6.75	4.54	6.09	8.89	[4,77 ; 9,75] (59,0)	1.14	0.55	$\hat{y}$ = 6,952 x EBITDA - 232.369	0.77	1,597,304
8.43	3.38	8.05	4.24	7.36	12.42	[6,36 ; 10,51] (437,6)	0.52	0.63	$\hat{y}$ = 5,183 x EBITDA + 740.233	0.83	3,494,860
7.47	3.33	7.07	4.89	5.89	10.02	[4,97 ; 9,97] (105,3)	0.82	0.59	$\hat{y}$ = 3,777 x EBITDA + 3.038.235	0.84	5,578,092
8.23	2.96	7.88	4.03	6.74	12.45	[6,41 ; 10,06] (592,0)	0.49	0.64	$\hat{y}$ = 5,931 x EBITDA + 367.818	0.87	1,645,108
8.03	2.43	7.63	2.88	6.23	12.66	[3,78 ; 12,28] (192,1)	0.57	0.74	$\hat{y}$ = 4,435 x EBITDA + 276.802	0.37	1,029,018
9.38	1.93	9.33	5.37	9.10	12.93	[5,27 ; 13,49] (89,7)	0.09	0.54	$\hat{y}$ = 11,592 x EBITDA - 74.324	0.90	1,019,315
7.20	2.27	6.80	3.05	6.05	10.88	[4,74 ; 9,66] (235,2)	0.61	0.69	$\hat{y}$ = 6,110 x EBITDA + 164.239	0.63	1,118,461
9.72	2.40	9.69	5.12	8.88	14.25	[4,84 ; 14,60] (110,5)	0.12	0.57	$\hat{y}$ = 6,326 x EBITDA + 598.428	0.98	1,322,525
6.27	1.30	5.90	2.52	5.20	9.44	[1,51 ; 11,04] (36,4)	0.70	0.72	$\hat{y}$ = 12,262 x EBITDA - 13.406	0.98	90,973
6.20	2.39	5.63	3.33	5.03	7.99	[4,13 ; 8,28] (133,1)	1.18	0.71	$\hat{y}$ = 5,642 x EBITDA + 72.468	0.87	710,621
7.90	2.61	7.46	4.06	5.82	11.66	[-3,24 ; 19,03] (28,6)	0.74	0.76	$\hat{y}$ = 8,145 x EBITDA + 153.141	0.69	750,199
7.66	5.54	7.58	6.65	7.17	8.42	[6,12 ; 9,21] (18,6)	0.52	0.39	$\hat{y}$ = 7,542 x EBITDA + 123.998	0.87	1,264,631
8.87	5.13	8.59	4.73	8.58	12.40	[3,25 ; 14,50] (43,1)	0.39	0.56	$\hat{y}$ = 6,567 x EBITDA + 174.469	0.74	474,282
6.48	3.54	5.82	2.53	3.69	9.39	[-2,02 ; 14,98] (28,1)	1.02	0.83	$\hat{y}$ = 2,860 x EBITDA + 116.587	0.85	341,544

Forward DEPV/EBITDA, 1 April 2021 until 31 March 2024

NACE Rev. 2 Sector			n
A	01 - 03	Agriculture, forestry and fishing	306
B	05 - 09	Mining and quarrying	4,573
CA	10 - 12	Manufacture of food products, beverages, tobacco products	660
CB	13 - 15	Manufacture of textiles, wearing apparel, teather and related products	3,161
CC	16 - 18	Manufacture of wood/products, paper/products, printing	778
CD	19	Manufacture of coke and refined petroleum products	730
CE	20	Manufacture of chemicals and chemical products	4,583
CF	21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	1,809
CG	22 - 23	Manufacture of rubber, plastic products, other non-metallic mineral products	2,979
CH	24 - 25	Manufacture of basic metals, fabricated metal products	3,929
CI	26	Manufacture of computer, electronic and optical products	6,961
CJ	27	Manufacture of electrical equipment	3,000
CK	28	Manufacture of machinery and equipment	5,598
CL	29 - 30	Manufacture of motor vehicles, trailers, other transport equipment	4,288
CM	31 - 33	Manufacture of furniture, other manufacturing, repair/installation of machinery and equipment	2,689
D	35	Electricity, gas, steam and air conditioning supply	3,864
E	36 - 39	Water supply, sewerage, waste management, remediation activities	1,116
F	41 - 43	Construction - Buildings, civil engineering, specialized construction activities	6,902
G	45 - 47	Wholesale/Retail trade, repair of motor vehicles and motorcycles	8,748
H	49 - 53	Transportation and storage - Land/pipelines, water, air; warehousing, postal/courier activities	5,598
I	55 - 56	Accommodation and food/beverage service activities	1,937
JA	58 - 60	Publishing, motion picture/video/television programme production, music publishing, broadcasting	6,210
JB	61	Telecommunications	2,002
JC	62 - 63	Computer programming/consultancy, information service activities	9,988
K	64 - 66	Financial and insurance activities	2,506
L	68	Real estate activities	2,925
MA	69 - 71	Legal/accounting activities, management consultancy, architectural/engineering activities, technical testing	4,873
MB	72	Scientific research and development	2,372
MC	73 - 75	Advertising/market research, other professional/scientific/technical activities, veterinary activities	295
N	77 - 82	Rental/employment/security activities, travel agency, facility management, office/business support activities	3,950
P	85	Education	360
Q	86 - 88	Human health and social work activities	1,492
R	90 - 93	Arts, entertainment and recreation	488
S	94 - 96	Other service activities - repair of computers/personal/household goods, other personal service activities	274

