Business Valuation is a Question of Trust

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Hugo Martinez is a French financial consultant (graduated chartered accountant).

Assessment of Damage to a Company's Image

Image is of strategic importance to a company. Damage to a company's image is therefore a financial loss that needs to be assessed, but no methodology has yet been developed to help financial experts carry out such an assessment. This article provides an overview of the problem of damage to image and an example of how to go about assessing this loss. Readers will find keys to understanding the issue, as well as precise tools for carrying out such a valuation.

Patent-based Startup Valuation

Missing historical financial data and prevalent operating losses are encumbering the valuation process of startup companies. In the motion control industry, however, patents are crucial to protect technological inventions and therefore contribute significantly to a company's valuation. Based on these preconditions, a patent-based valuation approach for startups in the motion control industry is developed. The results of this article can directly be applied to startup valuations within the motion control industry. Otherwise, the methodology of this study can be used as a blueprint for comparable valuation models in other industry segments.

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Cost of Capital Study 2024:

The New Dilemma: Balancing Interest Rates and Growth

Recently, the 19th edition of the Cost of Capital Study by KPMG was published. As in previous years, the study highlights current developments in the preparation of financial forecasts and the derivation of cost of capital, as well as their impact on company values and business developments. This year's theme is „The New Dilemma: Balancing Interest Rates and Growth".

From the Editors

Revision of the Business Valuation Standards in Germany and Austria: Exposure Drafts Published

At the end of 2024, the Institute of Public Auditors in Germany (IDW) and the Chamber of Chartered Accountants and Tax Consultants in Austria (KSW) have published draft versions of the respective business valuation standards (IDW S1 for Germany and KFS/BW 1 for Austria). The comment periods for both standards are currently open. Both standards explicitly distinguish between management planning as a starting point and planning for valuation purposes. This emphasises that future expected cash flows must be used as the basis for valuation and that these cash flows must be derived using plausible assumptions. Both standards emphasise three different areas of internal and external plausibility measures:

- Mathematical accuracy within and between the sub-plans as well as consistency of assumptions within individual sub-plans and between sub-plans;
- Material internal plausibility: comprehensibility and consistency of the planning with the explanations from management and quantitative and qualitative business analysis;
- Material external plausibility: Market analysis and analysis of competitors / benchmarking.

Plausibility is given when the underlying assumptions and the resulting plan figures are comprehensible, consistent and are in line with the findings of the market and competition analysis, the business analysis and the analysis of the company's past financial performance.

A significant change in the draft version of the German business valuation standards is the dissolution of the mandatory link between the function of a valuator and the bases of value to be determined. Depending on the valuator's responsibility with regard to the scope of the information used and the plausibility assessments of the assumptions underlying the planning for valuation purposes the draft version of the IDW S1 now separates three functions:

- *Neutral valuer* with comprehensive plausibility check preparing an *expert opinion*
- *Neutral expert* with sufficient plausibility check preparing an *expert statement*
- *Advisor* with no or insufficient plausibility check and reporting in the form of a *calculated value*.

In addition to the *objectified business value* (which was further developed in terms of content), the new *plausibilised decision value* was introduced as a new valuation concept.

The most significant change in the draft of the revised KFS/BW 1 standard in Austria is the new inclusion of the *market value* as a value in exchange concept in addition to the already existing *objectified business value* as a value in use concept. The *standardised subjective value* in Austria is very similar in content to the *plausibilised decision value* in Germany.

We are eagerly awaiting the final standards and will keep you informed of these and other business valuation developments in the EBVM. We hope you enjoy reading this issue.

Wolfgang Kniest, CVA
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Imprint

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Assessment of Damage to a Company's Image

Image is of strategic importance to a company. Damage to a company's image is therefore a financial loss that needs to be assessed, but no methodology has yet been developed to help financial experts carry out such an assessment. This article provides an overview of the problem of damage to image and an example of how to go about assessing this loss. Readers will find keys to understanding the issue, as well as precise tools for carrying out such a valuation.

I. Introduction

„It takes 20 years to build a reputation and five minutes to destroy it".[1] With this accurate sentence, *Warren Buffet* describes the importance for companies to preserve their reputation, which is part of a broader concept: the corporate image which can also be assimilated to corporate reputation. Both terminologies can be used and will be in this article.

Dowling specifies that *„reputation corresponds to the values attributed (such as authenticity, honesty, responsibility and integrity) to a company by an individual from the moment the company's image is stated"*[2].

A company's image is therefore a reflection of what it exudes and how its market perceives it, i.e. not only its customers, but also its suppliers, its employees, and those who support the company. A company could thus be perceived positively as being innovative (e.g. Apple), eco-responsible (e.g. Danone) or the symbol of a social brand (e.g. German car brands). On the other hand, the perception could be negative, as in the case of groups operating in the oil or tobacco sectors.

Image can be positive or negative. Depending on this perception, the company will be able to sell its products at a better price or in greater quantity. Taking the automotive industry as an example, the Audi brand enjoys a very positive image and is a strong social marker. As such, it can charge higher prices than its competitors. As a result, for the same features, an Audi car will be sold at a higher price than a Peugeot. As such we can say that corporate image, like reputation, qualifies as an intangible asset. It does not appear on traditional balance sheets but plays a vital role in value creation. Its worth lies in its ability to drive future cash flows, differentiate the company in competitive markets, and foster stakeholder trust. Image is the sum of the values conveyed by a company, making it an essential vector of communication. However, an event, whether it's wrongful or not, can damage this image and, consequently, disrupt the company's ability to communicate effectively.

When a company's way of communication with its market is hampered, it can have a direct impact on its business, leading to a drop in sales (for example) but not only. The company's reputation has become such an important matter that monitoring it is now an integral part of overall risk management.[3] This is easy to understand when you consider that when a company's way of communication with its market is hampered, it can have a direct impact on its business, leading to a drop in sales (for example) but not only.

For example, the Volkswagen emissions scandal severely disrupted the company's ability to communicate as a trustworthy and environmentally responsible brand, resulting in lost sales, legal penalties, and reputational repair costs. Similarly, in the Perrier benzene contamination case that will be further developed, the disruption to its image as a premium bottled water brand caused a temporary market withdrawal, leading to substantial financial losses. Such events can harm various stakeholders[4]: shareholders (through lost equity value), employees (job losses due to lower business activity), and customers (decreased trust and satisfaction). For financial experts, the goal is to assess the compensable damage caused by image harm to these stakeholders.

It then becomes mandatory to rebuild this image in order to restore its communication potential, and this involves substantial investment. But is this mandatory process a prejudice? In this case the event would have to be proven as wrongful. It is the lawyer's part. Then what about the damage? How to evaluate a damage coming from a reputation loss? It is the financial expert part. Finally, a casual link between these elements must be demonstrated.

However, if there is a fault (the event), a loss (loss of business, additional costs) and a causal link between these elements then yes there is a prejudice for the company, which we will describe as a corporate reputation damage. Even if this type of harm is yet to be known and fully understood, it must be assessed in the same way as any other type of harm. However, as we will describe it below, it has its own specific characteristics, which require the financial expert to apply a certain method.

The purpose of this article is to propose a framework to rationalize and objectify the quantification of financial losses caused by corporate image damage. Specifically, it seeks to address how financial experts can assess these damages, using robust methodologies and tools. Rather than prescribing a one-size-fits-all approach, the framework seeks to offer principles and tools to objectively evaluate damages in these complex scenarios.

To understand this method, we will first review and understand what a corporate reputation damage crisis is, and then the overall approach to be adopted by the financial expert. We will then study the loss quantification method, before reviewing the tools available to the expert.

II. Description of a corporate reputation damage crisis

A corporate reputation damage crisis can be broken down into two phases of interest to the financial expert: the crisis phase and the reconstruction phase.

1. Crisis, shock and damage control

A reputation crisis manifests itself as an event or series of actions that damage the perception of the company by its supporters, resulting in negative economic impacts. This period is marked by an initial shock, followed by measures to limit the damage. The crisis is often triggered by a scandal, public controversy or media incident.

1 Buffet, CEO of Berkshire Hathaway.

2 Dowling, Creating Corporate Reputations: Identity, Image, and Performance, 2002.

3 Pérez-Cornejo/de Quevedo-Puente/Delgado-García, How to manage corporate reputation ? The effect of enterprise risk management systems and audit committees on corporate reputation, European Management Journal vol. 37, no. 4 (2019): 505-515.

4 Gatzert, The impact of corporate reputation and reputation damaging events on financial performance: Empirical evidence from the literature, European Management Journal, no. 12 (2015): 485-499.

Take Perrier for example. In 1990, the Perrier brand enjoyed growth of over 20%, particularly in the United States. But one event put an end to this rise. In 1990, benzene was found at abnormally high levels in Perrier bottles. The brand had built part of its success on the image of purity of its water.5 But benzene is a hydrocarbon gas. So, it's easy to see why traces of benzene in a water with an image of purity is a real problem for the brand. Though the traces found in the water are absolutely harmless and pose no threat to health. There's not necessarily a public health problem, but consumer confidence is undermined, as the "purity" value conveyed by the brand is no longer recognized. Perrier reacted swiftly, recalling a considerable number of bottles and incurring considerable communication costs. The desire to make people forget and rebuild their image was clear: *„We have an image of purity throughout the world, and we can't let the slightest idea of insincerity linger"* explained the then CEO in 1990. Yet the damage is done. For example, while one billion bottles were sold in 1988, only 600,000 were recorded in 1998 – ten years later. The one billion mark was not reached again until 2015. The brand has lost a quarter of a century.

This example highlights the two phases of an image crisis: the crisis phase and the reconstruction phase. In the first case, there are many issues at stake for the company: restoring credibility, regaining immediate consumer confidence, and avoiding loss of sales. To minimize damage, the company needs to react quickly by implementing structured crisis management. This includes communication actions to control the message being broadcast, and concrete corrective measures such as product recalls. The costs associated with this period of crisis are numerous:

- Crisis management: specialist consultants and crisis units.
- Communication: investment in advertising, public relations and social networking campaigns to restore its image.
- Personnel costs: mobilization bonuses for crisis management teams and additional costs for recruiting communications or public relations experts.

These costs, as we shall see later, are part of a compensable loss. Then comes the long process of rebuilding.

2. The long haul: Reconstruction

The image reconstruction phase takes place once the peak of the crisis has passed. It is a long-term process, and it involves redefining and restoring the company's image through structured, long-term actions. Indeed, if we take up again *Buffet's* quote, the company once again starts a long period during which investments will be needed to rebuild what has been destroyed or damaged. But this rebuilding phase can only take place after a period of calm, during which the company has been working hard to resolve its problems. Indeed, communicating before the problems have been resolved means relaunching the crisis and reviving the media noise. This notion of media noise will be explored below, but let's remember that it's a about the company's inability to master the story it wants to tell.

This reconstruction may involve an intensive media plan, a change of logo or even a change of name in cases where the association with the event is too strong. Indeed, companies may choose to modify their visual identity or advertising message to reposition themselves in the market. This strategy is common to all companies that have suffered these crises. In France, for example:

- After the „horsemeat" scandal[6], Spanghero was renamed La Lauragaise;
- Orpéa was renamed Emeis following the scandal uncovered by a journalist about the management conditions of retirement homes in France;
- Germanwings becomes Eurowings after a crash deliberately provoked by the co-pilot;
- France Telecom becomes Orange after a wave of suicides in the company.

During this period, the company undertakes several actions which, taken together, are designed to rebuild its damaged image. In other words, the company needs to reinvest in its image. In concrete terms, this means media and marketing plans, logo changes and so on. All of these actions can be used to quantify the damage, as we shall see in the section on quantification methodology. In addition, this period of investment is also accompanied by other expenses that should not be forgotten. These include (non-exhaustive list):

- Human resources (HR) costs: an image crisis can affect employee morale and make it difficult to recruit new talents. The company may have to compensate by offering more attractive salaries or additional benefits to maintain the commitment of its teams;
- Cost of debt: banks and investors may perceive the company as a higher risk, thereby increasing the cost of borrowing or limiting access to financing. Perceptions of brand fragility can also impact the company's credit rating, making restructuring efforts more costly.

Finally, this long period can be monitored by the company. Reconstruction actions sometimes take place long after the triggering event, and their effectiveness is often based on ongoing analysis of changes in public sentiment, using media and social network monitoring tools. These tools make it possible to measure the evolution of the company's perception and adjust communication strategies accordingly to ensure that its image gradually recovers.

These various actions are all elements that the expert will need to grasp in his analysis, and which come under the heading of „characterizing" the loss.

III. The financial expert's approach: Characterization of the prejudice

The financial expert's context is as follows: a company has suffered damage to its reputation and is seeking compensation for it. In many cases, compensation will be sought through

5 See Snégaroff, En 1990, Face au scandale, Perrier tente de transformer le vice en vertu, 2015 (last access 20.10.2024).

6 In Ireland and the UK, tests carried out on beef-based lasagne sold under the Findus brand revealed the presence of undeclared horsemeat.

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the courts, from the legal or natural person (e.g. the company director) who caused the damage and who therefore carried out the damaging act. The financial expert, tasked with establishing the quantum of the damage, must adopt an audit approach to understand the company's context, and then focus on building up a body of evidence to characterize the damage.

1. An audit approach

The financial expert follows a detailed audit approach based on an in-depth understanding of the company's internal and external environment. It's not just a question of analysing financial performance, but of understanding all the dynamics underlying brand perception and the company's responses to crisis events.

The audit process begins with a contextual analysis that explores the company's history, sector of activity, core values and strategic focus. In this respect, it should be remembered that the expert's objective is to set a quantum that enables full compensation to be paid to the victim company, all other things being equal. In other words, the expert must not allow the company to „enrich itself" because of the compensation. This is why a precise and rigorous analysis of the company's past financial performance is essential. Let's imagine a company suffering an image harm, whose sales have been declining over the last three years. The expert will have to take this negative trend into account to be able to establish which part of the lost profit relates to the loss, and which to the downward trend previously observed.

Next, the expert deploys structured questionnaires and targeted interviews with key stakeholders, including managers, employees, and sometimes even customers or partners. In other words, the expert questions the company's market, the very people with whom it can no longer communicate. Gathering this information enables the expert to establish a solid basis for assessing with accuracy the impact of the crisis and reconstruction efforts.

2. A clustering method

Characterizing the damage is the central point of an image damage assessment report. The expert must be careful not to confuse the quantification with the characterization of the loss. Quantifying is the exercise whereby the expert indicates to the Court the amount which, in his opinion, would enable the victim to return to the situation *quo ante*, while respecting the principle of full compensation for the loss. Characterization, on the other hand, aims to get the Court to admit that the loss exists. In this way, certain elements will be able to help the expert to demonstrate the existence of the harm, which will then enable the damage valuation to be accepted. However, these elements alone do not allow the quantification.

To illustrate the point, and without further exploring the subject at this stage, using the example of human resources, the characterization of prejudice could be based on differences in the results of internal surveys on employees' view of the company, or that of candidates for recruitment.

Conversely, based on this same idea, the valuation of the damage will correspond to countermeasures taken by the company, such as exceptional bonuses paid to employees to "boost" the company's image, or more attractive salaries to make up for the new lack of attractiveness. At this characterization stage, the expert's overall aim is to make the figures he delivers credible in the eyes of the judges. In this respect, the expert should bear in mind that there are both financial and non-financial elements to analyse. Among the financial elements, let's mention the following:

- Stock market price: in 2019, AMO Strategic Advisors published a study focusing on the price of reputation.[7] The main findings are that corporate reputation accounts for 35.3% of the market capitalization of the companies studied, equivalent to almost 16.8 trillion dollars (USD) at the time of the study. Consequently, a fall in the share price of the company, uncorrelated with its reference market, could be sign of a negative and damaging event specific to the company;
- The cost of debt: it will be interesting for the expert to analyse whether the company is experiencing an increase in the cost of its financing during the crisis period, or even during the period of rebuilding its image. Such an increase would be evidence of a detrimental event.

The expert can analyse the evolution of the company's image using several tools. There are also numerous public image studies that the expert can use, such as Opinionway[8], or the Reptrak model[9], which measures a company's reputation and the factors that drive it.

Finally, let's talk about PR Value: The sector of marketing and advertising has invented a measure known as PR Value. This measure, or rather this value, is used to evaluate the effect of an advertising campaign or, more generally, the overall feeling towards the brand generated by all press articles (all understood by geographical market). It is a measure of sentiment. The PR Value can be analysed in several ways. For example, it can measure "media noise" i.e. the number of press articles that have been published about the company or have mentioned it. In the case of a discreet company or one unaccustomed to reaching the headlines, PR Value can help to detect a peak in the number of incidents or an increase in media noise. In detail, this noise can be analysed in greater detail, since it is possible to distinguish between articles with „positive" and „negative" connotations. If the negative outweighs the positive from the date of infringement, the expert has a strong argument to characterize his prejudice.

The expert will remember this characterization stage as the foundation of the credibility of his valuation. This stage involves the juxtaposition of several methods, which together form a „fresco" of image damage.

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7 See Cole, What price reputation? Corporate Reputation Value Drivers: A Global Report by AMO, 2019.

8 See OpinionWay, Marketing and communication research (last access 20.10.2024).

9 See Chan et al., Application of Selected Facets of RepTrak™ Reputation Model on Carlsberg Malaysia as One of the Companies in Tobacco, Gambling, Alcohol and Pornography (TGAP) Industry, 2018, (last access 20.10.2024).

IV. Calculating a corporate reputation damage

While damage to reputation requires a specific methodology, notably with the need to characterize the damage, the quantification itself is of a classic nature. In this sense, the expert will endeavour to evaluate the gains lost (*lucram cessens*) and/or the losses suffered (*damnum emergens*).

However, these damages can be distinguished according to whether they result directly from the crisis or are caused by the company's actions to restore its image. There are immediate costs of damage and costs of rebuilding the reputation.

1. Immediate costs of damage and loss of revenues

As we have already seen, an image crisis takes place in two stages. The first is the crisis phase, during which the company's objective is to manage and, if possible, minimize the consequences, followed by the image reconstruction phase. The immediate costs of damage are those that arise in the first part of this chronology. This will enable the expert to start his analysis with the most obvious costs, those incurred in crisis management. These include e.g. legal, litigation and communication costs which we can include in a "litigation costs package". Financial expert's fees would also be included in this package. Next come costs that are more difficult to measure, for instance those linked to the mobilization of top management. Indeed, a real image crisis is likely to mobilize a company's highest hierarchical level. Should the time spent by these people be considered as a recoverable cost?

The question is even debated in case law. Nevertheless, subject to solid argumentation and tangible evidence, the expert may consider that these are „*non amortized costs*[10]" which correspond to the allocation of part of the company's resources to work unrelated to its operating process. Obviously, General Management is not an operating resource. Nevertheless, the role of this department is not so much to fully manage a crisis operationally and for a long time, but rather to set the course and define the strategy. Thus, if the expert can determine that members of the Management were very strongly mobilized, in an exceptional way, by this crisis management, then we can consider that these members were no longer exercising a routine role. As such, the company's resources have been allocated to tasks other than those for which they are used to.

Employees (not from Management) are also company stakeholders. For example, several listed companies have recently introduced indicators to measure employees' perception of the company's image. Although the indicator as such cannot be used for quantification, it does reveal hidden consequences of the damage. Employees who don't have a good image of their company are even more likely to leave. And if employees leave, they must be replaced. This is a cost for the company. First and foremost, in terms of time (recruitment processes), but also in terms of money e.g. by using head-hunters. Even more so as a company with a poor image will be less attractive. The company's efforts will therefore have to be all the greater.

To capture this kind of costs the expert could e.g. compare the evolution of salaries offered before and after the crisis, at equivalent levels, to highlight an increase in the salaries offered, demonstrating thereby the company's efforts to restore its attractiveness.

Finally, let's look at the company's investors and consider a very simple example. Today, which (medium-sized) company would have the best access to bond financing: one that is a subcontractor in the luxury goods industry, or one that is a subcontractor in the oil or arms industries? Probably the first one, thanks to the image carried by the luxury goods industry. Remember that an image helps generate support. It is the sum of the company's values. Consequently, an image crisis is likely to erode support. For investors, this translates into higher financing costs. The expert could therefore compare the cost of credit before and after the damage. The difference between the two, all other things being equal, would be the result of the harmful event. In this way, the expert can go round the company's stakeholders and carry out a before-and-after comparison to measure the direct impacts of the crisis.

Then there's the question of lost profits. As we have said, an image is a vector that enables a company to communicate with its market. In this respect, damage to image can result in customers being less attracted to the company's products. Let's again take the example of Perrier, whose "purity" value was attacked, and which took several decades to recover its sales levels. The lost profit here is obvious. But beware of taking the easy way out. The Expert must never lose his intellectual rigor and must always consider all external factors which may also have an impact on the company.

The costs and profit loss described above are directly linked to the crisis and can be detected very quickly after the prejudice has occurred, which is why they are classified as "immediate costs" in this article. However, these costs will last for a long time, probably until the company manages to restore its reputation. To achieve this, the company must carry out a restoration process that will incur other specific costs in addition to those already identified.

2. Investments to restore the reputation

During the crisis period, a company that has suffered damage to its reputation is subject to intense media pressure, making it unable to defend itself against the crisis. As a result, the costs of rebuilding a company's image are sometimes out of sync with the period of crisis. The expert must list them exhaustively. These costs are of a different nature to those usually encountered in the context of conventional damage valuation. For example, the traditional external costs (lawyers, various fees) will also be listed by the expert, but they will be more likely to be incurred in the crisis phase, immediately following the injury.

Restoration costs are different since their purposes are to restore values and image, they will occur after the crisis. These are more likely to be:

- marketing costs;
- media buying for advertising campaigns;
- communication costs.

10 See Chagny, Ballot, Le Teuff, Loeper, Peronnet, Points clés relatifs à l'évaluation des préjudices économiques, CNECJ editions, March 2018.

Regarding the last point, in the case of image harm, it is common for the company to want to change its logo or even its slogan, as this is the only way to „carry on" with a new chapter. In this respect, the expert will have to check the associated costs such as:

- logo change;
- change of slogan;
- change of graphic charter.

When carrying out this analysis, the expert should never depart from the differential approach between actual and counterfactual scenarios, and from the principle of "*all other things being equal*". Indeed, the changes mentioned above are not triggered solely by image damage. A logo change is a classic event in the lifetime of a company. Consequently, the expert must constantly question the causal link: was the change triggered by the damage, or was it foreseen beforehand?

The expert must therefore be particularly vigilant on this point. Furthermore, even if these changes were planned, the image damage may have forced the company to increase the scale of these changes, as well as the communication that usually accompanies them. Consequently, only this increase, i.e. the cost differential, will be included in the calculation of the loss. To verify this point, the expert will need to obtain the campaign budgets before damage and the costs actually incurred, in order to quantify the difference. In other words, to put a figure on the budget overrun. Advertising campaigns are generally of two types:

- product campaign;
- corporate campaign.

Experience has shown that, following an image loss, the company no longer communicates solely on its products, but also on its values, since it is these that have been attacked by the loss. As a result, the company incurs costs for a corporate campaign. For example, after the „dieselgate" affair, the Volkswagen Group changed its slogan[11] and then launched a „corporate" advertising campaign to present the Group's new strategy. The media campaign featured no products – or at least only prototypes – so no commercial spin-offs were possible as a result. These costs, whether direct or delayed, must be identified by the expert. All that remains is to analyse the tools available to him to identify and quantify these missed gains and incurred costs.

V. Tools available to the expert

The expert in charge of assessing reputation damage has a wide range of tools at his disposal. Among these, we will examine the classics, as well as more recent ones, or those from spheres other than finance.

1. Classic tools

The construction of an actual and counterfactual scenario makes it possible to model the impact of the damage, in the sense that the actual scenario corresponds to the company's financial performance, including the damage, whereas the counterfactual scenario reflects the performance the company should have achieved in the absence of the said damage. The difference between the two corresponds to the damage, „*all other things being equal*[12]". This last notion needs to be clarified. The company may have lost sales because of the damage, in which case the difference between the two scenarios is obvious. But from these lost sales figures, the costs avoided, i.e. the direct costs correlated with the targeted sales figures, must be deducted. In other words, the expert will reason in terms of margin on variable costs, not standalone sales.

The modelisation of these two scenarios must begin with a definition of the different dates of the loss. As such, the expert will have to decide on:

- the date on which the damage began;
- the end date of the damage;
- the damage assessment period.

The date of beginning corresponds to the starting point of the damage, i.e. the point at which the victim company starts suffering the consequences of the damage. In the specific case of corporate reputation damage, the expert must be particularly careful not to confuse the starting point from a legal point of view, i.e. the event giving rise to the damage, with the starting point from a financial point of view. In fact, the legal triggering event will be the date on which the harmful facts are committed, whereas damage to reputation only begins when these facts are revealed. There is therefore a distortion between the two concepts.

As far as the end of the damage is concerned, this corresponds to the moment when the company returns to a normal situation. In this case, the question of how to deal with residual effects arises, because when a factory temporarily loses a machine essential to its production, it is obvious that the return to normal corresponds to the restarting of the machine and when the normal production rhythm is back on. This is less obvious in the case of damage to corporate reputation, since while the damaging events may cease quickly, the consequences are felt over a very long term. This difficulty needs to be addressed by the expert, who, in theory, should already have the answer. In fact, if after-effects are identified, then they must be integrated into the model, as part of the reputation reconstruction phase. And if these effects are documented, and if the expert is certain that they will continue beyond the submission of his report, i.e. that they will become future costs, then the situation is simply not back to normal yet.

However, it is inconceivable for the expert to retain a loss indefinitely. It is therefore advisable to retain the date of submission of the report as the end date – while indicating in the same report that the figures have been calculated on the basis of information available at this stage and that they are likely to change in the future, depending on the consequences that are identified.

11 See La Réclame, Volkswagen uses dieselgate to promote electric shift, 10.06.2019, (last access 20.10.2024).

12 See Chagny, Ballot, Le Teuff, Loeper, Peronnet (2018), op. cit. (footnote 8).

Finally, the expert will have to decide on the date on which the loss is to be assessed. Under French law, this date is that of the judgment, to guarantee full compensation. It is from this date that the dichotomy between past and future costs is made.

To illustrate this methodology, we could use the following simplified example (see Appendix): A company has suffered damage to its reputation. A drop in sales has been identified and the costs of the immediate crisis have been engaged (lawyers, communication etc.). This company has a revolving credit facility. Every 6 months the company takes out a new loan. Usual rate was 2%. Since the crisis the rate has risen up to 3%. Top Management spent 40% of its time for 3 months managing the crisis.

The damage occurred in March 2022, from April 2022 to June 2022, a period of crisis. Subsequently, Management identified damage up to December 2024, but taking a cautious approach the Expert considered that from July 2023 to December 2023, the damages could not be entirely linked the prejudice. This period is therefor considered to be excluded. The assessment of damages occurred in December 2024. The overall calculation of the loss would therefore be as shown in the appendix, after capitalisation[13] of the loss due to the loss of cash flow generated by it.

2. The new tools

The **Reptrak model** we mentioned earlier is one of the tools the expert could use to measure the loss. This model measures reputation based on seven indicators representing the quality of what is sold, the company's capacity for innovation, its relationship with its employees (well-being, attractiveness, remuneration), its ethical conduct (i.e. the way it behaves towards society) and its impact on it. Leadership refers to the company's top management, its vision and its responsibility. Finally, performance refers to the company's finances and results.

Taken together, these indicators enable the model to understand the company, what works, where there is a reputational risk for it, and how stakeholders react to this risk. These seven indicators help us to understand the origin of stakeholder support and the „why" behind reputation. From there, the expert could use the model, comparing it before the loss and after the loss, to understand which indicator has fallen, and thus better target the costs incurred by the company. For example, if the relationship with employees is deteriorating, the expert may be interested in remuneration and the various actions taken by the company to return to a better situation.

The expert can also use the **media equivalence method**. The basic idea of this method is to measure media noise and the general feeling of this noise and, from this, to deduce a media cost, i.e. to estimate how much this media coverage would cost with this tone. Once this amount has been obtained, the expert simply assumes that to rebuild the image, the company will have to spend at least the same amount on media to at least cancel the negative effects. Other "marketing" costs could occurr such as changing logos, colors, etc.

The expert could conduct sentiment analysis using **text mining methods**. Text mining, also known as „text mining" refers to the process of analysing and extracting meaningful information from large quantities of unstructured text. A sentiment analysis carried out using the TextBlob library[14], evaluates the polarity (positivity/negativity) and subjectivity (objectivity) of the given text. Here's what the conclusions based on the results mean:

1. **Polarity** measures the degree of positivity or negativity of the text. Polarity values close to zero generally indicate neutrality or an absence of strong feeling.
2. **Subjectivity** measures the degree of subjectivity or objectivity of the text. A subjectivity value above 0.5 suggests that the text contains a certain amount of personal judgment, opinion or emotion.
3. **Sentiment** represents the text's tendency towards positive or rather pejorative sentiment.

These tools can be used both for the characterization stage and for estimating the loss.

VI. Conclusion

The crucial importance of a company's reputation and image in the modern business landscape is indisputable. Warren Buffet rightly points out that reputation, built up over time, can be destroyed in an instant. As an integral part of the broader concept of corporate image, reputation is of major strategic importance.

This issue is the responsibility of corporate governance, who must address it before any damage is done, with a reputation monitoring policy. It should also be noted that the rise of generative artificial intelligence is only reinforcing the reputational risk for companies, with the risk of „deepfakes" in particular.

Clearly, these types of damage are likely to multiply, and with them the question of damage assessment.

The aim of this methodological proposal is not to describe what needs to be done, but rather to propose a framework or toolbox for rationalizing and objectifying the quantification of financial loss in case of a corporate repuation harm, which is currently more a matter of trying to obtain additional compensation than real compensation for the full damage suffered.

The growing importance of this subject means that financial experts need to be trained in these matters and to apply a rigorous method, as they do for other types of damage. ◆

13 To simplify matters, the rate has remained unchanged over the injury period, with 75% of the flow taken into account in 2022 and 100% in 2023 and 2024.

14 Textblob is a Python library.

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Appendix: Example (simplified)

				Start of damage	*Crisis period*			*Damage assessment period / Restoration period*											
	€	**Jan 22**	**Feb 22**	**Mrz 22**	**Apr 22**	**Mai 22**	**Jun 22**	**Jul 22**	**Aug 22**	**Sep 22**	**Okt 22**	**Nov 22**	**Dez 22**	**Jan 23**	**Feb 23**	**Mrz 23**	**Apr 23**	**Mai 23**	**Jun 23**
A	Actual sales	5.008.333	5.006.681	5.002.042	4.933.417	4.941.806	4.950.209	5.058.626	5.067.057	5.075.502	5.083.961	5.092.434	5.100.922	5.109.423	5.117.939	5.126.469	5.135.013	5.143.571	5.152.144 …
B	Counterfactual sales	**5.008.333**	**5.006.681**	**5.092.078**	**5.124.018**	**5.132.558**	**5.141.113**	**5.149.681**	**5.158.264**	**5.166.861**	**5.175.472**	**5.184.098**	**5.192.738**	**5.201.393**	**5.194.708**	**5.203.366**	**5.212.038**	**5.195.007**	**5.203.665** …
A - B	**Loss of profits**	**-**	**-**	**-90.037**	**-190.602**	**-190.753**	**-190.904**	**-91.055**	**-91.207**	**-91.359**	**-91.511**	**-91.664**	**-91.817**	**-91.970**	**-76.769**	**-76.897**	**-77.025**	**-51.436**	**-51.521** …
C+D+E+H	**Immediate costs**	-	-	**5.000**	**25.000**	**25.000**	**25.000**	**4.000**	**3.853**	**1.699**	**1.537**	**1.366**	**1.188**	**2.000**	**1.853**	**1.699**	**1.537**	**1.366**	**1.188** …
C	*Lawyers / litigation costs*			*5.000*	*10.000*	*10.000*	*10.000*												
D	*Communication / Damage control costs*				*7.000*	*7.000*	*7.000*	*3.000*	*3.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000* …
E = G - F	**Financial costs (100K€ loan)**	-	-	-	-	-	-	**1.000**	**853**	**699**	**537**	**366**	**188**	**1.000**	**853**	**699**	**537**	**366**	**188** …
F	*Usual rate 2%*	*2.000*	*1.683*	*1.360*	*1.030*	*693*	*350*	*2.000*	*1.683*	*1.360*	*1.030*	*693*	*350*	*2.000*	*1.683*	*1.360*	*1.030*	*693*	*350* …
G	*Actual rate 3%*							*3.000*	*2.536*	*2.059*	*1.566*	*1.060*	*538*	*3.000*	*2.536*	*2.059*	*1.566*	*1.060*	*538* …
H	**Top Management costs**				**8.000**	**8.000**	**8.000**												
I = J+K	**Restoration costs**	-	-	-	-	-	-	-	-	-	-	**3.500**	**3.500**	**3.500**	**1.000**	**1.000**	**1.000**	**3.500**	**3.500** …
J	*Marketing costs*											*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000* …
K	*Media costs*											*2.500*	*2.500*	*2.500*	-	-	-	*2.500*	*2.500* …

		Excluded period : Unsure relation to the damage								
	€	**Jul 23**	**Aug 23**	**Sep 23**	**Okt 23**	**Nov 23**	**Dez 23**	**FY22**	**FY23**	**Total**
A	Actual sales	5.160.731	5.169.332	5.177.948	5.186.578	5.195.222	5.203.881	60.320.989	30.784.560	**91.105.549**
B	Counterfactual sales	**5.207.177**	**5.210.687**	**5.198.659**	**5.207.324**	**5.216.003**	**5.224.696**	61.531.896	31.210.178	**92.742.074**
A - B	**Loss of profits**	**-46.447**	**-41.355**	**-20.712**	**-20.746**	**-20.781**	**-20.816**	**-1.210.908**	**-425.618**	**-1.636.526**
C+D+E+H	**Immediate costs**	-	-	-	-	-	-	**93.643**	**9.643**	**103.286**
C	*Lawyers / litigation costs*							35.000	0	**35.000**
D	*Communication / Damage control costs*							31.000	6.000	**37.000**
E = G - F	**Financial costs (100K€ loan)**							**3.643**	**3.643**	**7.286**
F	*Usual rate 2%*									
G	*Actual rate 3%*									
H	**Top Management costs**									
I = J+K	**Restoration costs**	**3.500**	**1.000**	**1.000**	**1.000**	**3.500**	**3.500**	**7.000**	**13.500**	**20.500**
J	*Marketing costs*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	2.000	6.000	**8.000**
K	*Media costs*	*2.500*				*2.500*	*2.500*	5.000	7.500	**12.500**

Years	**FY22**	**FY23**	**FY24**	**Total**	
Damage	**1.311.551**	**448.761**	**0**	1.760.312	
2% rate	1,02	1,02	1,02		
Capitalized damage	**1.384.955**	**466.891**	**0**	**1.851.846**	€

Top management cost	**24.000**
Number of peoples concerned	3
Average monthly cost	20.000
Average rate of crisis management (during 3 months)	40%

Patent-based Startup Valuation

Missing historical financial data and prevalent operating losses are encumbering the valuation process of startup companies. In the motion control industry, however, patents are crucial to protect technological inventions and therefore contribute significantly to a company's valuation. Based on these preconditions, a patent-based valuation approach for startups in the motion control industry is developed. The results of this article can directly be applied to startup valuations within the motion control industry. Otherwise, the methodology of this study can be used as a blueprint for comparable valuation models in other industry segments.

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I. Introduction

Startup companies present a unique challenge for company valuation due to their small revenues, operating losses, and missing historical financial data. Therefore, the standard techniques established for company valuation, such as the Discounted Cashflow method, are heavily based on assumptions or do not work at all. On the other hand, intangible assets, such as patents, can significantly contribute to a company's value. This is particularly true in technology-intensive industries like the motion control industry, which is the focus of this study. As a supplying industry to the industrial automation sector, the motion control industry is focusing on products or components, such as motors, gearboxes, controllers, drives, actuators as well as necessary sub-components such as, e.g., bearings. Integrated solutions that combine several of the previously mentioned products or components are also in scope of the motion control industry. However, also the valuation of patents is dealing with significant uncertainties due to the nature of intangible assets and the wide array of existing methods. In practice, these complexities pose significant challenges in the mergers and acquisitions (M&A) process, especially when potential buyers must evaluate the fair value of a startup company.

Based on the previously described challenges in the valuation process of startup companies, this study will focus on the identification of patent-related value drivers and on the development of a patent-based valuation approach for startups within the motion control industry. It should enable involved parties of M&A deals to find value estimates for possible M&A targets within the motion control industry quickly and efficiently based on the targets' patent portfolios. To achieve these goals, this study will utilize empirical data on company transactions and funding rounds to create a novel, patent-based valuation model for startup companies in the motion control industry.

II. Methodology

To create the patent-based valuation approach, this study utilizes multiple linear regression as the preferred method. It will be applied in orientation to the backward elimination approach.[1] Therefore, the number of independent variables will be reduced with every iteration. For this study, all variables will be included in the first empirical model and then eliminated based on their statistical significance falling below the threshold of $p<0.05$. The final empirical model will therefore only include significant variables.

III. Sample selection and data sources

Besides the methodological approach used in this study, the variables used in the empirical models as well as their data sources will be introduced. Based on a systematic literature review on patent valuation.[2] Table 1 shows the relevant variables for this study. The transaction value or the funding amount (TV) acts as the dependent variable, while the other nine variables are used as independent variables or predictors.

Table 1: Overview of variables used within this study

Abbreviation	Description	Explanation
TV	Transaction value or funding amount	Total value of the according company transaction or total funding amount at the date of research
PA	Number of patents	Total number of patents of the company
RPV	Remaining years of validity of patents	Accumulated number of remaining years of the validity of all patents of the company (calculated against a maximum protection length of 20 years for each patent)
PC	Patent claims	Total number of patent claims of all patents of the company.
FC	Forward citations	Total number of forward citations of all patents of the company, where the priority dates of the new (citing) patents are within the first five years after the publication of each cited patent.
BCP	Backward citations (patent documents)	Total number of backward citations of all patents of the company, where another patent is cited.
BCNP	Backward citations (non-patent literature)	Total number of backward citations of all patents of the company, where non-patent literature is cited.
TPO	Triadic patent offices	Total number of triadic patent offices (US, JP, EU) of all patents of the company, where the individual patent was applied and published.
IPC	IPC classifications	Total number of IPC classifications of all patents of the company.
INV	Inventors	Total number of investors of all patents of the company.