Forward DEPV/EBITDA Multiples									Forward EBITDA Regression		
$\bar{x}_a$	$\bar{x}_h$	$\bar{x}_t$	Q_1	Q_2	Q_3	95% (JB)	sk	cv	$\hat{y}$ = DEPV (TEUR)	$\bar{R}^2$	se_y
5.68	4.79	5.70	4.40	5.59	6.98	[4,65 ; 6,71] (28,5)	0.04	0.35	$\hat{y}$ = 4,859 x EBITDA + 703.615	0.89	1,395,296
3.09	1.79	2.94	1.96	2.68	4.19	[2,86 ; 3,32] (813,1)	1.60	0.60	$\hat{y}$ = 1,494 x EBITDA + 2.911.833	0.72	12,379,687
6.89	5.07	6.62	4.26	5.91	9.59	[4,55 ; 9,22] (40,9)	0.89	0.53	$\hat{y}$ = 5,064 x EBITDA + 1.627.713	0.95	8,925,764
5.24	4.05	4.93	3.50	4.71	6.25	[4,67 ; 5,80] (210,0)	1.46	0.51	$\hat{y}$ = 8,371 x EBITDA - 3.413.312	0.82	3,805,399
5.75	4.66	5.36	3.96	4.64	7.18	[4,45 ; 7,05] (80,9)	1.74	0.49	$\hat{y}$ = 4,890 x EBITDA + 304.435	0.87	1,279,722
2.89	2.10	2.60	2.10	2.38	3.23	[2,28 ; 3,50] (792,2)	3.05	0.66	$\hat{y}$ = 2,491 x EBITDA + 198.832	0.90	10,802,313
4.66	3.77	4.37	3.08	4.27	5.65	[4,31 ; 5,00] (281,0)	1.41	0.49	$\hat{y}$ = 2,690 x EBITDA + 3.514.698	0.79	7,999,721
6.52	4.37	6.18	4.48	5.69	8.78	[5,21 ; 7,82] (109,4)	0.98	0.54	$\hat{y}$ = 4,210 x EBITDA + 1.175.016	0.79	7,630,865
4.74	3.40	4.20	3.21	4.16	5.10	[4,03 ; 5,46] (1.039,6)	2.50	0.62	$\hat{y}$ = 3,880 x EBITDA - 251.759	0.85	3,620,516
4.21	1.23	4.07	2.32	3.50	6.38	[3,73 ; 4,70] (150,7)	1.08	0.61	$\hat{y}$ = 6,980 x EBITDA - 2.561.078	0.82	3,908,265
5.77	4.19	5.33	3.92	4.96	6.85	[5,21 ; 6,33] (488,7)	1.49	0.56	$\hat{y}$ = 7,350 x EBITDA - 1.804.367	0.79	7,701,692
5.93	4.81	5.41	4.20	5.01	6.36	[5,18 ; 6,68] (284,3)	1.75	0.51	$\hat{y}$ = 4,204 x EBITDA + 1.265.455	0.81	4,727,919
4.85	1.64	4.70	3.49	4.69	5.74	[4,51 ; 5,18] (254,2)	1.17	0.49	$\hat{y}$ = 9,565 x EBITDA - 4.934.662	0.87	6,692,294
3.77	1.23	3.49	2.16	3.30	4.85	[3,36 ; 4,19] (339,2)	1.54	0.65	$\hat{y}$ = 1,644 x EBITDA + 3.929.277	0.59	6,713,284
5.80	3.75	4.87	3.24	4.38	6.33	[4,18 ; 7,43] (299,9)	1.89	0.74	$\hat{y}$ = 3,282 x EBITDA + 1.275.151	0.63	2,529,704
4.44	3.41	4.40	3.37	4.48	5.35	[4,19 ; 4,70] (1.272,7)	1.40	0.42	$\hat{y}$ = 1,043 x EBITDA + 4.696.567	0.71	5,958,736
2.94	2.32	2.75	1.71	2.88	3.65	[2,61 ; 3,27] (438,8)	2.23	0.53	$\hat{y}$ = 2,303 x EBITDA + 510.911	0.76	3,861,085
6.22	3.43	5.74	3.19	5.22	8.44	[5,34 ; 7,11] (522,7)	1.02	0.65	$\hat{y}$ = 3,079 x EBITDA + 2.075.095	0.66	4,557,595
5.08	3.39	4.60	2.94	4.23	6.29	[4,59 ; 5,58] (752,3)	1.66	0.63	$\hat{y}$ = 4,224 x EBITDA + 305.154	0.67	10,263,155
3.20	1.45	2.72	1.34	1.96	4.27	[2,70 ; 3,69] (1.285,6)	2.14	0.89	$\hat{y}$ = 1,441 x EBITDA + 1.646.233	0.33	5,149,515
3.67	2.74	3.23	2.14	2.62	4.58	[3,07 ; 4,27] (202,2)	1.81	0.66	$\hat{y}$ = 3,183 x EBITDA + 353.857	0.34	3,231,420
6.49	3.94	5.99	3.74	5.42	8.23	[5,58 ; 7,40] (434,2)	1.16	0.61	$\hat{y}$ = 4,756 x EBITDA + 588.677	0.76	6,311,685
4.62	2.93	4.41	2.94	3.92	6.36	[4,05 ; 5,18] (100,2)	1.03	0.51	$\hat{y}$ = 2,986 x EBITDA + 2.514.064	0.89	4,772,464
7.00	3.74	6.48	3.33	6.03	9.56	[6,00 ; 8,00] (947,5)	0.87	0.67	$\hat{y}$ = 6,584 x EBITDA - 470.758	0.80	4,294,697
6.70	2.25	6.46	4.14	6.11	9.07	[5,54 ; 7,85] (201,9)	0.63	0.53	$\hat{y}$ = 1,344 x EBITDA + 2.280.370	0.52	5,253,990
9.80	7.45	9.66	7.54	9.23	12.30	[8,67 ; 10,94] (207,5)	0.36	0.38	$\hat{y}$ = 10,411 x EBITDA - 294.639	0.90	2,194,397
4.30	1.31	3.84	2.19	3.50	5.83	[3,62 ; 4,98] (535,9)	1.76	0.75	$\hat{y}$ = 3,410 x EBITDA + 173.378	0.62	3,515,652
7.46	5.09	6.86	4.96	5.83	9.01	[5,77 ; 9,15] (187,7)	1.24	0.57	$\hat{y}$ = 4,539 x EBITDA + 777.941	0.77	4,637,671
5.48	3.74	5.26	3.23	5.25	7.10	[3,21 ; 7,75] (16,6)	0.80	0.53	$\hat{y}$ = 3,829 x EBITDA + 382.337	0.71	784,556
3.82	2.80	3.37	2.25	2.81	4.88	[3,31 ; 4,34] (2.277,1)	2.64	0.70	$\hat{y}$ = 2,320 x EBITDA + 1.328.207	0.50	3,089,574
6.61	4.35	6.10	3.23	4.12	9.85	[1,61 ; 11,62] (44,8)	0.91	0.69	$\hat{y}$ = 2,851 x EBITDA + 1.056.538	0.83	1,040,793
5.31	4.09	5.29	4.60	5.39	5.96	[5,05 ; 5,58] (16,6)	0.33	0.28	$\hat{y}$ = 2,506 x EBITDA + 2.804.536	0.69	1,812,735
5.04	3.13	4.85	3.03	4.64	6.48	[3,84 ; 6,24] (41,3)	0.67	0.48	$\hat{y}$ = 2,847 x EBITDA + 424.380	0.60	604,591
3.16	2.31	2.86	2.39	2.96	3.43	[2,22 ; 4,09] (30,8)	1.81	0.59	$\hat{y}$ = 2,753 x EBITDA + 133.672	0.94	466,300