1 For further information on the backward elimination approach, please see Thompson, Selection of Variables in Multiple Regression: Part I. A Review and Evaluation, International Statistical Review, vol. 46, no. 1 (1978): 1-19.

2 Please find in the following relevant literature on patent valuation which was identified within the systematic literature review (non-exhaustive): Greenberg, Small Firms, Big Patents? Estimating Patent Value Using Data on Israeli Start-ups' Financing Rounds, European Management Review, vol. 10, no. 4 (2013): 183-196. Harhoff/Narin/Scherer/Vopel, Citation Frequency and the Value of Patented Inventions, The Review of Economics and Statistics, vol. 81, no. 3 (1999): 511-515. Lanjouw/Pakes/Putnam, How to Count Patents and Value Intellectual Property: The Uses of Patent Renewal and Application Data, The Journal of Industrial Economics, vol. 46, no. 4 (1998): 405-432. Trajtenberg, A Penny for Your Quotes: Patent Citations and the Value of Innovations, The RAND Journal of Economics, vol. 21, no. 1 (1990): 172-187. Additionally, the following publications provide a comprehensive overview on the topic of patent valuation and on different patent value indicators: Kalıp/Erzurumlu/Gün, Qualitative and quantitative patent valuation methods: A systematic literature review, World Patent Information, vol. 69 (2022): 102111. Reitzig, Die Bewertung von Patentrechten, Eine theoretische und empirische Analyse aus Unternehmens-sicht, 2002: 88-132. Van Zeebroeck, The puzzle of patent value indicators, Economics of Innovation and New Technology, vol. 20, no. 1 (2011): 33-62.

Table 2: Potential influence of variables on patent value

Abbreviation	Description	Influence on patent / company value
TV	Transaction value or funding amount	The transaction value or funding amount is used as an estimation for the company value in this study. The company value itself is defined as the sum of the value of the company's patents.[1]
PA	Number of patents	Each patent has some economic value to the company holding the patent. Thus, with an increasing number of patents, the total value of the patent portfolio and, therefore, of the company should increase.[2]
RPV	Remaining years of validity of patents	In the literature, two approaches can be differentiated: 1. The newer the patent and thus the more remaining years of validity of the patent, the higher the available protection period of the patent and the higher the economic value for the company.[3] 2. The holders of patents must pay renewal fees to keep their patents in force. If these fees are not paid, the patent will be permanently cancelled. Assuming that such renewal decisions are made based on economic criteria, the holders of patent will only keep paying these fees, when the value of holding the patent exceeds the costs of renewal. Therefore, the economic value of a patent should be increasing with its time of validity.[4]
PC	Patent claims	Since patent claims describe the scope of a patent, more patent claims and, therefore, a wider patent scope might be linked to increasing patent value.[5]
FC	Forward citations	The more forward citations a patent has, the more fundamental it might be in its according field of technology for future research and for later patents. Based on this assumption, an increasing number of forward citations should be linked to higher patent value.[6]
BCP	Backward citations (patent documents)	The more backward citations a patent has, the more it might be dependent on other patents and the lower its novelty and patent scope might be. Thus, an increasing number of backward citations might be correlated with lower economic value.[7]
BCNP	Backward citations (non-patent literature)	
TPO	Triadic patent offices	The number of countries where a patent is valid might correlate with the market size that the patent covers. Since not every country has the same importance for a patent's potential market, this study focuses on the number of triadic patent offices (US, JP, EU) as the most relevant potential markets for the patented invention. With an increasing number of triadic patent offices where the patent is applied, the patent value might increase.[8]
IPC	IPC classifications	Comparable to the patent claims (PC), the number of IPC classifications can be used to describe the scope of a patent. A wider patent scope might be linked to increasing patent value.[9]
INV	Inventors	The more inventors are involved in a patent, the more specialized knowledge is needed to create the invention through joint effort. This might lead to an invention of higher quality and, therefore, higher value.[10]

1 Reitzig (2002), op. cit. (footnote 2): 88-132.
2 Greenberg (2013), op. cit. (footnote 2): 183-196.
3 Og/Pawelec/Kim/Paprocki/Jeong, Measuring Patent Value Indicators with Patent Renewal Information, Journal of Open Innovation: Technology, Market, and Complexity, vol. 6, no. 1 (2020): 1-16.
4 Pakes, Patents as Options: Some Estimates of the Value of Holding European Patent Stocks, Econometrica, vol. 54, no. 4 (1986): 755-784. Van Zeebroeck (2011), op. cit. (footnote 2): 33-62.
5 Van Zeebroeck/van Pottelsberghe de la Potterie, Filing strategies and patent value, Economics of Innovation and New Technology, vol. 20, no. 6 (2011): 539-561.
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10 Grube, Measuring the Immeasurable, Valuing Patent Protection of Knowledge-Based Competitive Advantages (2009): 150.

The database required for the empirical models within this study are based on a research process from February to April 2024. First, relevant transactions in the motion control industry were identified by an exhaustive manual research process. Their transaction values serve as an estimate for the valuations of the according companies at the time of transaction. Besides this, the "Crunchbase" database was used to identify companies in the motion control industry that received significant fundings. The according funding amounts were used as estimates for the companies' valuations at the date of research. This research process resulted in a total of 137 companies in the motion control industry that have been sold with a disclosed transaction value or that have received fundings according to the Crunchbase database. For all companies iden-

tified, a threshold of up to 50 employees was applied as the defining criteria for startups within this study. This resulted in a total of 35 relevant companies.

Additionally, the patent data required for this study was gathered by using public databases from relevant patent offices, such as the "Espacenet" database by the European Patent Office or the "Patent Public Search" by the United States Patent and Trademark Office. This data was enriched with information from the "Google Patents" search engine.

The final database combines the company data and the patent data, resulting in a total of 25 company transactions or companies that received fundings, both exclusively in the motion control industry, which hold relevant patents.[3] The time period of the identified transactions ranges from and including the year 2007 until and including the year 2024. The transaction value ranges from $ 0.9 million to $ 37.5 million. The funding amount ranges from $ 0.5 million to $ 12.1 million.[4] From the 25 companies that could be identified, 48% have their headquarters in the United States of America, 12% in Switzerland, each 8% in Finland, Germany, Sweden, or the United Kingdom, and each 4% in China or Taiwan.

The previously mentioned patent value indicators in Table 1 are linked to different rationales in their influence on a patent's and therefore on a company's value. These individual rationales are explained in Table 2, where links to relevant literature references are given in the footnotes.

Since most of the variables listed in Table 1 and Table 2 show strong deviations from a normal distribution based on their variance, skewness, and kurtosis, and since a normal distribution for the input variables as well as a linear relation between the different variables are beneficial for the multiple linear regression approach, the variables will be transformed for this study. Different transformations were tested with the goal to approach a normal distribution for all variables. The square root, inversing the variables, and more complex transformations, such as the Johnson transformation or the Box-Cox transformation, did not deliver satisfying results. Therefore, a logarithmic transformation was chosen for all variables. Since some variables have a minimum value of zero, and since logarithms for the value zero are not defined, all variables are shifted by adding the value "one" (1). This leads to the final transformation of all variables to be the natural logarithm of the respective variable plus the value "one" (1).[5] The descriptive statistics of these transformed variables are shown in Table 3 and Table 4.

IV. Development of empirical models

As a starting point for the development of the empirical models, the first iteration contains all independent and dependent variables according to Chapter III. The equation for the multiple linear regression is shown below.

$$\begin{aligned}\ln\left(TV_C^*\right) = {} & \ln\left(PA_C^*\right)\cdot b_{PA} + \ln\left(RPV_C^*\right)\cdot b_{RPV} \\ & + \ln\left(PC_C^*\right)\cdot b_{PC} + \ln\left(FC_C^*\right)\cdot b_{FC} \\ & + \ln\left(BCP_C^*\right)\cdot b_{BCP} + \ln\left(BCNP_C^*\right)\cdot b_{BCNP} \\ & + \ln\left(TPO_C^*\right)\cdot b_{TPO} + \ln\left(IPC_C^*\right)\cdot b_{IPC} \\ & + \ln\left(INV_C^*\right)\cdot b_{INV} + a\end{aligned}$$

Before performing multiple linear regression on the above-mentioned empirical model, relevant preconditions for multiple linear regression were tested. The preconditions tested in this study were the linear relationship between the variables, no outliers, the independence of the residuals (no autocorrelation), no multicollinearity, homoscedasticity, and the normal distribution of the residuals.[6] All previously mentioned preconditions were fulfilled, expect the independence of residuals, as shown by the Durbin-Watson statistics. However, because this study is neither using hierarchical nor timeline data, the Durbin-Watson test is not necessary.[7]

By analyzing the statistical results of the first empirical model, insignificant variables were excluded from the subsequent empirical models. Additionally, for two independent variables multicollinearity was proven $\ln(PA^*)$, $\ln(PC^*)$. Because of the multicollinearity, it is not possible to determine the individual effect of the independent variables on the dependent variable. Therefore, two additional empirical models were tested, including the significant independent variables from the first empirical model, as well as one of the two previously mentioned independent variables, where multicollinearity was proven. However, all three empirical models showed significance only for the two variables $\ln(RPV^*)$ and $\ln(FC^*)$.

Based on these findings, the fourth iteration and final empirical model can be defined as follows.

$$\ln\left(TV_C^*\right) = \ln\left(RPV_C^*\right)\cdot b_{RPV} + \ln\left(FC_C^*\right)\cdot b_{FC} + a$$

V. Statistical results

The final empirical model, as illustrated in Chapter IV, only contains the two independent variables $\ln(RPV^*)$ and $\ln(FC^*)$. Its statistical results can be found in Table 5, which also shows the significance of both independent variables with $p_{\ln(RPV^*)} < 0.001$ and $p_{\ln(FC^*)} < 0.001$ falling below the threshold of significance of $p < 0.05$. It should be noted that even though the sample size is rather small with $N=25$, it exceeds the necessary

3 A total of 10 companies were excluded from the final database as they do not hold any relevant patents.

4 The transaction values are converted to (US) $ based on the average exchange rate of the year of transaction. The funding amounts are converted to (US) $ based on the average exchange rate of the year of research at a fixed date within the research period.

5 For better readability, the shift within each variable has been omitted for each subsequent variable in this article (the "+1" has been replaced by an asterisk).

6 The preconditions for multiple linear regression that were tested in this study are based on, e.g., cf. Hemmerich, Multiple Lineare Regression in SPSS, 2024 (last access 27.05.2024) and cf. Schendera, Regressionsanalyse mit SPSS, 2008: 132-137.

7 Cf. Kenton, Durbin Watson Test: What It Is in Statistics, With Examples, 27.05.2023 (last acccess 27.05.2024) and cf. Regorz, Voraussetzungen Regression: Unkorreliertheit der Fehler bzw. Residuen, 17.08.2020 (last access 27.05.2024).

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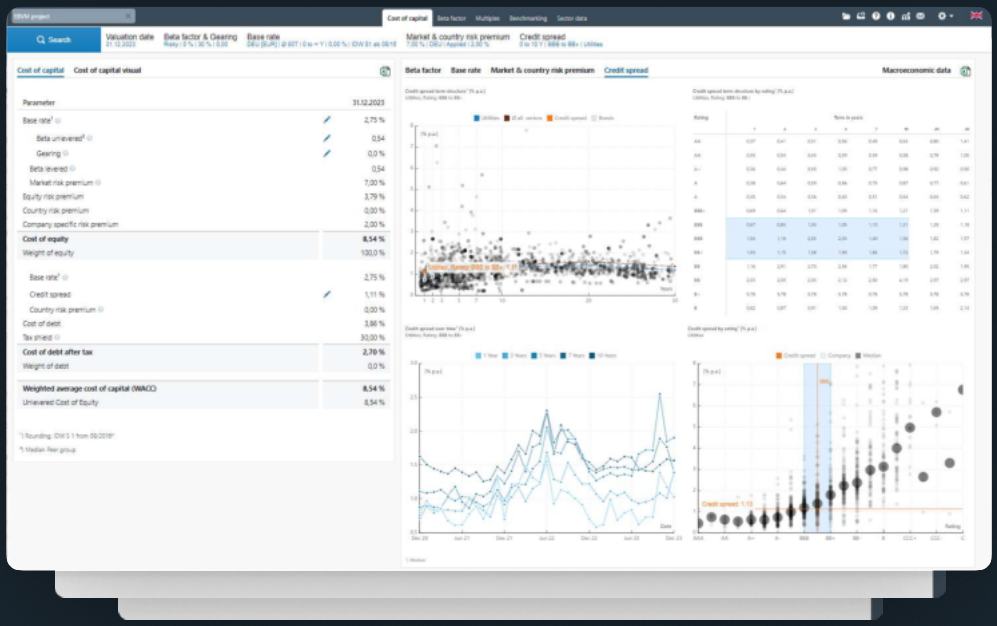

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Table 3: Descriptive statistics of the relevant variables (transformed) (1/2)

Variable	Sample size	Mean	Standard deviation	Minimum	Maximum
ln(TV+1)	N = 25	1.949	0.934	0.405	3.651
ln(PA*)	N = 25	1.699	0.643	0.693	2.773
ln(RPV*)	N = 25	4.059	0.770	2.773	5.328
ln(PC*)	N = 25	4.155	0.919	2.639	5.714
ln(FC*)	N = 25	2.461	1.539	0.000	5.187
ln(BCP*)	N = 25	4.166	1.352	1.609	7.279
ln(BCNP*)	N = 25	1.237	1.371	0.000	4.143
ln(TPO*)	N = 25	2.089	0.856	0.000	3.219
ln(IPC*)	N = 25	3.188	1.079	1.609	5.717
ln(INV*)	N = 25	2.322	0.733	0.693	3.296

Table 4: Descriptive statistics of the relevant variables (transformed) (2/2)

Variable	Variance	Skewness	Skewness std. error	Kurtosis	Kurtosis std. error
ln(TV*)	0.873	0.121	0.464	-1.104	0.902
ln(PA*)	0.414	-0.283	0.464	-1.063	0.902
ln(RPV*)	0.593	-0.152	0.464	-1.037	0.902
ln(PC*)	0.845	-0.185	0.464	-1.292	0.902
ln(FC*)	2.367	-0.098	0.464	-1.106	0.902
ln(BCP*)	1.827	0.056	0.464	0.494	0.902
ln(BCNP*)	1.88	0.953	0.464	-0.428	0.902
ln(TPO*)	0.733	-0.648	0.464	-0.157	0.902
ln(IPC*)	1.164	0.162	0.464	-0.245	0.902
ln(INV*)	0.598	-0.787	0.464	-0.279	0.902

threshold for the minimum sample size.[8] With a coefficient of determination of $R^2=0.589$, a statistical power of 0.9 and a significance level of $\alpha=0.05$, a minimum sample size of $N_{min}=13$ is required for a significant overall model with two predictors.

Based on the adjusted coefficient of determination $adj.\,R^2 = 0.552$, a share of 55.2% of the variance in the dependent variable can be explained by the independent variables. This equals a strong variance explanation according to *Cohen* 1988.

The unstandardized regression coefficients show a negative correlation $b_{RPV}=-0.741$ between the transformed accumulated number of remaining years of the patents' validity $\ln(RPV^*)$ and the transformed transaction value or total funding amount $\ln(TV^*)$. The transformed total number of forward citations $\ln(FC^*)$ has a positive correlation $b_{FC}=0.480$ with the transformed transaction value or total funding amount $\ln(TV^*)$.

The standardized regression coefficients β_i show strong correlations between both independent variables and the dependent variable. However, the correlation between the transformed total number of forward citations $\ln(FC^*)$ and the transformed transaction value or total funding amount $\ln(TV^*)$ is stronger than the correlation between the transformed accumulated number of remaining years of the patents' validity $\ln(RPV^*)$ and the transformed transaction value or total funding amount $\ln(TV^*)$ with $|\beta_{FC}| > |\beta_{RPV}|$.

VI. Development of the patent-based valuation approach

Based on the statistical results of the final empirical model, as introduced in Chapter V, the patent-based valuation approach should be developed. It aims to enable M&A practitioners to quickly calculate valuation estimates for startups or early-stage companies as potential M&A targets within the motion control industry.

The result from the final valuation model should be the company value. In this case, this value is estimated by the transaction value or total funding amount TV_C. Therefore, the equation can be rearranged, utilizing RPV_C and FC_C as input parameters for the valuation of a given startup company. When combining this rearranged equation with the statistical results from Chapter V, we derive the following, final equation.

8 Cf. Hemmerich, Poweranalyse und Stichprobenberechnung für Regression, 2019 (last access 11.12.2024).

Table 5: Statistical results from multiple linear regression

Coefficients	b	SD	β	t	p	95% CI	
						Lower limit	Upper limit
Constant value	3.775	0.690		5.469	< 0.001	2.344	5.207
ln(RPV*)	-0.741	0.183	-0.610	-4.050	< 0.001	-1.120	-0.362
ln(FC*)	0.480	0.092	0.790	5.242	< 0.001	0.290	0.670

Remarks: $N=25$; $R^2=0.589$; adj. $R^2=0.552$; $F(2, 22)=15.79$; $p<0.001$

$$TV_C = e^{-0.741 \cdot \ln(RPV^*)+0.480 \cdot \ln(FC^*)+3.775} - 1$$

As shown in the equation above, the unstandardized regression coefficient b_{RPV} indicates a negative correlation between the accumulated number of remaining years of the patents' validity (RPV_C^*) and the transaction value or total funding amount (TV_C^*) of a given company. This dependency can be explained based on the rationale described in Table 2.

The holders of patents must pay renewal fees to keep their patents in force. If these fees are not paid, the patent will be permanently cancelled. Assuming that such renewal decisions are made based on economic criteria, the holders of patent will only keep paying these fees, when the value of holding the patent exceeds the costs of renewal. Therefore, the economic value of a patent should be increasing with its time of validity.

The unstandardized regression coefficient b_{FC} in the equation above indicates a positive correlation between the total number of forward citations (FC_C^*) and the transaction value or total funding amount (TV_C^*) of a given company. According to Table 2, this dependency can be explained as follows:

The more forward citations a patent has, the more fundamental it might be in its according field of technology for future research and for later patents. Based on this assumption, an increasing number of forward citations should be linked to higher patent value.

VII. Verification of results

For verification of the patent-based valuation approach introduced in Chapter VI, the above-mentioned equation was used to calculate valuation approximations for the transaction and funding samples within the underlying database. Figure 1 shows the empirical values from the database against the calculated values.

The diagonal line in Figure 1 corresponds to a prediction quality of 100%, where the calculated transaction values would equal the empirical transaction values. It can be observed that, especially for calculated transaction values up to roughly $ 13 million, the developed valuation model delivers good approximations. For higher calculated transaction values, noticeable deviations towards the empirical transaction values may occur.

Additional limitations of the study are caused by the small sample size. The limitation to the motion control industry is restricting the number of relevant M&A transactions as well as available funding data. Additionally, the focus on startups is further narrowing down the available transaction and funding data. Anyhow, the sample size exceeds the necessary threshold for the minimum sample size.[9] Furthermore, the subjective assessment in evaluating relevant companies in the motion control industry as well as in evaluating relevant patents might lead to a selection bias. Regarding the multiple linear regression, the omitted variables or patent value indicators that were not considered in the underlying database might also be relevant for the valuation process. However, this limitation was mitigated by the systematic literature review regarding patent valuation on which the selection of variables is based on. Finally, the research data might contain errors from either the manual research process or from the data quality of the external databases. Especially the funding data from the "Crunchbase" database might contain errors, which could influence the results of this study.

VIII. Example and Application

For better understanding, the patent-based valuation approach, as introduced in Chapter VI, should be applied to a hypothetical startup company. This company is active in the motion control industry and owns several relevant patents as indicated in Table 6.

Table 6: Patent portfolio of an exemplary company

Value Indicator	PA	RPV	FC	INV
Patent 1	-	16	2	1
Patent 2	-	9	3	2
Patent 3	-	19	1	1
Patent Portfolio	3	44	6	4

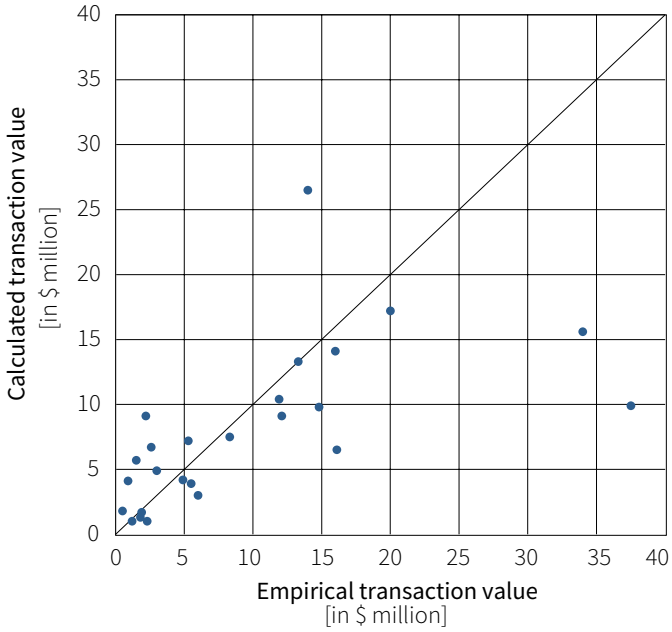
When applying the patent-based valuation approach, we receive the following equation for the company value of the hypothetical startup company.

$$TV_C = e^{-0.741 \cdot \ln(44+1)+0.480 \cdot \ln(6+1)+3.775} - 1 = 5.61$$

As indicated in the equation above, the value of the hypothetical company would be estimated with about $ 5.6 million by the patent-based valuation approach introduced in this study. This valuation is based on the company's patent portfolio, especially on the number of remaining years of the patent's validity RPV_C

9 With a coefficient of determination of $R^2=0.589$, a statistical power of 0.9, and a significance level of $\alpha=0.05$, a minimum sample size of $N_{min}=13$ is required for a significant model with two predictors.

Figure 1: Visualization of the empirical vs. calculated transaction values



and the number of forward citations of all patents of the company, where the priority dates of the new (citing) patents are within the first five years after the publication of each cited patent FC_c.

However, it is important to transparently indicate the preconditions that must be met to receive valid valuation estimates by the patent-based valuation approach presented in this study. First, since the database of company transactions and fundings only covers the motion control industry, the target company must also be operating in the motion control industry.[10] Second, the database only includes startup companies with up to 50 employees. Therefore, the valuation approach cannot be applied to established companies or companies with more than 50 employees. Third, the target company or startup must own relevant patents. The company's patents covering a technological invention in the field of the motion control industry and its related products are considered as relevant for this study.

IX. Conclusion

As stated in the beginning of this study, startup companies present a unique challenge for company valuation. To account for the unique characteristics of startups and early-stage companies, and to mitigate the limitations of "traditional" valuation methods in startup valuation, the goal of this study was the development of a patent-based valuation approach for startups in the motion control industry. This approach is based on the statistical analysis of relevant, empirical transactions and fundings. By applying multiple linear regression to the underlying database of this study, two independent variables were identified as significant predictors of the empirical transaction or funding value. Those predictors are the transformed accumulated number of remaining years of the patents' validity $\ln(RPV^*)$ and the transformed total number of forward citations $\ln(FC^*)$. By using the results from the final empirical model, an equation was derived, which can be used for valuation estimates of startups and early-stage companies in the motion control industry. This equation can be found in Chapter VI.

Finally, it should be noted that the developed valuation approach is only providing estimates for the valuation of startups and early-stage companies. Additional valuation methods should be applied to provide further guidance in the valuation process.

10 The definition of the term "motion control industry" can be found in Chapter I.

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Cost of Capital Study 2024:

The New Dilemma: Balancing Interest Rates and Growth

Recently, the 19th edition of the Cost of Capital Study by KPMG was published. As in previous years, the study highlights current developments in the preparation of financial forecasts and the derivation of cost of capital, as well as their impact on company values and business developments. This year's theme is „The New Dilemma: Balancing Interest Rates and Growth".

Heike Snellen

Director, Deal Advisory – Valuation, KPMG AG WPG, Düsseldorf. Her main areas of expertise are the analysis of young, innovative business models and handling the associated challenges in the implementation of transaction-related, accounting-related and expert company valuations.

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I. Preliminary Remarks

Based on sector-specific analyses, the Cost of Capital Study 2024 examines how the still uncertain market environment affects the interplay between interest rate developments and growth expectations, and what consequences this has on business models, corporate developments, and long-term return expectations (cost of capital). Additionally, it investigates the impact of long-term megatrends on the business models of the participants. Furthermore, the study provides valuable insights into the ongoing discussion about the derivation of cost of capital parameters based on a global or local perspective.

The accompanying focus topics also follow the theme of the current issue of the study:

- Solidified divergence? The trend towards a more divergent development of the major economic regions in the future has become more pronounced.
- Inflation defeated? Once again, it is evident that inflation can be particularly persistent towards the end of inflationary periods.
- Growth or stagnation? The coming years will determine the extent to which the weakness of European growth is due to economic cycles or structural factors.

The survey was conducted between April and July 2024. The consolidated financial statement dates depicted in the study ranged from 31 March 2023 to 31 March 2024.

The empirical data collected from participants is based on impairment testing under the International Financial Reporting Standards (IFRS) that are mandatory for all IFRS users.

The study continues to include extensive analyses by sector and sub-sector, as well as evaluations of family-owned and non-family-owned companies.

This year, the online presence of the Cost of Capital Study has been redesigned. For the first time, the new website allows users to view evaluations of key cost of capital parameters and the execution of impairment tests in ranges using interactive graphics. The study can be downloaded from the new website .

II. Overview of the Current Study Results

Planning Horizon: Compared to the previous year, the trend towards shorter planning horizons has continued due to the still prevalent high uncertainties and global crises, which increasingly complicate long-term planning for companies.

Growth: As in the previous reporting period, companies on average expected a higher increase in EBIT (Earnings Before Interest and Taxes) than in revenue. Overall, growth expectations, driven by the Technology and Media & Telecommunications sectors, have decreased compared to the previous year. During the reporting period, participating companies expected 5.2% revenue growth and 9.1% EBIT growth. In the previous reporting period, these figures were 5.6% and 9.4%, respectively.

The vast majority of surveyed companies plan to achieve their growth targets primarily through organic growth, viewing product innovation and improvement as central challenges. Other measures to achieve their growth targets include improvements to customer retention, expansion of the product portfolio, and efficiency gains. Approximately 14% of respondents aim to grow inorganically in the coming years, primarily to complementarily expand their business model. On average, companies that primarily aim for organic growth expect significantly higher growth rates.

Inflation Expectations: The short-term inflation expectations of the study participants were above the European Central Bank's (ECB) medium-term consumer-oriented inflation target of 2.0%, as in the previous year. In the medium to long term, most participating companies continued to expect company-specific inflation rates between 1.0% and 3.0%, unchanged from the previous year.

Planning Uncertainty: Compared to the previous year, the outlook has further deteriorated. Three out of four companies assessed the current economic uncertainty as negative or very negative for business planning. In the previous year, this figure was 70%. Despite the high uncertainties, only 17% of companies considered an adjustment to the planning process necessary, while 70% of companies wanted to maintain the existing planning process. The remaining study participants did not provide any information on this matter.

WACC: The average weighted cost of capital (WACC) across all sectors was 8.3%, representing a slight increase compared to the previous year (7.9%). Comparatively high WACCs were recorded on average in the Automotive sector (9.3%) and the Industrial Manufacturing sector (9.0%), while both the Energy & Natural Resources sector and the Real Estate sector had the lowest average WACCs (each 6.6%).

Risk-Free Rate: During the survey period, the risk-free rate continued its upward trend from the previous year, averaging 2.5%. In the survey period of last year's study, it was still at 1.9%, but had already risen to 2.5% by September 2023. The comparison between Austria and Germany on one side and Switzerland on the other side is significantly more heterogeneous compared to the previous year. The average risk-free rate was 2.6% in Germany and Austria, but 1.8% in Switzerland. In the previous year, the rates were 1.9% and 1.8%, respectively.

Market Risk Premium (MRP): After the average market risk premium set by participating companies had already decreased from 7.2% to 6.9% in the previous year, it further declined to 6.6% in this year's reporting period. Nearly one-third of the study participants set an MRP between 6.76% and 7.00% – one in five companies set an MRP below 6.0%, thus a market risk premium below the range of 6.0% to 8.0% recommended by the Expert Committee for Business Valuation and Business Administration (FAUB) of the Institute of Public Auditors in Germany (IDW). While the MRP in Germany and Austria decreased from averagely 7.1% and 7.2% to 6.7% in both countries, Swiss companies set an MRP of averagely 6.2%, which is an increase compared to the previous year (5.9%).

Beta Factor: During the survey period, the average unlevered beta factor of the participating companies remained unchanged from the previous year at 0.85. As in the previous year,

the highest unlevered beta factors were observed in the Technology (1.06) and Automotive (0.99) sectors. The lowest unlevered beta factors were observed in the Energy & Natural Resources (0.64) and Media & Telecommunications (0.72) sectors.

Cost of Debt: The average cost of debt continued its upward trend compared to previous years, increasing by 0.6 percentage points to 4.4%. The implicit average credit spread (the difference between the cost of debt and the risk-free rate), however, did not change and remained at 1.9%, the same as in the previous year.

Impairment Test: The proportion of companies that recognized an impairment in the past year continued to increase compared to previous years. After a decline in 2021/2022 to 43%, 48% of participating companies reported impairments in 2023/2024. In 2022/2023, the proportion was still at 45%. Impairments on assets increased compared to the previous year (24%) to 28%, while impairments on goodwill saw only a slight increase from 13% in the previous year to 14%.

Triggering Event: Compared to the previous year, the proportion of companies that conducted an unscheduled impairment test based on a so-called "triggering event" slightly decreased from 44% to 40%. According to the participants, the main reason for the impairment tests was lower long-term expectations (46%), while the loss of orders increasingly triggered impairment tests (17% of respondents vs. 9% in the previous year). In contrast, the percentage of increased cost of capital as a "triggering event" significantly decreased from 35% in the previous year to 19%.

Monitoring: Value-oriented monitoring of investment decisions remains of significant importance to companies. Compared to the previous year, the participating companies reported that there is not only a change in performance (planning) to be observed, but also in risk (return expectations/cost of capital).

Megatrends: This year's study analyzed the significance of megatrends concerning the business models of the respondents. The majority of participants from all sectors indicated that the influence of megatrends on their business models has increased. The megatrend 'Digitalization' was rated as the most relevant, followed by ESG (Environmental, Social, Governance) and Artificial Intelligence (AI).

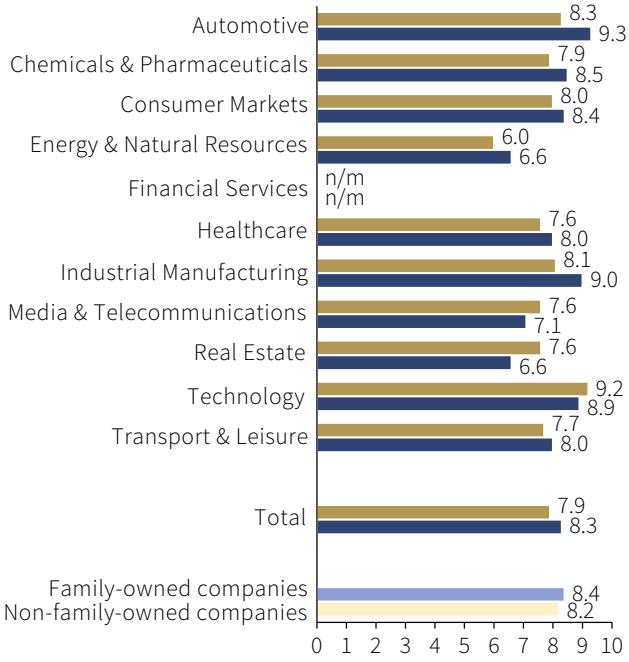
III. Selected Results in Detail

1. Increasing Cost of Capital

This year's Cost of Capital Study shows an increase in the weighted average cost of capital (WACC) from 7.9 percent in the previous year to 8.3 percent. This continues the upward trend of the last three years and raises the WACC to its highest level since 2005/2006 (cf. figure 1).

The increase in WACC is reflected differently across various sectors. The largest increases in WACC are observed in the Automotive sector (from 8.3% to 9.3%), Industrial Manufacturing sector (from 8.1% to 9.0%), Energy & Natural Resources sector (from 6.0% to 6.6%), and Chemicals & Pharmaceuticals sector (from 7.9% to 8.5%).

Figure 1: WACC (after corporate taxes) by sector
(in percent)



Source: KPMG in Germany, 2024

The relatively high WACC is mainly driven by the rise in the risk-free rate, which has ultimately been caused by the high inflation of recent years. Following a significant increase last year, the average risk-free rate has continued its upward trend and has risen to 2.5%.

2. Derivation of Cost of Capital from a Local vs. Global Perspective

The insights from this year's Cost of Capital Study on deriving cost of capital from a global versus local perspective enrich the discussion on the potential advantages and disadvantages of both methods with empirical data.

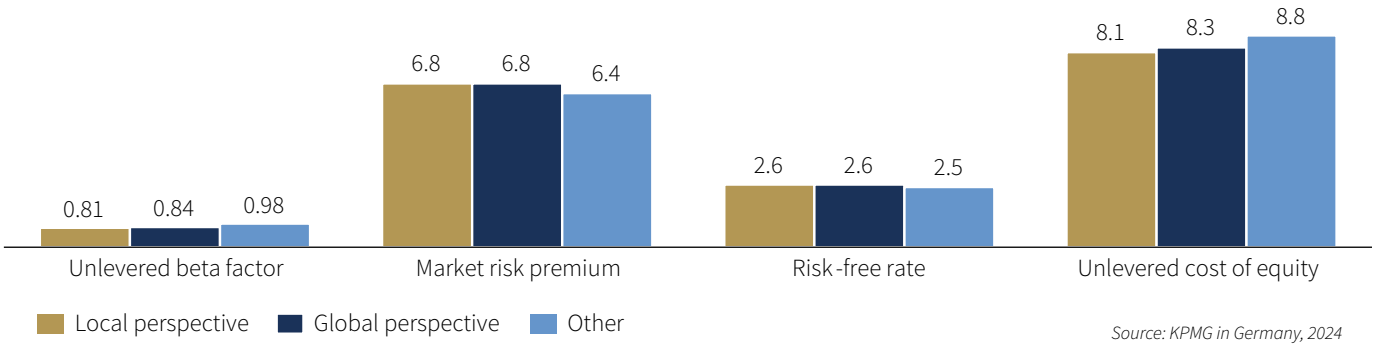
The study shows that, on average, there is no significant difference in the cost of capital parameters for German companies, regardless of whether a global or local perspective is taken in the derivation (cf. figure 2). What is crucial is not the choice of perspective but the consistent application of the chosen approach in deriving parameters such as the risk-free rate, the market risk premium, or the beta factor.

These results are overall positive for valuation practice, as they indicate that deriving cost of capital from either a local or global perspective does not lead to significant differences and thus results in consistent valuation outcomes.

3. Declining Growth Expectations

This year's expectations for revenue growth among participating companies show a decline of 0.4 percentage points, influenced by geopolitical uncertainties and their impacts (cf. figure 3). The main factors include Russia's war of aggression against Ukraine, the escalating Middle East conflict, and increasing

Figure 2: Average of cost of capital parameters based on perspective (Germany only)
Total (in percent)



Source: KPMG in Germany, 2024

tensions between China and the West. These geopolitical tensions could lead to increased trade restrictions, tariffs, and inflation, putting pressure on companies.

Particularly Affected Sectors

Media & Telecommunications: In this sector, revenue growth expectations have decreased by 2.1 percentage points. The reasons for this likely lie in the sector's greater dependence on economic conditions regarding advertising revenue. Inflation-driven price increases could lead to a decline in consumer spending, negatively impacting the sector.

Consumer Markets: The Consumer Markets sector recorded a decline in revenue growth expectations by 1.3 percentage points. Inflation-driven price increases have weakened consumer purchasing power, leading to a drop in demand. Here too, the origin of the lower growth expectations likely stems from international political tensions, which, through increased trade barriers, have been a trigger for the heightened inflation of recent years.

Automotive: In the Automotive sector, revenue growth expectations have decreased by 1.2 percentage points. A significant factor could be the downturn in the Chinese market, which plays an important role in the automotive industry. Additionally, the long-term impacts of megatrends, particularly regarding sustainability, as well as trade restrictions and tariffs, could strain international supply chains and business relationships.

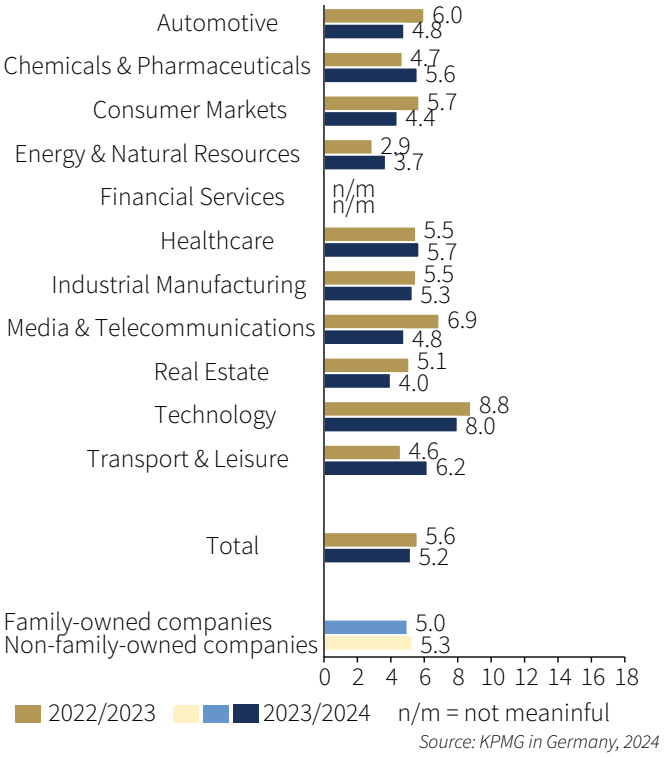
4. AI, Digitalization, and ESG as the Most Significant Megatrends for Business Models

At least half of the companies in all sectors perceive that megatrends have intensified over time and will significantly change business models. The increasing importance of megatrends is particularly emphasized in the Media & Telecommunications, Energy & Natural Resources, Financial Services, and Real Estate sectors. Reasons for this can include the rise in sustainability regulations and rapid advancements in AI and digitalization.