Trailing DEPV/EBIT, 1 April 2021 until 31 March 2024

NACE Rev. 2 Sector			n
A	01 - 03	Agriculture, forestry and fishing	311
B	05 - 09	Mining and quarrying	1,927
CA	10 - 12	Manufacture of food products, beverages, tobacco products	891
CB	13 - 15	Manufacture of textiles, wearing apparel, teather and related products	789
CC	16 - 18	Manufacture of wood/products, paper/products, printing	601
CD	19	Manufacture of coke and refined petroleum products	392
CE	20	Manufacture of chemicals and chemical products	1,352
CF	21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	880
CG	22 - 23	Manufacture of rubber, plastic products, other non-metallic mineral products	998
CH	24 - 25	Manufacture of basic metals, fabricated metal products	1,717
CI	26	Manufacture of computer, electronic and optical products	2,721
CJ	27	Manufacture of electrical equipment	1,267
CK	28	Manufacture of machinery and equipment	2,104
CL	29 - 30	Manufacture of motor vehicles, trailers, other transport equipment	735
CM	31 - 33	Manufacture of furniture, other manufacturing, repair/installation of machinery and equipment	971
D	35	Electricity, gas, steam and air conditioning supply	1,175
E	36 - 39	Water supply, sewerage, waste management, remediation activities	440
F	41 - 43	Construction - Buildings, civil engineering, specialized construction activities	3,129
G	45 - 47	Wholesale/Retail trade, repair of motor vehicles and motorcycles	3,977
H	49 - 53	Transportation and storage - Land/pipelines, water, air; warehousing, postal/courier activities	1,642
I	55 - 56	Accommodation and food/beverage service activities	810
JA	58 - 60	Publishing, motion picture/video/television programme production, music publishing, broadcasting	3,703
JB	61	Telecommunications	1,299
JC	62 - 63	Computer programming/consultancy, information service activities	4,793
K	64 - 66	Financial and insurance activities	2,206
L	68	Real estate activities	1,154
MA	69 - 71	Legal/accounting activities, management consultancy, architectural/engineering activities, technical testing	2,023
MB	72	Scientific research and development	848
MC	73 - 75	Advertising/market research, other professional/scientific/technical activities, veterinary activities	397
N	77 - 82	Rental/employment/security activities, travel agency, facility management, office/business support activities	1,916
P	85	Education	274
Q	86 - 88	Human health and social work activities	725
R	90 - 93	Arts, entertainment and recreation	247
S	94 - 96	Other service activities - repair of computers/personal/household goods, other personal service activities	182

Trailing DEPV/EBIT Multiples									Trailing EBIT Regression		
$\bar{x}_a$	$\bar{x}_h$	$\bar{x}_t$	Q_1	Q_2	Q_3	95% (JB)	sk	cv	$\hat{y}$ = DEPV (TEUR)	$\bar{R}^2$	se_y
10.29	1.74	9.39	3.53	8.51	13.84	[-8,22 ; 28,81] (29,8)	0.87	0.82	$\hat{y}$ = 10,707 x EBIT + 245.689	0.85	1,545,916
11.72	2.58	11.02	3.81	7.73	19.97	[3,30 ; 20,13] (275,4)	0.54	0.77	$\hat{y}$ = 3,310 x EBIT + 6.244.774	0.51	12,167,015
11.75	3.36	11.06	4.43	8.57	17.29	[-0,12 ; 23,62] (115,9)	0.65	0.75	$\hat{y}$ = 5,756 x EBIT + 2.149.904	0.39	5,670,446
14.50	7.64	14.29	6.77	15.41	18.12	[4,77 ; 24,23] (84,2)	0.11	0.53	$\hat{y}$ = 19,850 x EBIT - 105.898	0.74	2,286,266
9.07	4.31	8.42	4.37	8.36	12.42	[1,96 ; 16,19] (36,9)	0.97	0.68	$\hat{y}$ = 7,990 x EBIT + 132.047	0.87	1,400,881
13.56	3.78	13.31	3.37	15.08	23.34	[-8,77 ; 35,90] (62,4)	0.12	0.73	$\hat{y}$ = 3,413 x EBIT + 3.972.500	0.44	7,527,926
14.26	3.79	14.13	8.13	14.73	20.02	[7,43 ; 21,08] (161,3)	0.11	0.52	$\hat{y}$ = 4,766 x EBIT + 5.338.732	0.39	5,723,573
13.48	2.92	13.38	8.05	13.18	19.30	[5,37 ; 21,59] (109,1)	0.11	0.54	$\hat{y}$ = 8,495 x EBIT + 1.271.293	0.93	2,296,666
13.43	2.01	13.01	5.43	12.00	21.96	[0,95 ; 25,92] (139,1)	0.42	0.69	$\hat{y}$ = 22,406 x EBIT - 123.749	0.83	1,113,752
11.49	2.16	10.99	4.74	10.09	17.16	[4,62 ; 18,37] (208,4)	0.46	0.69	$\hat{y}$ = 5,115 x EBIT + 587.423	0.80	1,416,037
14.01	9.10	13.71	8.27	13.17	19.42	[9,51 ; 18,51] (313,7)	0.35	0.51	$\hat{y}$ = 23,246 x EBIT - 2.287.383	0.96	4,478,227
11.58	4.81	10.84	7.84	9.76	13.99	[6,63 ; 16,53] (90,6)	1.10	0.54	$\hat{y}$ = 18,047 x EBIT - 2.165.973	0.88	3,880,499
12.79	5.64	12.43	7.32	11.46	17.95	[7,24 ; 18,34] (236,8)	0.39	0.59	$\hat{y}$ = 22,878 x EBIT - 3.163.842	0.94	5,816,740
15.82	6.68	15.80	7.80	14.71	24.78	[1,97 ; 29,67] (104,9)	0.11	0.57	$\hat{y}$ = 8,036 x EBIT + 1.454.028	0.56	4,482,532
14.71	2.71	14.60	5.52	13.14	23.43	[1,83 ; 27,59] (140,6)	0.11	0.64	$\hat{y}$ = 8,141 x EBIT + 1.134.457	0.72	2,294,908
11.55	3.12	11.03	3.24	10.23	18.82	[1,98 ; 21,11] (158,9)	0.37	0.74	$\hat{y}$ = 3,667 x EBIT + 5.345.830	0.42	12,107,782
10.80	6.06	10.19	6.67	9.54	14.35	[1,66 ; 19,94] (32,8)	0.81	0.60	$\hat{y}$ = 9,893 x EBIT + 365.999	0.84	3,365,552
10.05	0.21	9.23	4.55	8.32	14.02	[5,54 ; 14,57] (296,9)	0.85	0.74	$\hat{y}$ = 12,997 x EBIT - 170.443	0.70	3,001,244
10.91	0.84	10.05	3.99	8.43	17.47	[5,89 ; 15,92] (475,4)	0.74	0.77	$\hat{y}$ = 18,833 x EBIT - 907.769	0.86	6,900,040
12.51	0.13	11.96	5.08	11.05	19.34	[4,01 ; 21,02] (210,2)	0.46	0.70	$\hat{y}$ = 2,837 x EBIT + 2.153.551	0.28	8,026,494
9.65	5.05	8.45	4.82	6.28	10.81	[0,73 ; 18,58] (82,4)	1.32	0.78	$\hat{y}$ = 6,541 x EBIT + 625.744	0.41	2,856,720
12.78	4.38	12.53	6.98	13.18	18.23	[8,82 ; 16,74] (421,9)	0.21	0.57	$\hat{y}$ = 12,250 x EBIT + 379.686	0.93	2,185,597
14.48	6.49	14.46	9.35	14.24	20.78	[8,34 ; 20,61] (143,3)	0.14	0.48	$\hat{y}$ = 12,146 x EBIT + 939.970	0.90	4,674,897
11.89	3.41	11.42	4.73	11.33	17.25	[7,84 ; 15,94] (587,8)	0.40	0.66	$\hat{y}$ = 14,468 x EBIT + 106.124	0.87	1,527,553
10.73	1.99	10.00	4.94	8.68	16.14	[4,92 ; 16,53] (238,8)	0.77	0.72	$\hat{y}$ = 6,685 x EBIT + 161.515	0.57	700,703
13.19	2.43	12.87	6.67	12.64	18.55	[4,34 ; 22,05] (132,6)	0.35	0.62	$\hat{y}$ = 14,145 x EBIT + 58.174	0.83	1,351,313
10.42	2.45	9.61	3.65	7.92	17.01	[3,61 ; 17,23] (237,9)	0.72	0.79	$\hat{y}$ = 6,617 x EBIT + 371.839	0.44	1,479,148
12.88	2.62	12.71	6.93	11.80	18.87	[4,11 ; 21,66] (104,2)	0.15	0.58	$\hat{y}$ = 8,454 x EBIT + 745.671	0.96	1,833,023
8.95	1.19	8.22	2.79	6.82	13.77	[-3,89 ; 21,78] (43,9)	0.79	0.84	$\hat{y}$ = 17,239 x EBIT + 2.627	0.93	302,750
10.40	2.94	9.56	4.72	7.67	15.10	[3,74 ; 17,06] (218,0)	0.88	0.77	$\hat{y}$ = 6,155 x EBIT + 465.179	0.55	1,701,023
13.88	3.41	13.74	4.62	14.02	22.45	[-12,33 ; 40,08] (44,8)	0.07	0.70	$\hat{y}$ = 22,800 x EBIT + 8.019	0.95	618,906
17.99	8.80	18.81	11.97	21.42	24.23	[7,73 ; 28,26] (89,9)	-0.80	0.43	$\hat{y}$ = 16,570 x EBIT + 866.066	0.80	1,820,643
11.45	5.36	10.70	4.24	7.60	18.84	[-9,77 ; 32,67] (31,3)	0.68	0.75	$\hat{y}$ = 6,547 x EBIT + 193.624	0.72	427,445
7.88	4.91	7.06	3.59	6.44	10.44	[-2,96 ; 18,71] (11,6)	1.32	0.72	$\hat{y}$ = 8,498 x EBIT - 33.662	0.92	279,520

Forward DEPV/EBIT, 1 April 2021 until 31 March 2024

NACE Rev. 2 Sector			n
A	01 - 03	Agriculture, forestry and fishing	284
B	05 - 09	Mining and quarrying	4,498
CA	10 - 12	Manufacture of food products, beverages, tobacco products	644
CB	13 - 15	Manufacture of textiles, wearing apparel, teather and related products	3,156
CC	16 - 18	Manufacture of wood/products, paper/products, printing	773
CD	19	Manufacture of coke and refined petroleum products	714
CE	20	Manufacture of chemicals and chemical products	4,578
CF	21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	1,750
CG	22 - 23	Manufacture of rubber, plastic products, other non-metallic mineral products	2,957
CH	24 - 25	Manufacture of basic metals, fabricated metal products	3,913
CI	26	Manufacture of computer, electronic and optical products	6,854
CJ	27	Manufacture of electrical equipment	2,807
CK	28	Manufacture of machinery and equipment	5,641
CL	29 - 30	Manufacture of motor vehicles, trailers, other transport equipment	4,288
CM	31 - 33	Manufacture of furniture, other manufacturing, repair/installation of machinery and equipment	2,694
D	35	Electricity, gas, steam and air conditioning supply	3,837
E	36 - 39	Water supply, sewerage, waste management, remediation activities	1,116
F	41 - 43	Construction - Buildings, civil engineering, specialized construction activities	6,966
G	45 - 47	Wholesale/Retail trade, repair of motor vehicles and motorcycles	8,292
H	49 - 53	Transportation and storage - Land/pipelines, water, air; warehousing, postal/courier activities	5,571
I	55 - 56	Accommodation and food/beverage service activities	1,943
JA	58 - 60	Publishing, motion picture/video/television programme production, music publishing, broadcasting	5,979
JB	61	Telecommunications	1,937
JC	62 - 63	Computer programming/consultancy, information service activities	8,126
K	64 - 66	Financial and insurance activities	2,463
L	68	Real estate activities	2,989
MA	69 - 71	Legal/accounting activities, management consultancy, architectural/engineering activities, technical testing	4,793
MB	72	Scientific research and development	2,361
MC	73 - 75	Advertising/market research, other professional/scientific/technical activities, veterinary activities	295
N	77 - 82	Rental/employment/security activities, travel agency, facility management, office/business support activities	3,902
P	85	Education	392
Q	86 - 88	Human health and social work activities	1,326
R	90 - 93	Arts, entertainment and recreation	467
S	94 - 96	Other service activities - repair of computers/personal/household goods, other personal service activities	274