The analysis shows that the megatrends of AI, Digitalization, and ESG are of great relevance in many sectors (cf. figure 4).

AI has already had a significant impact on many companies, particularly in the Technology and Media & Telecommunications sectors. The advantages in data analysis, automation, and decision-making are enormous for data-driven industries and drive innovation. Additionally, AI enables both sectors to develop new products, offering additional growth potential.

Figure 3: Forecast revenue growth by sector
(in percent)

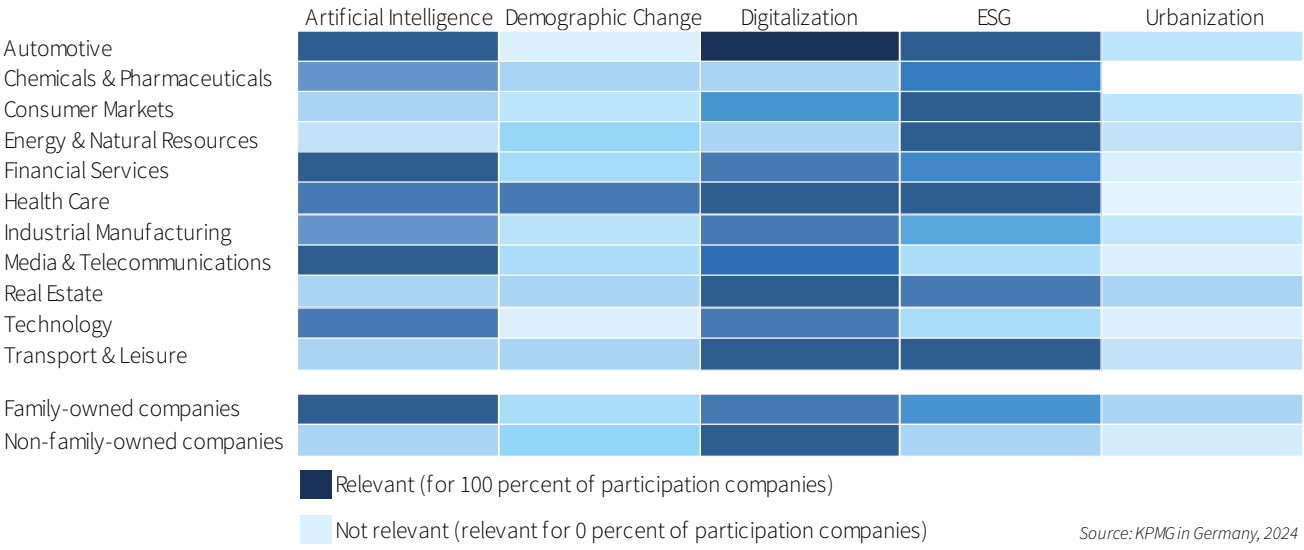


Source: KPMG in Germany, 2024

Digitalization permeates nearly all sectors, leading to increased efficiency, innovation, and improved customer experience. The Financial Services sector, in particular, benefits from optimized processes and new business models enabled by digital data processing and the resulting changes in consumer behavior.

ESG is especially relevant for the Automotive, Real Estate, and Transport & Leisure sectors. These sectors are particularly affected by new regulations and high societal expectations regarding sustainability and social responsibility. Companies must continuously adapt to meet these requirements and secure their long-term competitiveness.

Figure 4: Relevance of megatrends by sector
Total (in percent, multiple choices possible)



Source: KPMG in Germany, 2024

IV. Summary

The average cost of capital (measured by WACC) has increased this year, which is particularly visible in the renewed rise in the risk-free rate used by participants. Companies also expect, similar to the previous year, a further decline in inflation in the medium to long term, while also having lower growth expectations.

An analysis of inflation trends shows that core inflation in Germany is approaching the ECB's target of 2.0%, but it often proves to be persistent, especially at the end of a period of declining inflation. In the past, inflation had a rather subordinate importance due to the extremely low inflation rates. However, in the recent high-inflation phase, it has significantly influenced the overall return requirements of market participants.

Declining growth expectations also seem to be a European phenomenon. Our analysis highlights those other developed economies, particularly the United States, have achieved a significantly higher growth in the past. This is partly due to seemingly short-term developments such as the conflict in the Ukraine, but it is mainly due to several structural issues such as digitalization, demographics, immigration, capital market efficiency, bureaucracy, regulation, security, and access to education.

The growing importance of long-term, structural developments is also evident in the study, as the majority of surveyed companies across sectors emphasize the increasing relevance of megatrends, particularly digitalization, AI, and ESG, for their business models. To best cope with the increase in geopolitical uncertainties, structural disruptions, and regulatory challenges in the long term, it is more important than ever for companies to enhance their resilience, meaning their ability to respond flexibly to unforeseen events.

The current results of the Cost of Capital Study show more clearly than ever that long-term return expectations are strongly influenced by short-term, structural developments, further inflation trends, and the behavior of central banks.

In the context of corporate valuations, capital market data is regularly used. Due to increased uncertainties, it is advisable to analyze (irrational) over- or underestimations of the markets to avoid an unreflective transfer of possible market overreactions to valuations. In the current environment, both the implicit inflation expectations and the risk assessments of market participants must be focused on. We therefore recommend continuous monitoring of the development of valuation-relevant capital market parameters, which we regularly collect. These can be accessed via this link: KPMG Valuation Data Source. ◆

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Industry Betas and Multiples

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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 December 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 8,5%, leading to a market risk premium of 6.0%. 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 December 2024	Median Levered Betas								
Industries	1-Year, weekly returns							5-Year, monthly returns	
	Comps incl. (Average*)	1/2020 to 12/2020	1/2021 to 12/2021	1/2022 to 12/2022	1/2023 to 12/2023	1/2024 to 12/2024	Average*	Comps incl.	1/2024 to 12/2024
Industrials	*266*	0.96	0.93	0.85	0.84	0.84	0.88	*250*	1.11
Consumer Discretionary	*180*	0.98	1.06	0.98	0.94	0.91	0.97	*162*	1.19
Health Care	*131*	0.70	0.71	0.78	0.68	0.66	0.71	*121*	0.74
Financials	*141*	1.06	0.89	1.00	0.83	0.78	0.91	*136*	1.10
Utilities	*50*	0.78	0.66	0.63	0.62	0.37	0.61	*49*	0.73
Materials	*85*	0.97	0.83	0.94	0.92	0.84	0.90	*86*	1.12
Real Estate	*87*	0.79	0.43	0.72	0.84	0.44	0.64	*80*	0.89
Communication Services	*87*	0.74	0.69	0.63	0.60	0.50	0.63	*87*	0.84
Information Technology	*155*	0.84	0.91	0.95	0.83	0.87	0.88	*141*	1.03
Consumer Staples	*76*	0.54	0.58	0.64	0.42	0.41	0.52	*72*	0.62
Energy	*34*	0.99	0.85	0.55	0.48	0.53	0.68	*34*	0.93

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

31 December 2024	Median Equity-Ratios								
Industries	1-Year							5-Year	
	Comps incl. (Average*)	1/2020 to 12/2020	1/2021 to 12/2021	1/2022 to 12/2022	1/2023 to 12/2023	1/2024 to 12/2024	Average*	Comps incl.	1/2024 to 12/2024
Industrials	*275*	75.5%	82.2%	76.6%	77.9%	74.6%	77.4%	*247*	77.4%
Consumer Discretionary	*183*	74.0%	79.1%	74.4%	76.8%	71.2%	75.1%	*157*	74.2%
Health Care	*138*	99.0%	97.6%	91.3%	93.3%	89.1%	94.0%	*126*	96.7%
Utilities	*51*	58.9%	62.5%	60.3%	58.8%	56.3%	59.4%	*48*	60.4%
Materials	*88*	73.6%	78.5%	75.7%	76.4%	73.4%	75.5%	*86*	74.7%
Real Estate	*93*	46.9%	53.6%	42.9%	42.7%	43.1%	45.8%	*82*	46.3%
Communication Services	*90*	74.9%	82.5%	76.1%	67.0%	67.7%	73.6%	*83*	71.7%
Information Technology	*160*	99.2%	98.9%	95.7%	94.1%	90.5%	95.7%	*144*	97.0%
Consumer Staples	*80*	67.7%	73.0%	65.7%	62.4%	66.5%	67.0%	*76*	69.9%
Energy	*36*	57.7%	56.2%	79.3%	79.4%	76.5%	69.8%	*34*	65.5%

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

31 December 2024	Median Unlevered Betas								
Industries	1-Year, weekly returns							5-Year, monthly returns	
	Comps incl. (Average*)	1/2020 to 12/2020	1/2021 to 12/2021	1/2022 to 12/2022	1/2023 to 12/2023	1/2024 to 12/2024	Average*	Comps incl.	1/2024 to 12/2024
Industrials	*247*	0.79	0.73	0.68	0.62	0.60	0.68	*231*	0.89
Consumer Discretionary	*163*	0.79	0.78	0.73	0.71	0.69	0.74	*146*	0.92
Health Care	*115*	0.63	0.56	0.64	0.53	0.52	0.58	*107*	0.61
Utilities	*50*	0.57	0.48	0.45	0.45	0.32	0.45	*48*	0.53
Materials	*83*	0.81	0.67	0.73	0.73	0.62	0.71	*83*	0.86
Real Estate	*82*	0.61	0.34	0.48	0.54	0.33	0.46	*73*	0.60
Communication Services	*80*	0.62	0.53	0.51	0.46	0.46	0.52	*78*	0.67
Information Technology	*144*	0.86	0.78	0.92	0.73	0.71	0.80	*128*	0.95
Consumer Staples	*74*	0.52	0.47	0.56	0.40	0.38	0.46	*70*	0.52
Energy	*32*	0.89	0.74	0.50	0.46	0.48	0.61	*31*	0.69

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

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

31 December 2024	Median Levered Betas								
	1-Year, weekly returns							5-Year, monthly returns	
Subindustry: Industrials	Comps incl. (Average*)	1/2020 to 12/2020	1/2021 to 12/2021	1/2022 to 12/2022	1/2023 to 12/2023	1/2024 to 12/2024	Average*	Comps incl.	1/2024 to 12/2024
Aerospace & Defense	*14*	1.28	0.93	0.73	0.87	0.84	0.93	*14*	1.28
Building Products	*17*	0.82	0.95	0.86	1.02	0.70	0.87	*16*	1.06
Construction & Engineering	*28*	1.12	0.84	0.76	0.78	0.88	0.88	*25*	1.33
Electrical Equipment	*31*	0.93	1.16	0.86	1.29	0.94	1.04	*25*	1.05
Industrial Conglomerates	*10*	1.07	0.88	0.82	0.87	1.00	0.93	*11*	1.19
Machinery	*67*	0.93	0.97	1.01	0.89	0.88	0.94	*66*	1.15
Trading Companies & Distributors	*12*	0.85	1.12	1.01	1.12	0.67	0.95	*12*	1.02
Commercial Services & Supplies	*25*	0.81	0.72	0.76	0.63	0.71	0.72	*23*	1.22
Professional Services	*19*	0.99	0.95	0.80	0.71	0.65	0.82	*17*	1.13
Air Freight & Logistics	*11*	0.65	0.38	0.73	0.69	0.43	0.57	*12*	0.74
Passenger Airlines	*5*	1.36	0.74	1.33	1.45	0.87	1.15	*5*	1.75
Marine Transportation	*8*	1.02	1.42	0.49	0.30	0.85	0.81	*8*	1.25
Ground Transportation	*6*	1.52	0.98	1.18	1.14	1.12	1.19	*4*	1.62
Transportation Infrastructure	*12*	1.07	0.59	0.57	0.61	0.65	0.70	*12*	0.97

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

31 December 2024	Median Equity-Ratios								
	1-Year							5-Year	
Subindustry: Industrials	Comps incl. (Average*)	1/2020 to 12/2020	1/2021 to 12/2021	1/2022 to 12/2022	1/2023 to 12/2023	1/2024 to 12/2024	Average*	Comps incl.	1/2024 to 12/2024
Aerospace & Defense	*16*	83.0%	84.9%	92.6%	86.8%	87.3%	0.87	*14*	88.6%
Building Products	*16*	89.6%	91.3%	82.9%	86.7%	82.3%	0.87	*16*	83.0%
Construction & Engineering	*26*	60.0%	69.7%	66.5%	73.0%	74.3%	0.69	*23*	68.8%
Electrical Equipment	*35*	84.5%	90.3%	83.9%	88.0%	82.4%	0.86	*25*	80.9%
Industrial Conglomerates	*10*	88.7%	83.9%	77.7%	81.6%	71.0%	0.81	*10*	83.6%
Machinery	*69*	82.1%	88.0%	79.6%	85.1%	79.4%	0.83	*62*	78.6%
Trading Companies & Distributors	*13*	59.4%	69.6%	71.3%	76.0%	74.5%	0.70	*11*	67.8%
Commercial Services & Supplies	*26*	62.7%	68.8%	68.5%	68.2%	58.1%	0.65	*0*	62.2%
Professional Services	*20*	87.3%	90.3%	87.8%	83.8%	82.1%	0.86	*0*	86.1%
Air Freight & Logistics	*11*	74.1%	73.7%	58.7%	60.5%	36.1%	0.61	*0*	64.7%
Passenger Airlines	*5*	44.2%	36.7%	50.6%	53.2%	49.1%	0.47	*0*	42.1%
Marine Transportation	*8*	34.8%	64.4%	65.7%	57.2%	48.5%	0.54	*0*	51.2%
Ground Transportation	*7*	23.3%	34.6%	23.8%	16.5%	29.5%	0.26	*0*	39.4%
Transportation Infrastructure	*13*	55.8%	65.6%	64.6%	73.7%	76.9%	0.67	*0*	67.6%

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

31 December 2024	Median Unlevered Betas								
	1-Year, weekly returns							5-Year, monthly returns	
Subindustry: Industrials	Comps incl. (Average*)	1/2020 to 12/2020	1/2021 to 12/2021	1/2022 to 12/2022	1/2023 to 12/2023	1/2024 to 12/2024	Average*	Comps incl.	1/2024 to 12/2024
Aerospace & Defense	*13*	1.04	0.75	0.73	0.68	0.74	0.79	*14*	1.14
Building Products	*15*	0.71	0.85	0.79	0.77	0.66	0.76	*14*	0.83
Construction & Engineering	*23*	0.71	0.52	0.56	0.52	0.61	0.58	*20*	0.74
Electrical Equipment	*29*	0.85	0.92	0.79	0.99	0.75	0.86	*23*	0.92
Industrial Conglomerates	*10*	0.90	0.73	0.54	0.94	0.73	0.77	*10*	0.84
Machinery	*62*	0.75	0.77	0.74	0.69	0.66	0.72	*59*	0.90
Trading Companies & Distributors	*12*	0.72	0.91	0.63	0.93	0.52	0.74	*11*	0.78
Commercial Services & Supplies	*24*	0.66	0.62	0.49	0.52	0.49	0.56	*23*	0.74
Professional Services	*19*	0.97	0.82	0.77	0.72	0.51	0.76	*17*	0.98
Air Freight & Logistics	*9*	0.42	0.29	0.55	0.49	0.35	0.42	*11*	0.53
Passenger Airlines	*5*	1.03	0.86	0.88	0.86	0.57	0.84	*5*	1.17
Marine Transportation	*7*	0.87	1.02	0.43	0.32	0.74	0.67	*8*	0.95
Ground Transportation	*6*	0.63	0.67	0.65	0.47	0.43	0.57	*4*	0.95
Transportation Infrastructure	*12*	0.79	0.46	0.47	0.45	0.51	0.53	*12*	0.74

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 December 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	1.0	0.9	*233*	7.4	6.6	*225*	11.9	10.2	*214*	13.6	11.3	*204*	1.6	1.5	*216*
Consumer Discretionary	0.9	0.9	*150*	7.0	6.0	*143*	12.7	10.5	*134*	13.3	11.0	*120*	1.7	1.7	*139*
Health Care	2.4	2.5	*109*	9.8	8.6	*79*	14.3	13.0	*72*	15.7	15.6	*68*	2.1	1.9	*88*
Financials	n/m	n/m	*n/a*	n/m	n/m	*n/a*	n/m	n/m	*n/a*	8.7	8.2	*106*	1.0	0.9	*105*
Utilities	3.3	2.6	*46*	8.1	8.1	*44*	13.8	12.9	*44*	12.5	12.0	*43*	1.4	1.3	*43*
Materials	1.0	0.9	*79*	6.6	5.9	*78*	12.1	9.8	*72*	12.9	10.4	*67*	1.1	1.0	*71*
Real Estate	12.1	11.4	*62*	18.2	17.1	*58*	20.8	17.1	*60*	11.6	11.4	*53*	0.7	0.7	*54*
Communication Services	1.4	1.4	*73*	5.8	5.3	*72*	11.6	10.7	*64*	11.8	10.4	*58*	1.7	1.6	*65*
Information Technology	1.2	1.0	*136*	9.0	7.5	*127*	13.2	12.8	*105*	15.9	14.9	*91*	2.1	1.9	*113*
Consumer Staples	0.7	0.7	*62*	7.2	6.9	*62*	11.6	10.9	*57*	14.3	13.1	*57*	1.4	1.3	*59*
Energy	1.0	0.9	*30*	4.9	4.4	*30*	7.4	6.7	*30*	9.4	7.4	*29*	1.1	1.0	*28*

Table 8: Median Subindustry (Industrials) Multiples

31 December 2024	Sales			EBITDA			EBIT			Earnings			Market to Book		
Subindustry: Industrials	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.
Aerospace & Defense	1.2	1.1	*13*	10.9	9.7	*12*	16.1	13.0	*12*	19.8	15.2	*12*	2.0	2.1	*13*
Building Products	1.2	1.2	*13*	10.4	8.7	*13*	15.1	13.8	*13*	17.4	16.1	*13*	1.5	1.6	*12*
Construction & Engineering	0.4	0.4	*24*	5.2	4.8	*23*	8.0	7.0	*22*	10.8	10.9	*25*	1.4	1.5	*22*
Electrical Equipment	1.1	1.0	*28*	10.6	7.3	*25*	14.9	10.1	*21*	18.7	14.6	*20*	2.2	2.0	*27*
Industrial Conglomerates	0.7	0.6	*7*	6.9	6.4	*7*	9.1	8.3	*6*	12.4	9.8	*6*	0.8	0.8	*6*
Machinery	0.7	0.7	*63*	7.7	6.5	*60*	11.9	10.0	*59*	13.5	11.3	*56*	1.3	1.3	*57*
Trading Companies & Distributors	0.6	0.6	*10*	8.8	7.1	*10*	13.3	12.3	*8*	13.2	12.9	*8*	1.2	1.2	*10*
Commercial Services & Supplies	1.0	0.9	*20*	5.5	5.0	*20*	11.1	9.4	*20*	11.2	9.4	*17*	1.3	1.2	*16*
Professional Services	1.2	1.2	*18*	8.1	7.4	*18*	15.0	12.2	*17*	16.7	16.1	*14*	1.9	1.6	*18*
Air Freight & Logistics	0.7	0.7	*8*	5.3	5.0	*8*	12.2	11.3	*8*	12.2	11.3	*8*	2.4	2.0	*9*
Passenger Airlines	0.5	0.5	*5*	3.9	3.3	*5*	9.5	6.9	*5*	7.6	5.3	*5*	1.3	1.1	*4*
Marine Transportation	2.1	2.0	*8*	4.8	4.3	*8*	7.2	7.1	*8*	5.2	4.3	*7*	0.5	0.7	*7*
Ground Transportation	1.8	1.7	*6*	7.6	7.3	*6*	40.3	28.9	*6*	10.7	10.1	*4*	0.8	0.8	*6*
Transportation Infrastructure	3.0	3.0	*10*	9.9	9.2	*10*	16.0	14.6	*9*	17.1	15.5	*9*	2.4	2.2	*9*

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

IIn the previous issue we provided multiples for Central and Western Europe and Southern Europe. The multiples in this issue provide a regional breakdown into:

- **Scandinavia** and
- **Britain**

In the following issue we will continue the regional breakdown into 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

$$\left(\bar{x}_h = \frac{n}{\sum_{i=1}^{n}\frac{n}{x_i}}\right)$$

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):

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

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. ◆

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

NACE Rev. 2 Sector	
C10 - C12	Manufacture of food products, beverages, tobacco products
C13 - C15	Manufacture of textiles, wearing apparel, teather and related products
C16, C17, C31, C32	Manufacture of wood/products, paper/products, furniture; other manufacturing
C19 - C23	Manufacture of coke, chemicals, rubber, refined petroleum/chemical/pharmaceutical/plastic/mineral products
C24 - C25	Manufacture of basic metals, fabricated metal products
C26 - C27	Manufacture of computers, electronic/optical products, electrical equipment
C28 - C30, C33	Manufacture of machinery, motor vehicles, other transport equipment; repair/installation
D35	Electricity, gas, steam and air conditioning supply
E36 - E39	Water supply, sewerage, waste management, remediation activities
F41 - F43	Construction - Buildings, civil engineering, specialized construction activities
G45 - G47	Wholesale/Retail trade, repair of motor vehicles and motorcycles
H49 - H53	Transportation and storage - Land/pipelines, water, air; warehousing, postal/courier activities
J58 - J60, C18	Publishing activities, programme production, music publishing, broadcasting, printing
J61 - J63	Telecommunications, computer programming/consultancy, information service activities
K64 - K66	Financial and insurance activities
L68	Real estate activities
M69, M70, M73, N77 - N82	Legal/accounting activities, consultancy, advertising/market research, rental/employment/security activities, travel agency
M71, M72, M74, M75	Architectural/engineering/other professional activities, technical testing, scientific R&D, veterinary activities

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

NACE Rev. 2 Sector	
C10 - C12	Manufacture of food products, beverages, tobacco products
C13 - C15	Manufacture of textiles, wearing apparel, teather and related products
C16, C17, C31, C32	Manufacture of wood/products, paper/products, furniture; other manufacturing
C19 - C23	Manufacture of coke, chemicals, rubber, refined petroleum/chemical/pharmaceutical/plastic/mineral products
C24 - C25	Manufacture of basic metals, fabricated metal products
C26 - C27	Manufacture of computers, electronic/optical products, electrical equipment
C28 - C30, C33	Manufacture of machinery, motor vehicles, other transport equipment; repair/installation
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n	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
86	0.76	0.45	0.71	0.28	0.75	1.01	[0,62 ; 0,90] (7,5)	0.81	0.70	y = 0,746 x Sales - 64	0.68	20,029
365	2.07	1.73	2.10	1.79	1.99	2.47	[2,02 ; 2,13] (20,4)	-1.28	0.23	y = 1,963 x Sales + 280.071	0.61	751,715
343	1.73	0.58	1.79	0.94	2.29	2.53	[1,51 ; 1,94] (50,9)	-0.47	0.54	y = 1,300 x Sales + 1.235.914	0.84	1,847,654
365	1.48	0.62	1.49	1.00	1.54	1.89	[1,35 ; 1,61] (39,4)	-0.18	0.50	y = 1,296 x Sales + 384.065	0.75	1,369,405
1,036	2.03	0.72	2.17	2.04	2.22	2.36	[1,97 ; 2,10] (111,2)	-1.85	0.33	y = 2,062 x Sales + 100.621	0.90	396,841
1,213	1.15	0.86	1.12	0.90	1.13	1.33	[1,12 ; 1,18] (42,8)	1.06	0.43	y = 1,655 x Sales - 1.388.961	0.81	2,241,211
1,100	1.36	0.55	1.31	0.97	1.25	1.55	[1,31 ; 1,41] (68,8)	0.63	0.43	y = 1,213 x Sales + 403.471	0.70	2,970,889
193	1.27	1.06	1.25	1.17	1.25	1.35	[1,21 ; 1,34] (3,7)	0.60	0.36	y = 0,922 x Sales + 8.870.708	0.82	9,134,496
-	-	-	-	-	-	-	-	-	-	-	-	-
1,036	0.79	0.15	0.74	0.21	0.77	1.21	[0,74 ; 0,84] (55,1)	0.77	0.75	y = 1,730 x Sales - 326.311	0.90	1,952,642
494	0.85	0.26	0.71	0.23	0.45	0.99	[0,68 ; 1,02] (57,4)	1.26	1.08	y = 2,545 x Sales - 158.024	0.90	447,121
204	0.42	0.03	0.31	0.09	0.31	0.48	[0,33 ; 0,51] (64,5)	2.49	1.27	y = 0,229 x Sales + 126.901	0.93	1,291,322
649	1.38	0.71	1.36	0.74	1.30	2.02	[1,27 ; 1,49] (80,6)	0.22	0.56	y = 1,439 x Sales + 43.943	0.90	411,607
719	1.18	0.51	1.13	0.50	0.97	1.90	[1,07 ; 1,29] (94,8)	0.48	0.68	y = 1,851 x Sales - 7.464	0.79	183,604
107	1.48	0.88	1.45	0.63	1.22	2.30	[1,12 ; 1,84] (17,8)	0.20	0.61	y = 1,051 x Sales + 3.918	0.58	22,046
166	1.03	0.96	1.00	0.77	1.08	1.21	[1,00 ; 1,06] (17,4)	0.51	0.27	y = 2,551 x Sales - 1.379.752	0.37	245,624
381	0.60	0.10	0.46	0.15	0.34	0.72	[0,49 ; 0,72] (37,9)	1.79	1.16	y = 0,273 x Sales + 6.169	0.33	45,895
182	0.60	0.12	0.45	0.07	0.28	0.59	[0,38 ; 0,82] (18,1)	1.59	1.34	y = 2,120 x Sales - 92.035	0.83	391,607

n	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
32	1.09	0.72	1.09	0.73	1.02	1.44	[0,83 ; 1,35] (2,9)	0.26	0.52	y = 0,910 x Sales + 545.464	0.93	1,040,822
531	0.95	0.82	0.86	0.71	0.84	1.02	[0,91 ; 0,99] (95,1)	2.14	0.47	y = 0,626 x Sales + 911.163	0.76	685,828
1,020	1.21	0.82	1.13	0.71	1.14	1.43	[1,15 ; 1,27] (85,3)	0.98	0.54	y = 0,753 x Sales + 1.500.839	0.54	1,975,948
1,267	1.59	0.91	1.58	0.76	1.64	2.28	[1,51 ; 1,67] (199,0)	0.04	0.51	y = 0,889 x Sales + 673.659	0.78	2,048,427
2,710	0.90	0.42	0.86	0.25	0.70	1.69	[0,86 ; 0,94] (422,7)	0.38	0.76	y = 2,161 x Sales - 9.917.309	0.68	5,655,415
2,914	0.91	0.71	0.85	0.55	0.78	1.17	[0,89 ; 0,92] (170,4)	1.35	0.51	y = 0,787 x Sales + 117.608	0.57	2,969,846
3,333	0.89	0.68	0.82	0.52	0.71	1.07	[0,87 ; 0,91] (276,5)	1.34	0.58	y = 1,712 x Sales - 4.827.964	0.78	3,755,480
327	1.02	0.64	0.93	0.41	0.72	1.27	[0,89 ; 1,15] (36,4)	0.88	0.70	y = 0,418 x Sales + 2.366.628	0.87	8,333,836
-	-	-	-	-	-	-	-	-	-	-	-	-
1,798	0.79	0.47	0.68	0.38	0.63	0.94	[0,75 ; 0,83] (159,5)	1.68	0.77	y = 0,549 x Sales + 396.333	0.44	3,791,476
1,948	0.82	0.53	0.77	0.49	0.78	1.05	[0,79 ; 0,84] (98,8)	0.96	0.57	y = 0,810 x Sales - 261.016	0.77	4,503,520
268	0.61	0.27	0.53	0.23	0.31	0.85	[0,53 ; 0,70] (31,9)	1.02	0.90	y = 0,384 x Sales + 930.583	0.44	6,848,731
1,615	1.19	0.78	1.09	0.53	0.85	1.74	[1,12 ; 1,26] (204,7)	0.87	0.67	y = 0,622 x Sales + 1.111.836	0.18	2,140,516
2,265	1.31	0.70	1.26	0.70	1.06	2.13	[1,25 ; 1,36] (305,2)	0.52	0.60	y = 0,582 x Sales + 1.488.491	0.73	2,396,807
204	1.01	0.29	0.94	0.55	0.79	1.31	[0,84 ; 1,17] (18,5)	1.12	0.71	y = 1,001 x Sales - 83.818	0.51	932,430
225	1.12	0.74	1.00	0.59	0.86	1.21	[0,95 ; 1,28] (22,1)	1.29	0.66	y = 0,494 x Sales + 392.224	0.17	403,626
1,937	0.51	0.22	0.30	0.16	0.19	0.31	[0,45 ; 0,56] (374,0)	2.38	1.44	y = 0,042 x Sales + 1.830.090	0.04	1,055,968
2,152	1.30	0.63	1.27	0.75	1.19	1.78	[1,25 ; 1,36] (247,4)	0.31	0.57	y = 0,133 x Sales + 1.871.842	0.17	1,191,615

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

NACE Rev. 2 Sector	
C10 - C12	Manufacture of food products, beverages, tobacco products
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C26 - C27	Manufacture of computers, electronic/optical products, electrical equipment
C28 - C30, C33	Manufacture of machinery, motor vehicles, other transport equipment; repair/installation
D35	Electricity, gas, steam and air conditioning supply
E36 - E39	Water supply, sewerage, waste management, remediation activities
F41 - F43	Construction - Buildings, civil engineering, specialized construction activities
G45 - G47	Wholesale/Retail trade, repair of motor vehicles and motorcycles
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J58 - J60, C18	Publishing activities, programme production, music publishing, broadcasting, printing
J61 - J63	Telecommunications, computer programming/consultancy, information service activities
K64 - K66	Financial and insurance activities
L68	Real estate activities
M69, M70, M73, N77 - N82	Legal/accounting activities, consultancy, advertising/market research, rental/employment/security activities, travel agency
M71, M72, M74, M75	Architectural/engineering/other professional activities, technical testing, scientific R&D, veterinary activities

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

NACE Rev. 2 Sector	
C10 - C12	Manufacture of food products, beverages, tobacco products
C13 - C15	Manufacture of textiles, wearing apparel, teather and related products
C16, C17, C31, C32	Manufacture of wood/products, paper/products, furniture; other manufacturing
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n	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
48	7.19	4.14	7.19	3.12	8.65	8.90	[-3,95 ; 18,33] (5,5)	0.08	0.57	y = 7,170 x EBITDA + 2.843	0.94	10,763
327	14.76	13.67	14.87	14.28	14.61	15.55	[13,39 ; 16,13] (218,6)	-2.10	0.16	y = 11,657 x EBITDA + 875.627	0.75	401,501
274	8.46	4.70	8.67	5.80	9.29	11.97	[3,99 ; 12,93] (25,6)	-0.27	0.48	y = 7,325 x EBITDA + 1.200.431	0.86	1,835,549
365	12.43	6.08	13.05	7.67	13.96	17.08	[5,07 ; 19,78] (44,8)	-0.84	0.45	y = 0,986 x EBITDA + 4.679.405	0.08	3,609,571
279	10.24	2.21	10.46	4.17	12.74	14.76	[0,48 ; 19,99] (44,5)	-0.40	0.59	y = 14,565 x EBITDA - 50.871	0.95	473,350
322	9.43	5.76	9.20	5.21	10.67	11.49	[3,29 ; 15,57] (29,7)	0.23	0.52	y = 13,473 x EBITDA - 287.371	0.91	2,758,436
843	9.07	2.70	8.87	6.01	7.80	11.57	[5,85 ; 12,28] (83,7)	0.48	0.50	y = 8,429 x EBITDA + 360.945	0.64	3,557,216
102	11.93	6.29	12.10	4.94	13.25	18.09	[-7,35 ; 31,20] (17,1)	-0.32	0.55	y = 2,344 x EBITDA + 19.639.493	0.51	19,744,971
-	-	-	-	-	-	-	-	-	-	-	-	-
1,041	6.21	0.72	5.99	2.29	6.14	9.43	[3,51 ; 8,92] (83,4)	0.48	0.71	y = 13,477 x EBITDA - 391.496	0.93	1,557,730
494	6.92	2.55	6.53	2.79	5.07	11.05	[2,03 ; 11,80] (54,2)	0.61	0.71	y = 11,331 x EBITDA - 20.643	0.98	525,903
166	2.37	0.15	1.86	0.95	1.66	3.15	[0,17 ; 4,57] (59,3)	2.40	1.05	y = 0,648 x EBITDA + 628.881	0.72	2,763,335
462	9.11	4.88	9.01	5.29	9.65	12.74	[4,31 ; 13,90] (51,9)	0.06	0.52	y = 12,216 x EBITDA - 60.231	0.98	411,547
703	8.44	4.27	8.14	3.58	8.31	12.68	[3,81 ; 13,08] (89,1)	0.31	0.62	y = 12,191 x EBITDA - 29.812	0.98	351,129
97	6.63	3.47	6.30	3.70	5.04	8.69	[-5,20 ; 18,47] (8,6)	1.01	0.76	y = 3,948 x EBITDA + 10.458	1.00	36,273
209	8.66	7.69	8.36	6.35	8.16	10.01	[5,67 ; 11,66] (13,4)	0.90	0.36	y = 6,681 x EBITDA + 133.859	0.55	264,197
279	3.78	0.90	3.19	1.38	3.17	4.97	[0,30 ; 7,25] (37,4)	1.86	0.95	y = 7,789 x EBITDA - 3.772	0.70	35,444
279	9.10	1.91	9.11	2.71	10.91	14.09	[-1,57 ; 19,78] (45,9)	-0.12	0.69	y = 13,991 x EBITDA - 27.974	0.96	404,104

n	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
32	5.94	4.92	5.94	4.36	4.54	7.41	[-0,16 ; 12,04] (3,0)	0.80	0.46	y = 4,175 x EBITDA + 707.260	0.92	1,116,527
547	5.93	5.36	5.50	4.49	5.33	6.35	[4,86 ; 7,00] (120,0)	2.24	0.40	y = 3,856 x EBITDA + 987.753	0.73	707,129
1,293	7.13	4.99	6.29	3.92	5.31	8.12	[4,13 ; 10,13] (129,9)	1.43	0.68	y = 4,015 x EBITDA + 1.033.207	0.70	1,567,194
1,476	6.61	4.19	6.34	4.25	5.54	9.23	[5,15 ; 8,07] (120,4)	0.69	0.53	y = 1,350 x EBITDA + 3.095.751	0.18	4,283,054
2,737	4.81	3.66	4.67	2.58	4.06	7.14	[4,28 ; 5,34] (96,1)	0.93	0.51	y = 7,750 x EBITDA - 3.158.109	0.92	2,730,434
3,038	6.22	5.24	5.71	4.57	5.22	7.02	[5,50 ; 6,93] (416,6)	1.97	0.47	y = 6,150 x EBITDA - 117.681	0.68	2,785,617
3,365	5.55	4.84	5.23	4.21	4.87	6.61	[5,13 ; 5,98] (507,3)	1.93	0.42	y = 7,716 x EBITDA - 1.898.183	0.89	2,745,689
408	3.05	1.74	2.80	1.04	2.89	4.28	[1,96 ; 4,14] (20,5)	1.27	0.72	y = 0,969 x EBITDA + 2.557.313	0.89	7,537,279
-	-	-	-	-	-	-	-	-	-	-	-	-
2,399	6.04	4.48	5.86	3.81	5.50	7.99	[5,32 ; 6,77] (183,3)	0.64	0.46	y = 4,773 x EBITDA + 447.797	0.58	2,883,844
1,943	5.12	4.31	4.87	3.64	4.78	6.21	[4,64 ; 5,60] (115,3)	1.10	0.42	y = 5,471 x EBITDA - 953.413	0.86	3,527,294
268	2.64	1.57	2.13	1.39	1.89	3.09	[1,09 ; 4,19] (45,9)	2.19	0.90	y = 2,575 x EBITDA + 896.531	0.40	7,111,837
1,782	7.16	5.37	6.40	4.19	5.62	8.91	[5,20 ; 9,12] (155,7)	1.40	0.60	y = 6,377 x EBITDA + 121.689	0.61	2,185,601
2,533	7.96	4.90	7.41	3.88	6.47	9.88	[5,69 ; 10,24] (281,8)	0.91	0.63	y = 3,860 x EBITDA + 1.512.067	0.69	2,864,363
462	6.02	3.32	5.99	3.54	5.58	8.30	[4,38 ; 7,67] (59,0)	0.11	0.46	y = 7,756 x EBITDA - 433.707	0.88	3,117,997
832	7.65	5.53	7.72	6.16	7.60	9.51	[6,86 ; 8,45] (44,0)	-0.22	0.29	y = 8,269 x EBITDA - 138.043	0.79	916,801
2,109	3.87	2.93	3.29	2.29	2.72	4.32	[3,12 ; 4,62] (545,0)	2.38	0.71	y = 2,244 x EBITDA + 810.668	0.24	1,302,474
2,480	5.94	3.77	5.19	3.15	5.16	6.61	[4,43 ; 7,46] (246,2)	1.79	0.69	y = 2,855 x EBITDA + 997.037	0.31	1,424,907