Forward DEPV/EBIT Multiples									Forward EBIT Regression		
$\bar{x}_a$	$\bar{x}_h$	$\bar{x}_t$	Q_1	Q_2	Q_3	95% (JB)	sk	cv	$\hat{y}$ = DEPV (TEUR)	$\bar{R}^2$	se_y
8.06	7.02	8.00	6.59	7.39	9.68	[6,05 ; 10,08] (18,1)	0.44	0.34	$\hat{y}$ = 6,507 x EBIT + 688.913	0.89	1,376,232
5.89	2.81	5.23	2.89	4.15	8.45	[4,42 ; 7,37] (338,8)	1.55	0.79	$\hat{y}$ = 1,839 x EBIT + 4.009.650	0.65	13,958,343
9.16	7.12	8.89	5.78	8.05	12.38	[5,77 ; 12,56] (23,3)	0.89	0.48	$\hat{y}$ = 6,274 x EBIT + 1.855.793	0.92	11,227,351
8.75	6.86	8.26	5.93	7.39	10.59	[7,20 ; 10,30] (229,9)	1.12	0.50	$\hat{y}$ = 13,151 x EBIT - 2.875.773	0.79	4,018,208
8.27	6.94	7.87	6.15	7.37	9.30	[6,34 ; 10,19] (44,5)	1.35	0.42	$\hat{y}$ = 6,990 x EBIT + 368.995	0.90	1,096,896
5.34	3.17	3.97	3.07	3.58	4.55	[0,53 ; 10,14] (146,4)	2.41	1.00	$\hat{y}$ = 3,622 x EBIT + 276.495	0.89	11,538,813
8.20	6.61	8.04	5.36	7.94	10.85	[7,38 ; 9,02] (258,3)	0.50	0.43	$\hat{y}$ = 3,828 x EBIT + 4.154.988	0.79	7,956,671
8.66	5.57	8.09	5.69	7.42	10.53	[6,06 ; 11,26] (99,2)	1.22	0.57	$\hat{y}$ = 5,562 x EBIT + 1.274.370	0.81	7,268,471
7.59	5.59	6.60	4.97	6.69	8.06	[5,52 ; 9,66] (922,2)	2.52	0.66	$\hat{y}$ = 6,010 x EBIT - 194.171	0.84	3,799,758
5.79	2.04	5.71	3.55	5.22	8.46	[5,09 ; 6,49] (108,1)	0.82	0.54	$\hat{y}$ = 8,798 x EBIT - 2.015.839	0.88	3,190,269
7.92	6.33	7.31	5.38	6.74	9.27	[7,01 ; 8,83] (713,2)	1.77	0.51	$\hat{y}$ = 9,060 x EBIT - 1.298.397	0.86	6,391,511
7.26	6.23	6.84	5.44	6.36	8.36	[6,49 ; 8,04] (509,7)	1.96	0.41	$\hat{y}$ = 5,972 x EBIT + 1.202.238	0.84	4,419,878
7.12	2.74	6.76	5.03	6.48	8.94	[6,18 ; 8,06] (1.276,5)	1.92	0.55	$\hat{y}$ = 11,099 x EBIT - 3.197.112	0.92	5,013,461
5.63	2.14	5.30	3.83	5.06	6.49	[4,92 ; 6,33] (520,3)	1.66	0.57	$\hat{y}$ = 2,762 x EBIT + 3.745.997	0.67	5,985,446
9.12	6.14	7.93	4.68	6.80	9.76	[5,35 ; 12,89] (244,3)	1.51	0.72	$\hat{y}$ = 5,311 x EBIT + 1.218.983	0.61	2,629,657
7.64	5.48	7.45	5.56	7.13	9.63	[6,68 ; 8,60] (314,7)	1.36	0.47	$\hat{y}$ = 1,260 x EBIT + 5.223.809	0.67	6,361,354
4.88	3.71	4.59	3.21	4.45	6.30	[3,92 ; 5,83] (216,1)	1.84	0.54	$\hat{y}$ = 4,481 x EBIT - 59.669	0.78	3,713,903
7.51	4.69	6.83	4.24	6.41	9.36	[6,23 ; 8,79] (694,5)	1.71	0.65	$\hat{y}$ = 4,666 x EBIT + 1.721.208	0.67	4,638,151
8.42	5.75	7.79	4.63	7.31	10.83	[7,13 ; 9,70] (521,0)	1.40	0.60	$\hat{y}$ = 6,684 x EBIT + 758.662	0.77	8,631,560
5.67	2.97	4.99	2.59	4.32	7.54	[4,44 ; 6,91] (806,3)	1.91	0.80	$\hat{y}$ = 3,167 x EBIT + 1.062.286	0.45	4,654,033
5.50	4.17	4.91	3.16	3.86	7.32	[4,28 ; 6,72] (174,5)	1.70	0.63	$\hat{y}$ = 5,756 x EBIT - 351.182	0.42	3,021,903
9.54	6.13	8.96	5.48	8.63	12.26	[7,88 ; 11,20] (361,9)	1.08	0.56	$\hat{y}$ = 7,526 x EBIT + 636.176	0.89	4,403,722
9.02	6.43	8.96	6.61	9.07	10.87	[7,71 ; 10,33] (25,8)	0.65	0.40	$\hat{y}$ = 6,198 x EBIT + 2.905.424	0.79	6,631,762
9.26	5.92	8.70	5.29	8.07	12.47	[7,73 ; 10,79] (594,4)	0.93	0.60	$\hat{y}$ = 8,472 x EBIT - 199.273	0.91	3,160,553
8.20	3.21	8.18	5.69	8.35	10.53	[7,10 ; 9,31] (194,1)	0.11	0.42	$\hat{y}$ = 3,120 x EBIT + 1.828.365	0.68	4,278,730
10.21	7.79	9.90	7.59	9.55	12.31	[8,79 ; 11,64] (168,6)	0.80	0.41	$\hat{y}$ = 11,116 x EBIT - 470.581	0.91	2,123,932
6.21	2.25	5.78	3.59	5.64	8.16	[5,20 ; 7,22] (588,1)	1.68	0.63	$\hat{y}$ = 5,060 x EBIT + 202.986	0.70	3,110,061
10.23	6.65	9.22	6.39	8.08	11.31	[6,48 ; 13,98] (193,1)	1.45	0.62	$\hat{y}$ = 5,890 x EBIT + 821.883	0.83	4,022,674
8.65	2.59	8.29	3.72	8.36	12.59	[-0,69 ; 17,98] (12,5)	0.82	0.69	$\hat{y}$ = 6,195 x EBIT + 557.828	0.40	1,360,911
5.56	4.25	5.14	3.21	4.08	7.82	[4,84 ; 6,27] (352,6)	1.61	0.57	$\hat{y}$ = 4,677 x EBIT + 535.189	0.56	2,908,478
10.00	7.74	9.31	6.27	8.07	11.84	[3,23 ; 16,77] (28,2)	1.26	0.54	$\hat{y}$ = 6,814 x EBIT + 723.143	0.83	1,055,227
17.36	9.18	17.82	15.97	18.61	21.20	[12,54 ; 22,18] (128,3)	-0.74	0.36	$\hat{y}$ = 3,951 x EBIT + 3.923.245	0.64	1,972,168
7.85	4.18	7.37	3.99	6.96	10.47	[2,83 ; 12,88] (46,2)	1.60	0.62	$\hat{y}$ = 3,338 x EBIT + 571.742	0.47	714,673
6.95	4.65	6.71	5.83	7.29	8.05	[3,70 ; 10,20] (7,9)	0.76	0.50	$\hat{y}$ = 7,091 x EBIT - 50.007	0.94	474,943