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

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

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C19 - C23	Manufacture of coke, chemicals, rubber, refined petroleum/chemical/pharmaceutical/plastic/mineral products
C24 - C25	Manufacture of basic metals, fabricated metal products
C26 - C27	Manufacture of computers, electronic/optical products, electrical equipment
C28 - C30, C33	Manufacture of machinery, motor vehicles, other transport equipment; repair/installation
D35	Electricity, gas, steam and air conditioning supply
E36 - E39	Water supply, sewerage, waste management, remediation activities
F41 - F43	Construction - Buildings, civil engineering, specialized construction activities
G45 - G47	Wholesale/Retail trade, repair of motor vehicles and motorcycles
H49 - H53	Transportation and storage - Land/pipelines, water, air; warehousing, postal/courier activities
J58 - J60, C18	Publishing activities, programme production, music publishing, broadcasting, printing
J61 - J63	Telecommunications, computer programming/consultancy, information service activities
K64 - K66	Financial and insurance activities
L68	Real estate activities
M69, M70, M73, N77 - N82	Legal/accounting activities, consultancy, advertising/market research, rental/employment/security activities, travel agency
M71, M72, M74, M75	Architectural/engineering/other professional activities, technical testing, scientific R&D, veterinary activities

n	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
43	10.85	4.85	10.85	3.34	9.56	15.26	[-37,24 ; 58,94] (6,2)	0.51	0.77	$\hat{y}$ = 7,524 x EBIT + 7.134	0.82	20,330
349	16.44	15.09	16.48	14.91	16.81	17.96	[14,50 ; 18,38] (97,8)	-1.49	0.17	$\hat{y}$ = 14,807 x EBIT + 453.549	0.57	580,156
311	13.26	5.91	12.89	8.66	11.52	13.96	[-3,67 ; 30,19] (28,8)	0.77	0.61	$\hat{y}$ = 9,596 x EBIT + 1.089.951	0.89	1,470,882
419	17.00	7.78	17.78	11.55	17.69	24.16	[3,69 ; 30,31] (50,0)	-0.67	0.46	$\hat{y}$ = 1,040 x EBIT + 5.160.265	0.05	4,044,496
606	16.79	4.69	17.31	12.17	17.23	23.31	[6,47 ; 27,11] (61,5)	-0.55	0.45	$\hat{y}$ = 15,605 x EBIT + 257.665	0.90	491,179
327	12.01	6.91	11.67	5.35	13.12	14.21	[0,74 ; 23,27] (30,0)	0.35	0.56	$\hat{y}$ = 16,531 x EBIT - 270.032	0.92	2,554,744
848	11.52	3.90	11.44	8.15	11.02	14.44	[7,33 ; 15,72] (55,4)	0.26	0.45	$\hat{y}$ = 11,955 x EBIT - 129.582	0.72	3,108,246
113	16.77	7.12	17.03	5.62	21.77	24.09	[-25,79 ; 59,33] (19,1)	-0.38	0.59	$\hat{y}$ = 2,076 x EBIT + 27.428.120	0.35	22,155,181
-	-	-	-	-	-	-	-	-	-	-	-	-
1,030	6.99	0.85	6.51	2.82	6.46	9.84	[3,22 ; 10,75] (50,3)	0.95	0.74	$\hat{y}$ = 16,626 x EBIT - 597.630	0.94	1,511,407
569	9.91	2.87	8.78	3.13	7.70	13.18	[-3,64 ; 23,46] (54,9)	1.00	0.85	$\hat{y}$ = 11,707 x EBIT + 179.994	0.94	775,012
177	4.31	0.17	3.49	1.12	3.63	5.92	[-4,30 ; 12,92] (281,8)	3.30	1.17	$\hat{y}$ = 0,790 x EBIT + 1.026.483	0.51	3,547,547
478	14.24	6.13	14.12	5.90	14.18	22.62	[-1,41 ; 29,88] (71,2)	0.07	0.61	$\hat{y}$ = 21,277 x EBIT - 116.853	0.95	642,336
682	11.78	4.87	11.20	4.14	9.42	20.47	[-1,63 ; 25,19] (98,3)	0.51	0.75	$\hat{y}$ = 21,179 x EBIT - 91.555	0.96	540,878
102	6.74	3.26	6.08	3.02	4.23	9.13	[-7,50 ; 20,97] (6,5)	1.43	0.84	$\hat{y}$ = 3,944 x EBIT + 13.081	0.99	39,649
258	10.85	8.80	10.19	6.65	9.58	13.50	[2,79 ; 18,90] (20,4)	1.10	0.49	$\hat{y}$ = 6,296 x EBIT + 207.743	0.58	276,335
317	5.88	0.89	4.64	1.34	3.81	6.65	[-5,87 ; 17,63] (30,9)	1.76	1.15	$\hat{y}$ = 5,898 x EBIT + 1.113	0.69	18,261
279	11.96	2.38	11.93	3.59	15.07	18.18	[-5,50 ; 29,41] (42,0)	-0.12	0.67	$\hat{y}$ = 20,917 x EBIT - 439.262	0.90	1,247,293

n	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
32	8.29	6.79	8.29	5.94	7.79	10.36	[-1,36 ; 17,93] (3,5)	0.30	0.42	$\hat{y}$ = 5,637 x EBIT + 673.843	0.92	1,080,887
547	8.25	7.74	7.96	6.72	7.96	9.06	[7,19 ; 9,32] (51,6)	1.68	0.28	$\hat{y}$ = 6,237 x EBIT + 716.410	0.76	668,205
1,310	10.19	7.23	8.91	5.86	7.47	11.18	[3,80 ; 16,58] (129,8)	1.54	0.70	$\hat{y}$ = 5,585 x EBIT + 1.079.292	0.59	2,096,320
1,476	9.68	5.64	8.77	6.10	7.61	12.15	[5,15 ; 14,21] (105,4)	1.35	0.64	$\hat{y}$ = 1,791 x EBIT + 3.120.589	0.19	4,259,303
2,737	6.52	5.34	6.41	3.98	6.40	8.91	[5,84 ; 7,21] (85,2)	0.83	0.43	$\hat{y}$ = 9,273 x EBIT - 2.095.029	0.94	2,517,519
3,016	8.05	6.75	7.37	5.60	6.80	9.30	[6,82 ; 9,28] (365,6)	1.87	0.48	$\hat{y}$ = 7,226 x EBIT + 120.025	0.68	2,811,203
3,376	7.02	6.17	6.64	5.28	6.22	8.31	[6,39 ; 7,66] (465,2)	1.87	0.41	$\hat{y}$ = 9,638 x EBIT - 1.731.510	0.89	2,754,808
408	4.41	2.27	3.98	1.29	4.36	6.10	[1,68 ; 7,14] (34,5)	1.52	0.79	$\hat{y}$ = 1,200 x EBIT + 2.641.251	0.89	7,538,090
-	-	-	-	-	-	-	-	-	-	-	-	-
2,415	6.84	5.34	6.58	4.77	6.56	8.35	[6,00 ; 7,68] (604,2)	1.72	0.44	$\hat{y}$ = 5,928 x EBIT + 324.917	0.62	2,748,041
1,927	9.28	7.13	8.98	5.50	9.47	11.53	[7,22 ; 11,34] (60,4)	0.98	0.48	$\hat{y}$ = 11,582 x EBIT - 2.241.762	0.81	4,132,185
268	5.55	3.85	5.29	3.01	5.63	6.83	[3,42 ; 7,67] (14,2)	0.80	0.50	$\hat{y}$ = 10,398 x EBIT - 1.132.561	0.90	2,864,627
1,615	9.38	7.07	8.84	5.39	7.59	12.92	[6,61 ; 12,14] (127,0)	0.90	0.53	$\hat{y}$ = 8,119 x EBIT + 90.521	0.69	1,863,006
2,260	10.45	7.15	10.00	5.72	9.68	14.24	[7,44 ; 13,46] (205,8)	0.61	0.54	$\hat{y}$ = 4,908 x EBIT + 1.368.940	0.76	2,589,801
462	6.88	4.70	6.73	4.32	6.22	8.74	[4,78 ; 8,98] (44,0)	0.36	0.46	$\hat{y}$ = 8,817 x EBIT - 455.438	0.88	3,114,968
859	7.80	5.50	7.62	5.93	7.59	9.60	[6,27 ; 9,32] (521,0)	2.22	0.40	$\hat{y}$ = 8,043 x EBIT - 22.326	0.72	1,090,247
2,125	5.36	4.00	4.59	3.09	3.71	6.23	[3,89 ; 6,83] (661,0)	2.40	0.72	$\hat{y}$ = 2,867 x EBIT + 938.779	0.20	1,338,051
2,490	8.37	5.57	7.20	4.99	7.21	9.45	[5,27 ; 11,47] (355,7)	2.06	0.70	$\hat{y}$ = 4,706 x EBIT + 762.518	0.44	1,273,404

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

NACE Rev. 2 Sector	
C10 - C12	Manufacture of food products, beverages, tobacco products
C13 - C15	Manufacture of textiles, wearing apparel, teather and related products
C16, C17, C31, C32	Manufacture of wood/products, paper/products, furniture; other manufacturing
C19 - C23	Manufacture of coke, chemicals, rubber, refined petroleum/chemical/pharmaceutical/plastic/mineral products
C24 - C25	Manufacture of basic metals, fabricated metal products
C26 - C27	Manufacture of computers, electronic/optical products, electrical equipment
C28 - C30, C33	Manufacture of machinery, motor vehicles, other transport equipment; repair/installation
D35	Electricity, gas, steam and air conditioning supply
E36 - E39	Water supply, sewerage, waste management, remediation activities
F41 - F43	Construction - Buildings, civil engineering, specialized construction activities
G45 - G47	Wholesale/Retail trade, repair of motor vehicles and motorcycles
H49 - H53	Transportation and storage - Land/pipelines, water, air; warehousing, postal/courier activities
J58 - J60, C18	Publishing activities, programme production, music publishing, broadcasting, printing
J61 - J63	Telecommunications, computer programming/consultancy, information service activities
K64 - K66	Financial and insurance activities
L68	Real estate activities
M69, M70, M73, N77 - N82	Legal/accounting activities, consultancy, advertising/market research, rental/employment/security activities, travel agency
M71, M72, M74, M75	Architectural/engineering/other professional activities, technical testing, scientific R&D, veterinary activities

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

NACE Rev. 2 Sector	
C10 - C12	Manufacture of food products, beverages, tobacco products
C13 - C15	Manufacture of textiles, wearing apparel, teather and related products
C16, C17, C31, C32	Manufacture of wood/products, paper/products, furniture; other manufacturing
C19 - C23	Manufacture of coke, chemicals, rubber, refined petroleum/chemical/pharmaceutical/plastic/mineral products
C24 - C25	Manufacture of basic metals, fabricated metal products
C26 - C27	Manufacture of computers, electronic/optical products, electrical equipment
C28 - C30, C33	Manufacture of machinery, motor vehicles, other transport equipment; repair/installation
D35	Electricity, gas, steam and air conditioning supply
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F41 - F43	Construction - Buildings, civil engineering, specialized construction activities
G45 - G47	Wholesale/Retail trade, repair of motor vehicles and motorcycles
H49 - H53	Transportation and storage - Land/pipelines, water, air; warehousing, postal/courier activities
J58 - J60, C18	Publishing activities, programme production, music publishing, broadcasting, printing
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M71, M72, M74, M75	Architectural/engineering/other professional activities, technical testing, scientific R&D, veterinary activities

n	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
70	0.66	0.57	0.64	0.45	0.68	0.83	[0,62 ; 0,69] (5,3)	0.67	0.38	$\hat{y}$ = 0,797 x IC - 4.124	0.93	47,689
467	0.83	0.80	0.82	0.69	0.84	0.93	[0,82 ; 0,83] (49,1)	0.34	0.19	$\hat{y}$ = 0,727 x IC + 365.151	0.80	659,995
494	0.80	0.63	0.82	0.60	0.88	1.01	[0,79 ; 0,82] (43,8)	-0.57	0.33	$\hat{y}$ = 0,640 x IC + 437.547	0.93	1,065,233
816	0.81	0.09	0.85	0.63	0.87	1.03	[0,80 ; 0,83] (63,9)	-0.92	0.34	$\hat{y}$ = 0,374 x IC + 763.306	0.74	1,065,843
1,632	0.46	0.34	0.42	0.27	0.34	0.54	[0,45 ; 0,46] (161,2)	1.28	0.58	$\hat{y}$ = 0,310 x IC + 442.670	0.40	950,681
2,179	0.83	0.71	0.84	0.58	0.80	1.11	[0,82 ; 0,84] (314,5)	-0.11	0.33	$\hat{y}$ = 0,465 x IC + 1.254.438	0.84	1,002,599
1,921	0.89	0.64	0.90	0.68	0.92	1.12	[0,88 ; 0,89] (187,1)	-0.54	0.29	$\hat{y}$ = 0,828 x IC + 213.366	0.89	895,481
365	0.56	0.49	0.54	0.39	0.48	0.67	[0,55 ; 0,58] (36,7)	1.00	0.42	$\hat{y}$ = 0,507 x IC - 1.038.541	0.97	4,110,990
38	0.80	0.53	0.80	0.45	1.00	1.14	[0,69 ; 0,91] (7,4)	-0.37	0.49	$\hat{y}$ = 0,468 x IC + 49.211	0.21	151,254
2,378	0.66	0.24	0.65	0.45	0.61	0.85	[0,65 ; 0,67] (239,5)	0.22	0.46	$\hat{y}$ = 0,486 x IC + 430.103	0.91	820,424
827	0.69	0.49	0.69	0.49	0.70	0.90	[0,68 ; 0,70] (89,1)	-0.05	0.41	$\hat{y}$ = 0,672 x IC + 40.952	0.95	313,730
403	0.49	0.07	0.47	0.26	0.46	0.68	[0,47 ; 0,51] (31,6)	0.63	0.59	$\hat{y}$ = 0,162 x IC + 272.367	0.96	653,780
1,331	0.75	0.52	0.76	0.60	0.69	0.96	[0,74 ; 0,76] (118,3)	-0.14	0.37	$\hat{y}$ = 0,788 x IC - 91.618	0.83	788,996
1,911	0.71	0.57	0.71	0.52	0.66	0.91	[0,70 ; 0,72] (203,7)	0.10	0.37	$\hat{y}$ = 0,478 x IC + 467.476	0.94	1,086,059
623	0.67	0.40	0.67	0.30	0.76	0.95	[0,65 ; 0,69] (90,9)	-0.13	0.50	$\hat{y}$ = 0,261 x IC + 404.204	0.71	593,480
1,041	0.65	0.46	0.64	0.48	0.61	0.78	[0,64 ; 0,66] (77,0)	0.34	0.37	$\hat{y}$ = 0,506 x IC + 269.625	0.86	770,540
2,286	0.65	0.48	0.64	0.53	0.61	0.79	[0,64 ; 0,65] (114,9)	0.18	0.35	$\hat{y}$ = 0,775 x IC - 321.366	0.85	647,463
1,138	0.77	0.40	0.79	0.56	0.82	1.03	[0,75 ; 0,78] (111,5)	-0.61	0.39	$\hat{y}$ = 0,588 x IC + 365.477	0.73	705,994

n	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
236	0.63	0.45	0.63	0.37	0.62	0.95	[0,60 ; 0,66] (31,3)	0.25	0.49	$\hat{y}$ = 0,452 x IC + 180.258	0.89	1,781,650
172	0.67	0.50	0.66	0.44	0.66	0.85	[0,64 ; 0,69] (19,5)	0.14	0.42	$\hat{y}$ = 0,534 x IC + 73.412	0.96	316,396
343	0.61	0.41	0.60	0.39	0.59	0.80	[0,59 ; 0,63] (40,0)	0.11	0.47	$\hat{y}$ = 0,665 x IC + 136.939	0.97	772,369
730	0.60	0.37	0.59	0.31	0.54	0.88	[0,58 ; 0,62] (101,0)	0.25	0.55	$\hat{y}$ = 0,481 x IC + 330.967	0.92	6,163,000
381	0.60	0.37	0.59	0.40	0.53	0.78	[0,58 ; 0,62] (40,9)	0.37	0.48	$\hat{y}$ = 0,815 x IC - 26.228	0.97	157,443
574	0.70	0.52	0.71	0.50	0.71	0.91	[0,69 ; 0,72] (63,6)	-0.27	0.40	$\hat{y}$ = 0,611 x IC + 44.362	0.74	237,059
853	0.67	0.32	0.67	0.41	0.64	0.92	[0,65 ; 0,69] (104,1)	0.14	0.53	$\hat{y}$ = 0,174 x IC + 2.079.555	0.28	3,062,182
193	0.48	0.34	0.46	0.30	0.34	0.74	[0,45 ; 0,51] (22,7)	0.88	0.59	$\hat{y}$ = 0,812 x IC - 371.667	0.96	611,357
91	0.84	0.58	0.86	0.81	0.86	1.03	[0,80 ; 0,88] (5,4)	-1.14	0.35	$\hat{y}$ = 0,998 x IC - 173.024	0.99	379,306
1,014	0.59	0.28	0.59	0.45	0.57	0.76	[0,59 ; 0,60] (62,8)	0.27	0.42	$\hat{y}$ = 0,664 x IC - 233.313	0.86	1,219,849
1,288	0.55	0.36	0.53	0.30	0.53	0.74	[0,54 ; 0,56] (140,6)	0.43	0.53	$\hat{y}$ = 0,461 x IC - 116.996	0.98	3,079,861
564	0.53	0.39	0.50	0.36	0.46	0.66	[0,51 ; 0,54] (50,9)	0.85	0.50	$\hat{y}$ = 0,488 x IC - 17.159	0.65	1,828,572
875	0.67	0.43	0.67	0.46	0.61	0.93	[0,65 ; 0,68] (99,3)	0.03	0.47	$\hat{y}$ = 0,533 x IC + 88.123	0.99	672,907
1,310	0.66	0.38	0.66	0.38	0.63	0.95	[0,65 ; 0,68] (173,2)	0.10	0.50	$\hat{y}$ = 0,412 x IC + 244.859	0.96	2,004,204
2,539	0.66	0.11	0.67	0.43	0.68	0.90	[0,65 ; 0,67] (278,3)	-0.24	0.47	$\hat{y}$ = 0,044 x IC + 715.029	0.06	1,414,215
494	0.66	0.59	0.64	0.54	0.62	0.76	[0,65 ; 0,66] (21,9)	0.59	0.28	$\hat{y}$ = 0,640 x IC - 88.160	0.90	1,028,043
993	0.64	0.41	0.64	0.36	0.59	0.91	[0,63 ; 0,66] (132,5)	0.16	0.49	$\hat{y}$ = 0,383 x IC + 61.087	0.68	202,338
784	0.65	0.24	0.65	0.41	0.68	0.85	[0,63 ; 0,66] (90,4)	-0.09	0.48	$\hat{y}$ = 1,048 x IC - 660.317	0.97	1,683,538