Trailing DEPV/Invested Capital, 1 April 2021 until 31 March 2024

NACE Rev. 2 Sector			n
A	01 - 03	Agriculture, forestry and fishing	660
B	05 - 09	Mining and quarrying	5,845
CA	10 - 12	Manufacture of food products, beverages, tobacco products	1,374
CB	13 - 15	Manufacture of textiles, wearing apparel, teather and related products	1,578
CC	16 - 18	Manufacture of wood/products, paper/products, printing	1,111
CD	19	Manufacture of coke and refined petroleum products	902
CE	20	Manufacture of chemicals and chemical products	3,628
CF	21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	2,109
CG	22 - 23	Manufacture of rubber, plastic products, other non-metallic mineral products	2,673
CH	24 - 25	Manufacture of basic metals, fabricated metal products	4,396
CI	26	Manufacture of computer, electronic and optical products	4,734
CJ	27	Manufacture of electrical equipment	3,231
CK	28	Manufacture of machinery and equipment	4,863
CL	29 - 30	Manufacture of motor vehicles, trailers, other transport equipment	4,095
CM	31 - 33	Manufacture of furniture, other manufacturing, repair/installation of machinery and equipment	2,195
D	35	Electricity, gas, steam and air conditioning supply	4,213
E	36 - 39	Water supply, sewerage, waste management, remediation activities	1,492
F	41 - 43	Construction - Buildings, civil engineering, specialized construction activities	9,312
G	45 - 47	Wholesale/Retail trade, repair of motor vehicles and motorcycles	7,653
H	49 - 53	Transportation and storage - Land/pipelines, water, air; warehousing, postal/courier activities	5,442
I	55 - 56	Accommodation and food/beverage service activities	2,426
JA	58 - 60	Publishing, motion picture/video/television programme production, music publishing, broadcasting	6,795
JB	61	Telecommunications	2,243
JC	62 - 63	Computer programming/consultancy, information service activities	9,612
K	64 - 66	Financial and insurance activities	5,716
L	68	Real estate activities	4,358
MA	69 - 71	Legal/accounting activities, management consultancy, architectural/engineering activities, technical testing	5,614
MB	72	Scientific research and development	2,029
MC	73 - 75	Advertising/market research, other professional/scientific/technical activities, veterinary activities	590
N	77 - 82	Rental/employment/security activities, travel agency, facility management, office/business support activities	4,841
P	85	Education	472
Q	86 - 88	Human health and social work activities	1,825
R	90 - 93	Arts, entertainment and recreation	644
S	94 - 96	Other service activities - repair of computers/personal/household goods, other personal service activities	403

Trailing DEPV/Invested Capital Multiples									Trailing Invested Capital Regression		
$\bar{x}_a$	$\bar{x}_h$	$\bar{x}_t$	Q_1	Q_2	Q_3	95% (JB)	sk	cv	$\hat{y}$ = DEPV (TEUR)	$\bar{R}^2$	se_y
0.53	0.08	0.52	0.20	0.56	0.82	[0,51 ; 0,55] (94,5)	0.15	0.67	$\hat{y}$ = 0,736 x IC - 2.124	0.98	336,615
0.51	0.29	0.50	0.32	0.49	0.67	[0,51 ; 0,52] (449,7)	0.51	0.48	$\hat{y}$ = 0,567 x IC - 464.513	0.87	7,459,594
0.63	0.26	0.63	0.36	0.62	0.89	[0,62 ; 0,64] (173,5)	0.08	0.51	$\hat{y}$ = 0,849 x IC - 17.402	0.97	5,107,470
0.69	0.38	0.70	0.50	0.70	0.90	[0,69 ; 0,70] (141,3)	-0.21	0.40	$\hat{y}$ = 0,719 x IC + 142.475	0.94	649,848
0.68	0.40	0.68	0.42	0.64	0.96	[0,66 ; 0,69] (144,7)	-0.04	0.48	$\hat{y}$ = 0,685 x IC + 190.810	0.95	755,553
0.53	0.42	0.52	0.34	0.52	0.69	[0,52 ; 0,54] (78,5)	0.36	0.41	$\hat{y}$ = 0,611 x IC - 154.551	0.86	11,501,847
0.71	0.21	0.72	0.49	0.72	0.99	[0,71 ; 0,72] (452,9)	-0.04	0.44	$\hat{y}$ = 0,753 x IC + 214.804	0.87	6,382,288
0.68	0.13	0.69	0.40	0.71	0.98	[0,67 ; 0,69] (274,9)	-0.21	0.48	$\hat{y}$ = 0,665 x IC + 521.884	0.80	7,139,801
0.65	0.41	0.66	0.43	0.68	0.85	[0,65 ; 0,66] (282,8)	-0.11	0.43	$\hat{y}$ = 0,741 x IC - 454.598	0.86	3,748,922
0.52	0.08	0.51	0.29	0.46	0.72	[0,51 ; 0,53] (463,5)	0.44	0.58	$\hat{y}$ = 0,170 x IC + 955.485	0.17	2,007,396
0.67	0.46	0.66	0.44	0.59	0.93	[0,66 ; 0,67] (588,6)	0.38	0.46	$\hat{y}$ = 0,607 x IC - 25.346	0.90	2,386,345
0.71	0.49	0.70	0.51	0.65	0.94	[0,70 ; 0,71] (337,2)	0.27	0.37	$\hat{y}$ = 0,628 x IC + 278.118	0.93	2,275,343
0.69	0.15	0.70	0.46	0.70	0.98	[0,68 ; 0,70] (550,1)	-0.20	0.49	$\hat{y}$ = 0,323 x IC + 1.355.328	0.36	3,392,637
0.58	0.08	0.57	0.36	0.51	0.82	[0,57 ; 0,58] (449,7)	0.25	0.54	$\hat{y}$ = 0,385 x IC + 1.603.744	0.57	6,626,707
0.66	0.31	0.66	0.38	0.69	0.91	[0,65 ; 0,67] (269,5)	-0.06	0.47	$\hat{y}$ = 0,761 x IC - 37.148	0.89	1,148,834
0.58	0.30	0.57	0.39	0.53	0.77	[0,57 ; 0,58] (398,7)	0.31	0.46	$\hat{y}$ = 0,477 x IC + 752.303	0.88	3,893,428
0.53	0.34	0.51	0.33	0.49	0.73	[0,52 ; 0,54] (134,2)	0.63	0.48	$\hat{y}$ = 0,385 x IC + 626.963	0.86	2,805,147
0.60	0.14	0.59	0.38	0.57	0.80	[0,59 ; 0,60] (945,0)	0.26	0.50	$\hat{y}$ = 0,634 x IC + 130.360	0.81	3,283,236
0.60	0.19	0.59	0.35	0.56	0.83	[0,59 ; 0,60] (909,4)	0.24	0.53	$\hat{y}$ = 0,454 x IC + 284.402	0.95	2,182,580
0.46	0.04	0.43	0.23	0.36	0.66	[0,46 ; 0,47] (564,8)	0.81	0.63	$\hat{y}$ = 0,281 x IC + 1.101.092	0.40	4,753,926
0.58	0.41	0.57	0.42	0.56	0.71	[0,57 ; 0,58] (199,8)	0.41	0.40	$\hat{y}$ = 0,576 x IC - 10.255	0.74	1,462,856
0.65	0.34	0.65	0.41	0.63	0.91	[0,65 ; 0,66] (815,1)	0.09	0.49	$\hat{y}$ = 0,516 x IC + 443.352	0.84	3,140,195
0.75	0.45	0.77	0.52	0.73	1.05	[0,75 ; 0,76] (268,3)	-0.19	0.40	$\hat{y}$ = 0,460 x IC + 2.253.876	0.88	5,012,235
0.62	0.27	0.62	0.35	0.58	0.92	[0,62 ; 0,63] (1.260,2)	0.20	0.54	$\hat{y}$ = 0,502 x IC + 247.526	0.66	2,719,833
0.63	0.11	0.64	0.39	0.65	0.88	[0,63 ; 0,64] (663,4)	-0.12	0.51	$\hat{y}$ = 0,186 x IC + 533.210	0.71	1,713,824
0.62	0.20	0.61	0.47	0.61	0.75	[0,61 ; 0,62] (231,3)	0.15	0.39	$\hat{y}$ = 0,491 x IC + 508.875	0.93	1,626,670
0.60	0.14	0.60	0.36	0.61	0.83	[0,60 ; 0,61] (638,8)	0.01	0.53	$\hat{y}$ = 0,382 x IC + 541.069	0.41	2,587,195
0.67	0.16	0.68	0.38	0.72	0.96	[0,66 ; 0,68] (271,2)	-0.18	0.50	$\hat{y}$ = 1,056 x IC - 635.681	0.97	1,638,245
0.56	0.26	0.54	0.29	0.54	0.78	[0,54 ; 0,57] (70,4)	0.26	0.55	$\hat{y}$ = 0,497 x IC + 71.149	0.65	449,617
0.60	0.19	0.60	0.43	0.58	0.77	[0,60 ; 0,61] (413,5)	0.22	0.43	$\hat{y}$ = 0,227 x IC + 1.756.404	0.40	67,338,056
0.70	0.44	0.71	0.53	0.72	0.92	[0,68 ; 0,71] (50,1)	-0.31	0.42	$\hat{y}$ = 0,763 x IC - 28.741	0.93	799,651
0.69	0.46	0.68	0.52	0.65	0.83	[0,69 ; 0,70] (146,2)	0.30	0.36	$\hat{y}$ = 0,551 x IC + 642.074	0.72	1,780,877
0.66	0.37	0.65	0.40	0.59	0.95	[0,64 ; 0,67] (83,4)	0.15	0.49	$\hat{y}$ = 0,323 x IC + 172.543	0.63	368,466
0.51	0.03	0.50	0.30	0.51	0.70	[0,50 ; 0,53] (30,1)	0.33	0.51	$\hat{y}$ = 0,227 x IC + 983.942	0.38	236,308,156

News from IVSC

IVSC Launches its Agenda Consultation 2024

The IVSC has this month published its Agenda Consultation 2024, a core component of our standard-setting process. This consultation invites valuable feedback from our stakeholders to shape the future development of the International Valuation Standards (IVS).

The 2024 Agenda Consultation addresses potential topics that are pivotal for the ongoing refinement and enhancement of IVS. We encourage participation from all stakeholders, including practitioners, valuation professional organisations, financial institutions, investors, academics, and regulators. Your insights are crucial in ensuring that the standards comprehensively meet the needs of the global valuation community.

Key areas under consideration include Environmental, Social, and Governance (ESG) factors, advancements in technology affecting valuation processes, and the overarching valuation risk considerations. Each topic has been outlined with specific questions to guide feedback.

We value all input and are committed to a transparent consultation process. All responses will be made publicly available on the IVSC website and will be included in the final document, 'IVSC Agenda Consultation 2024: Basis for Conclusions.'

The consultation period is open for 90 days, concluding on October 9, 2024. We look forward to your contributions and to incorporating your recommendations into the evolution of IVS.

For more details and to participate in the consultation, please visit the IVSC website: www.ivsc.org.

Watch Again: IVSC Valuation Webinar Series 2024

The IVSC hosted its Valuation Webinar Series in June 2024, attracting over 3,000 delegates from 144 countries. This thought-provoking series is now available 'on demand' for those who wish to revisit the discussions or for new viewers to explore the diverse topics covered.

The 2024 series convened a panel of distinguished international experts from the fields of valuation, politics, finance, business, and academia. Together, they explored issues shaping the world of valuation today. Key topics included the global macroeconomic outlook, the pivotal role of valuation in unlocking intellectual property financing, and the emerging challenges and opportunities in the valuation of digital assets. Other sessions focused on valuation in restructuring scenarios and effective strategies to mitigate valuation risk.

For professionals looking to deepen their understanding of these areas and to stay at the forefront of valuation practice, these webinars provide an invaluable resource. Each session offers expert insights and practical guidance applicable to a wide range of professional contexts.

To register and watch these webinars on demand, please visit IVSC Webinar Series 2024.

Former Singapore Finance Minister, Lim Hwee Hua, Appointed Chair of the IVSC

The IVSC is pleased to announce the appointment of Mrs. Lim Hwee Hua as the new Chair of the IVSC Board of Trustees, effective June 2024. Mrs. Lim, who has served as a Trustee since June 2020, succeeds Lord Alistair Darling, the former UK Chancellor of the Exchequer.

Mrs. Lim's distinguished career spans politics, finance, and global business leadership. Serving in Singapore's Parliament from December 1996 until May 2011, she achieved several milestones, including her historic appointment in 2009 as the first woman to serve in Singapore's Cabinet. Her significant roles included Minister in the Prime Minister's Office and Second Minister for Finance and for Transport, where she was instrumental in spearheading major reforms and strategic initiatives across various sectors. In the financial sphere, Mrs. Lim has held senior positions at Swiss Bank Corporation, Jardine Fleming, and Temasek Holdings. Her leadership in these roles facilitated major divestments, corporate restructurings, and the formation of strategic international partnerships.

Mrs. Lim's tenure as Chair coincides with a significant period for the IVSC as it continues to expand its influence across the Asian region and prepares for its Annual General Meeting in Hong Kong this November. Her vision and leadership are poised to further the IVSC's mission to elevate valuation standards and professionalism globally.

New Perspectives Paper Explores 'Inspections' as Part of the Valuation Process

The IVSC's Tangible Assets Board has released a timely Perspectives Paper on the inspection of tangible assets within the valuation process. This publication explores the critical aspects of conducting both traditional physical inspections and innovative technology-based virtual assessments.

In light of the challenges posed by the COVID-19 pandemic, the necessity and methods of physical inspections have been reevaluated. This paper addresses these evolving dynamics, highlighting how technological advancements have facilitated alternative methods for carrying out inspections.

This paper is part of an ongoing effort to foster discussion, offer guidance, and solicit feedback from the valuation community. It aims to establish best practices and align inspection standards with the International Valuation Standards (IVS). By proposing a framework for inspection classifications and detailing the benefits and challenges associated with various inspection types, the IVSC seeks to enhance transparency and consistency across valuation processes.

Contributions from valuation experts across different regions enrich the paper, offering a diverse and comprehensive global perspective. This document is intended to support valuation professionals by providing practical guidance on navigating the complexities of asset inspections, thereby ensuring the integrity and precision of valuations.

For further details and to access the full paper, please visit IVSC Perspectives Paper on Inspections.

News from EACVA

Certified Valuation Analyst (CVA) – in Europe, for Europe

Do you want to enhance your business valuation skills and gain an internationally recognized qualification? Then the globally recognized Certified Valuation Analyst (CVA) credential is just right for you!

Join over 1,600 professionals who have been trained by EACVA, Europe's largest business valuation association, since 2005.

Upcoming course: **28 October – 1 November 2024** | in-person business valuation certification and training in Frankfurt, Germany | *10% early registration discount if registered by 28 August 2024*

By attending the CVA training week and passing the CVA exam, you will not only deepen your knowledge in the field of business valuation, but also document your professional expertise with an internationally recognized certificate. You will also benefit from our international EACVA network, which provides you with an excellent global platform to exchange ideas with other valuation professionals.

Seats are limited, so secure your spot today. » Learn more and register!

EACVA's Live Web Seminar: Start-Up Valuation on 8 October 2024

We invite you to attend our web seminar "**Start-Up Valuation – Analysis and Valuation of Young and Innovative Business Models**", beeing held on **Wednesday, 8 October 2024** I 13:30–16:15 (CEST/GMT-2).

Description: The valuation of innovative business ideas has become increasingly important in recent years. Digitization, big data and new technological advances have not only led to an increase in new business ventures, but also prompted many of the old brick and mortar companies to reinvent themselves. For valuation professionals the challenges are usually quite high: such valuation cases usually have no history, no visibility and no good comparable situations.

In this web seminar you will get **a deeper insight into necessary analytical steps, common techniques and approaches to the valuation of start-up companies and innovative business models**, in order to prepare the valuation expert for such situations.

Speaker: **Matthias Meitner**, Ph.D., CFA, Managing Partner at VALUESQUE | Professor for Finance, Accounting & Business Valuation at the International School of Management (ISM) in Munich, Germany.

» Learn more and register!

EACVA Annual Business Valuation Conference 2024

5 and 6 December 2024
Maritim Hotel Düsseldorf

EACVA's 17th Annual International Business Valuation Conference is THE premier networking event for all business valuation professionals from Europe and around the globe

Early Bird DISCOUNT by 15 September

Secure your spot by registering at
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Highlights:

- A varied conference program with two keynotes and 24 concurrent sessions
- Current business valuation topics
- 26 of the most renowned speakers at the forefront of the business valuation field
- Networking dinner - free for all conference participants
- Excellent opportunities to expand your professional network

and much more....

IVSC Members Introduce Themselves:

The NiRV (Dutch Association of Registered Valuators) is the professional association to which all Register Valuators in the Netherlands are affiliated. A Register Valuator (RV) is a financial expert who specializes in determining the value of a business and/or other assets. The title 'RV' exists for more than 25 years, yet.

NiRV
Nederlands Instituut voor
Register Valuators

How would you describe your organisation?

The mission of NiRV is [1] to maintain and improve the quality standards our members adhere to, [2] to further improve recognition of the valuation profession in society, [3] to stimulate (social) cohesion amongst our members.

Please tell us about your member structure.

At present we have approximately 375 members of which a few are honorary members. Our board encompasses five individuals who safeguard the mission of the association for the governance of the NiRV while the executive director is heading the day-to-day operations. Permanent committees are in place such as an admission and membership, a professional practice and standards committee and an investigation and discipline committee providing advise to the discipline council and the appeals board which are independent from the NiRV main organizational structure.

What are your member benefits?

Members enjoy benefits such as professional support and marketing efforts by the NiRV to increase recognition of the valuation profession with the public at large, social events and intervision meetings to improve cohesion amongst our members, an Annual Meeting with speakers active in the valuation field, a technical (online) helpdesk, a Permanent Education Programme with national and international valuation experts and many other initiatives. Furthermore, we have close liaisons with four academic institutes that offer business valuation education in preparation to the admission of future members to the NiRV. Subsequently, NiRV collaborates with universities with respect to academic research benefiting our members for example in the field of dispute valuation. In this case the position of the valuator is assessed in relation to lawyers, judges and other actors involved.

What are the most challenging valuation topics for your members right now?

- Estimating discount rates and especially quantifying discounts like small firm premium. Another challenge to keep up with all macroeconomic factors of the cost of capital like quantitative Easing/tighting policies by ECB/FED.
- Geopolitical developments.
- The last decades technology is moving fast, but we feel that AI forms a new paradigm shift of which the effects (pertaining to valuation) are difficult to assess.

What (other) valuation standards do your members follow?

Our members apply International Valuation Standards, IFRS, OECD Guidelines, and other standards depending on the purpose of the valuation engagement. Primarily the focus is on income approach with, if applicable, the use of market-based approaches. The cost approach is mostly avoided.

What are challenges for NiRV?

As an association in a relatively small country several challenges have to be faced such as the fact that the internal market has its limits in terms of the number of engagements, but also with respect to the number of individuals that could qualify as a Registered Valuator. Hence, the organizational structure of NiRV has to stay lean to prevent annual membership fees from rising. On the other hand, NiRV gets more and more recognized as the professional organization for valuators in The Netherlands which automatically results in more exposure overall. Logically, we deem it extremely important to maintain and improve quality standards within NiRV and the associated members.

Why are you member with IVSC?

Currently we are an Associate Member of IVSC and actively working towards becoming a full member. Our ambition is to contribute to the IVSC in terms of knowledge sharing and to further align prevailing code of conduct and professional standards. Our vision is that society is becoming more and more complex and data driven, with increasing chances of disputes. Therefore, we believe that NiRV should anticipate on this trend by seeking cooperation with international bodies to jointly strengthen our positioning and that of our members. ◆

EBVM

The European Business Valuation Magazine

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