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

NACE Rev. 2 Sector	
C10 - C12	Manufacture of food products, beverages, tobacco products
C13 - C15	Manufacture of textiles, wearing apparel, teather and related products
C16, C17, C31, C32	Manufacture of wood/products, paper/products, furniture; other manufacturing
C19 - C23	Manufacture of coke, chemicals, rubber, refined petroleum/chemical/pharmaceutical/plastic/mineral products
C24 - C25	Manufacture of basic metals, fabricated metal products
C26 - C27	Manufacture of computers, electronic/optical products, electrical equipment
C28 - C30, C33	Manufacture of machinery, motor vehicles, other transport equipment; repair/installation
D35	Electricity, gas, steam and air conditioning supply
E36 - E39	Water supply, sewerage, waste management, remediation activities
F41 - F43	Construction - Buildings, civil engineering, specialized construction activities
G45 - G47	Wholesale/Retail trade, repair of motor vehicles and motorcycles
H49 - H53	Transportation and storage - Land/pipelines, water, air; warehousing, postal/courier activities
J58 - J60, C18	Publishing activities, programme production, music publishing, broadcasting, printing
J61 - J63	Telecommunications, computer programming/consultancy, information service activities
K64 - K66	Financial and insurance activities
L68	Real estate activities
M69, M70, M73, N77 - N82	Legal/accounting activities, consultancy, advertising/market research, rental/employment/security activities, travel agency
M71, M72, M74, M75	Architectural/engineering/other professional activities, technical testing, scientific R&D, veterinary activities

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

NACE Rev. 2 Sector	
C10 - C12	Manufacture of food products, beverages, tobacco products
C13 - C15	Manufacture of textiles, wearing apparel, teather and related products
C16, C17, C31, C32	Manufacture of wood/products, paper/products, furniture; other manufacturing
C19 - C23	Manufacture of coke, chemicals, rubber, refined petroleum/chemical/pharmaceutical/plastic/mineral products
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E36 - E39	Water supply, sewerage, waste management, remediation activities
F41 - F43	Construction - Buildings, civil engineering, specialized construction activities
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M69, M70, M73, N77 - N82	Legal/accounting activities, consultancy, advertising/market research, rental/employment/security activities, travel agency
M71, M72, M74, M75	Architectural/engineering/other professional activities, technical testing, scientific R&D, veterinary activities

n	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
301	1.09	0.35	1.02	0.43	0.81	1.56	[0,90 ; 1,28] (34,3)	0.83	0.78	$\hat{y}$ = 0,644 x Sales + 804.085	0.77	2,790,219
134	0.82	0.45	0.74	0.47	0.59	0.82	[0,68 ; 0,96] (11,6)	1.62	0.72	$\hat{y}$ = 0,560 x Sales + 343.589	0.64	1,493,512
290	0.76	0.34	0.73	0.32	0.73	1.03	[0,70 ; 0,82] (14,2)	0.78	0.64	$\hat{y}$ = 0,625 x Sales + 347.585	0.94	1,215,831
601	1.17	0.50	1.12	0.48	1.03	1.79	[1,05 ; 1,28] (74,5)	0.46	0.67	$\hat{y}$ = 0,940 x Sales + 521.542	0.93	6,206,980
322	0.79	0.43	0.71	0.36	0.59	1.14	[0,71 ; 0,88] (20,7)	1.37	0.73	$\hat{y}$ = 0,835 x Sales + 46.741	0.85	728,644
601	1.04	0.62	0.94	0.56	0.84	1.23	[0,94 ; 1,13] (49,6)	1.20	0.68	$\hat{y}$ = 2,967 x Sales - 415.252	0.99	561,377
564	0.92	0.39	0.81	0.39	0.67	1.29	[0,81 ; 1,04] (51,9)	1.17	0.84	$\hat{y}$ = 0,761 x Sales - 6.719	0.31	6,986,556
129	1.67	0.61	1.71	1.01	2.05	2.27	[1,40 ; 1,93] (15,6)	-0.67	0.49	$\hat{y}$ = 2,466 x Sales - 370.363	0.93	1,056,090
59	1.08	0.35	1.10	0.81	0.94	1.47	[0,90 ; 1,27] (4,9)	0.10	0.52	$\hat{y}$ = 0,920 x Sales + 44.025	0.99	64,009
558	0.88	0.36	0.82	0.33	0.74	1.26	[0,80 ; 0,95] (52,3)	0.72	0.72	$\hat{y}$ = 0,507 x Sales + 402.136	0.47	1,056,182
1,326	0.71	0.25	0.59	0.21	0.51	0.90	[0,65 ; 0,77] (114,3)	1.52	0.96	$\hat{y}$ = 0,934 x Sales - 674.739	0.97	3,769,239
521	0.90	0.38	0.79	0.26	0.46	1.53	[0,75 ; 1,04] (64,9)	1.04	0.96	$\hat{y}$ = 0,304 x Sales + 848.547	0.33	2,262,952
977	1.40	0.60	1.37	0.64	1.32	2.14	[1,29 ; 1,50] (135,5)	0.21	0.61	$\hat{y}$ = 1,271 x Sales - 4.064	0.97	1,162,222
1,401	1.34	0.57	1.31	0.60	1.32	2.04	[1,26 ; 1,42] (184,1)	0.16	0.61	$\hat{y}$ = 1,300 x Sales - 54.263	0.98	1,515,091
671	1.24	0.58	1.19	0.59	0.98	1.91	[1,12 ; 1,36] (87,8)	0.45	0.67	$\hat{y}$ = 0,176 x Sales + 97.924	0.65	390,380
59	1.18	0.86	1.18	0.87	1.09	1.55	[1,03 ; 1,34] (4,4)	0.19	0.44	$\hat{y}$ = 0,502 x Sales + 83.566	0.20	242,445
945	0.97	0.36	0.91	0.43	0.83	1.39	[0,91 ; 1,04] (87,6)	0.73	0.70	$\hat{y}$ = 0,244 x Sales + 164.390	0.25	384,709
590	1.18	0.50	1.13	0.59	1.06	1.73	[1,07 ; 1,30] (68,7)	0.50	0.67	$\hat{y}$ = 2,158 x Sales - 327.839	0.96	1,926,703

n	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
188	1.11	0.42	1.12	0.63	1.07	1.75	[0,97 ; 1,26] (26,0)	0.18	0.59	$\hat{y}$ = 1,971 x Sales - 2.421.018	0.92	7,038,454
86	0.71	0.40	0.64	0.37	0.46	0.60	[0,49 ; 0,94] (7,7)	1.64	0.94	$\hat{y}$ = 0,389 x Sales + 671.505	0.54	1,860,545
107	1.03	0.37	0.96	0.30	0.63	2.05	[0,69 ; 1,37] (17,5)	0.56	0.86	$\hat{y}$ = 1,515 x Sales - 274.250	0.82	2,928,622
687	1.09	0.42	1.05	0.54	0.99	1.65	[1,00 ; 1,19] (71,3)	0.54	0.67	$\hat{y}$ = 0,571 x Sales + 920.872	0.89	7,374,199
209	0.60	0.39	0.54	0.30	0.43	0.79	[0,53 ; 0,68] (88,7)	2.38	0.79	$\hat{y}$ = 0,891 x Sales - 77.334	0.64	112,117
419	1.03	0.67	0.94	0.48	0.78	1.31	[0,92 ; 1,15] (41,5)	1.08	0.69	$\hat{y}$ = 2,422 x Sales - 565.633	0.99	582,712
564	0.72	0.34	0.67	0.30	0.58	1.04	[0,67 ; 0,77] (31,9)	0.99	0.72	$\hat{y}$ = 0,676 x Sales + 132.841	0.31	6,996,890
97	1.62	0.48	1.63	1.57	1.84	2.04	[1,36 ; 1,87] (6,1)	-1.08	0.46	$\hat{y}$ = 1,587 x Sales - 33.657	1.00	233,826
75	0.24	0.19	0.24	0.15	0.28	0.31	[0,24 ; 0,25] (10,5)	-0.12	0.41	$\hat{y}$ = -0,836 x Sales + 1.944.745	0.49	120,735
617	0.74	0.38	0.72	0.32	0.73	1.05	[0,70 ; 0,78] (18,2)	0.94	0.63	$\hat{y}$ = 0,736 x Sales + 138.937	0.63	1,790,494
1,036	0.58	0.23	0.47	0.21	0.38	0.72	[0,54 ; 0,63] (139,0)	1.99	0.98	$\hat{y}$ = 0,580 x Sales + 8.762	0.92	6,559,701
381	0.68	0.35	0.57	0.26	0.38	1.03	[0,59 ; 0,78] (31,9)	1.61	0.93	$\hat{y}$ = 0,423 x Sales + 393.258	0.40	3,326,137
671	1.29	0.39	1.27	0.64	1.24	1.84	[1,20 ; 1,38] (73,5)	0.24	0.57	$\hat{y}$ = 1,270 x Sales - 242.756	0.97	1,421,323
945	1.19	0.67	1.14	0.53	1.17	1.69	[1,11 ; 1,27] (108,0)	0.41	0.61	$\hat{y}$ = 1,355 x Sales - 386.682	0.97	2,134,333
537	1.07	0.30	0.98	0.39	0.73	1.77	[0,93 ; 1,21] (64,9)	0.69	0.78	$\hat{y}$ = 0,180 x Sales + 498.504	0.61	1,593,696
43	0.46	0.34	0.46	0.23	0.52	0.61	[0,43 ; 0,48] (8,1)	-0.26	0.45	$\hat{y}$ = 0,339 x Sales + 80.804	0.55	679,374
574	0.94	0.31	0.87	0.39	0.72	1.43	[0,85 ; 1,02] (54,4)	0.83	0.73	$\hat{y}$ = 0,170 x Sales + 290.673	0.19	448,926
596	1.13	0.42	1.10	0.54	1.04	1.70	[1,04 ; 1,22] (66,9)	0.30	0.62	$\hat{y}$ = 1,671 x Sales - 1.782.109	0.85	4,042,975

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

NACE Rev. 2 Sector	
C10 - C12	Manufacture of food products, beverages, tobacco products
C13 - C15	Manufacture of textiles, wearing apparel, teather and related products
C16, C17, C31, C32	Manufacture of wood/products, paper/products, furniture; other manufacturing
C19 - C23	Manufacture of coke, chemicals, rubber, refined petroleum/chemical/pharmaceutical/plastic/mineral products
C24 - C25	Manufacture of basic metals, fabricated metal products
C26 - C27	Manufacture of computers, electronic/optical products, electrical equipment
C28 - C30, C33	Manufacture of machinery, motor vehicles, other transport equipment; repair/installation
D35	Electricity, gas, steam and air conditioning supply
E36 - E39	Water supply, sewerage, waste management, remediation activities
F41 - F43	Construction - Buildings, civil engineering, specialized construction activities
G45 - G47	Wholesale/Retail trade, repair of motor vehicles and motorcycles
H49 - H53	Transportation and storage - Land/pipelines, water, air; warehousing, postal/courier activities
J58 - J60, C18	Publishing activities, programme production, music publishing, broadcasting, printing
J61 - J63	Telecommunications, computer programming/consultancy, information service activities
K64 - K66	Financial and insurance activities
L68	Real estate activities
M69, M70, M73, N77 - N82	Legal/accounting activities, consultancy, advertising/market research, rental/employment/security activities, travel agency
M71, M72, M74, M75	Architectural/engineering/other professional activities, technical testing, scientific R&D, veterinary activities

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

NACE Rev. 2 Sector	
C10 - C12	Manufacture of food products, beverages, tobacco products
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C16, C17, C31, C32	Manufacture of wood/products, paper/products, furniture; other manufacturing
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C28 - C30, C33	Manufacture of machinery, motor vehicles, other transport equipment; repair/installation
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n	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
268	8.05	4.56	7.57	4.39	6.44	12.25	[0,73 ; 15,36] (29,7)	0.70	0.64	$\hat{y}$ = 3,039 x EBITDA + 1.166.944	0.61	3,774,970
107	6.60	5.30	6.47	4.73	5.37	9.20	[2,52 ; 10,68] (14,4)	0.57	0.46	$\hat{y}$ = 4,910 x EBITDA + 72.765	0.81	1,186,639
215	5.99	1.83	5.59	2.92	4.91	7.20	[1,44 ; 10,54] (18,5)	0.89	0.64	$\hat{y}$ = 4,752 x EBITDA + 46.409	0.98	871,172
504	7.27	4.24	6.75	4.55	6.10	9.15	[3,88 ; 10,65] (41,8)	1.07	0.56	$\hat{y}$ = 5,733 x EBITDA + 700.009	0.97	4,771,947
317	5.44	3.55	5.22	3.24	4.73	7.18	[3,11 ; 7,76] (15,4)	0.90	0.56	$\hat{y}$ = 2,545 x EBITDA + 210.227	0.74	1,088,035
483	8.36	4.93	8.03	3.76	8.21	11.67	[3,25 ; 13,46] (56,5)	0.40	0.59	$\hat{y}$ = 8,006 x EBITDA + 59	0.60	339,686
542	9.53	4.55	9.24	3.38	6.97	17.79	[0,52 ; 18,54] (86,0)	0.42	0.71	$\hat{y}$ = 6,410 x EBITDA + 1.043.968	0.71	1,772,419
156	7.60	5.19	7.28	5.04	5.61	9.13	[0,60 ; 14,61] (12,4)	1.05	0.58	$\hat{y}$ = 9,612 x EBITDA - 66.766	0.96	776,379
86	7.13	4.25	7.37	4.90	7.83	9.16	[3,39 ; 10,88] (7,6)	-0.68	0.39	$\hat{y}$ = 9,166 x EBITDA - 17.310	1.00	114,970
488	7.57	4.62	7.20	4.77	6.41	9.89	[3,69 ; 11,44] (40,8)	0.79	0.57	$\hat{y}$ = 4,573 x EBITDA + 477.350	0.44	1,712,494
1,132	6.61	3.71	6.14	3.04	4.84	9.73	[3,79 ; 9,42] (133,4)	0.81	0.69	$\hat{y}$ = 4,579 x EBITDA + 63.532	0.92	6,127,367
403	5.77	3.72	5.03	2.84	4.25	7.61	[1,54 ; 10,01] (32,1)	1.51	0.75	$\hat{y}$ = 4,077 x EBITDA + 464.863	0.44	2,205,565
810	8.57	5.15	8.23	3.90	7.46	12.33	[4,42 ; 12,72] (103,9)	0.44	0.60	$\hat{y}$ = 3,575 x EBITDA + 517.252	0.95	1,646,748
1,122	8.46	4.48	8.16	4.59	7.55	11.94	[5,41 ; 11,51] (121,5)	0.44	0.56	$\hat{y}$ = 3,300 x EBITDA + 437.124	0.96	2,252,269
730	8.71	3.81	8.42	3.25	6.47	14.71	[2,23 ; 15,19] (108,3)	0.48	0.71	$\hat{y}$ = 3,608 x EBITDA + 474.411	0.30	1,092,209
145	12.32	10.50	12.39	9.98	12.96	14.96	[6,21 ; 18,43] (14,6)	-0.48	0.33	$\hat{y}$ = 8,687 x EBITDA + 632.616	0.68	1,970,705
896	6.44	3.49	6.03	3.86	5.25	8.33	[3,91 ; 8,96] (75,4)	0.96	0.63	$\hat{y}$ = 10,140 x EBITDA - 227.755	0.86	643,419
408	9.06	5.30	8.97	4.93	9.22	13.16	[3,78 ; 14,34] (53,3)	0.16	0.53	$\hat{y}$ = 6,286 x EBITDA + 273.383	1.00	763,776

n	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
188	6.33	4.61	5.64	4.22	4.66	7.20	[0,71 ; 11,94] (24,9)	1.95	0.65	$\hat{y}$ = 4,062 x EBITDA + 581.260	0.96	5,279,890
75	3.51	2.65	3.39	2.80	3.82	4.19	[2,23 ; 4,78] (1,4)	0.49	0.44	$\hat{y}$ = 4,564 x EBITDA - 331.638	0.79	1,331,365
113	5.91	3.46	5.42	3.59	4.17	8.50	[-1,35 ; 13,18] (10,2)	1.01	0.70	$\hat{y}$ = 4,199 x EBITDA + 151.997	1.00	470,699
692	5.38	3.18	5.08	3.58	4.69	6.29	[3,66 ; 7,10] (40,6)	1.03	0.59	$\hat{y}$ = 2,982 x EBITDA + 587.987	0.93	5,700,142
220	2.97	1.86	2.82	1.96	2.55	3.69	[2,14 ; 3,79] (11,2)	1.28	0.55	$\hat{y}$ = 2,486 x EBITDA + 20.135	0.64	111,298
451	6.82	4.11	6.58	4.25	5.72	8.85	[3,67 ; 9,97] (31,1)	0.78	0.56	$\hat{y}$ = 11,305 x EBITDA - 376.054	0.99	575,144
569	4.53	2.40	4.20	1.93	4.34	6.69	[2,76 ; 6,31] (35,7)	0.89	0.67	$\hat{y}$ = 5,612 x EBITDA - 1.178.760	0.51	5,853,432
107	5.16	4.51	4.62	4.04	4.44	4.83	[2,39 ; 7,93] (49,5)	2.55	0.49	$\hat{y}$ = 4,979 x EBITDA + 23.152	1.00	199,973
86	3.67	2.02	3.53	2.12	3.74	4.31	[1,02 ; 6,31] (5,7)	0.69	0.63	$\hat{y}$ = 9,170 x EBITDA - 1.120.429	0.96	720,215
746	6.70	4.05	6.07	3.85	5.72	7.35	[3,27 ; 10,14] (61,2)	1.30	0.68	$\hat{y}$ = 4,996 x EBITDA + 694.282	0.53	2,080,478
988	5.05	3.32	4.54	2.94	4.17	6.11	[3,42 ; 6,68] (94,4)	1.71	0.67	$\hat{y}$ = 3,081 x EBITDA + 784.115	0.97	3,987,611
354	4.57	3.49	3.86	2.67	3.88	4.94	[1,44 ; 7,71] (385,7)	3.40	0.79	$\hat{y}$ = 4,060 x EBITDA - 152.259	0.86	1,652,866
714	7.23	3.53	6.95	4.19	6.68	10.14	[4,64 ; 9,82] (57,3)	0.71	0.54	$\hat{y}$ = 3,304 x EBITDA + 466.804	0.97	1,383,202
1,036	7.40	4.79	7.04	3.86	6.21	10.76	[4,77 ; 10,02] (100,6)	0.70	0.58	$\hat{y}$ = 3,903 x EBITDA + 269.363	0.94	2,883,613
633	5.79	0.87	5.36	2.47	5.37	8.13	[2,80 ; 8,77] (43,8)	0.92	0.70	$\hat{y}$ = 0,724 x EBITDA + 890.262	0.26	2,003,606
381	12.33	8.57	12.59	8.41	13.84	16.71	[6,18 ; 18,48] (49,9)	-0.37	0.42	$\hat{y}$ = 11,384 x EBITDA + 256.548	0.63	1,683,523
601	5.20	3.15	4.79	3.12	4.31	6.69	[3,49 ; 6,92] (46,8)	1.17	0.59	$\hat{y}$ = 7,694 x EBITDA - 323.507	0.90	668,761
537	5.91	3.70	5.84	4.13	6.14	7.33	[4,21 ; 7,61] (10,6)	0.79	0.50	$\hat{y}$ = 5,985 x EBITDA - 128.106	0.98	1,528,824

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

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J58 - J60, C18	Publishing activities, programme production, music publishing, broadcasting, printing
J61 - J63	Telecommunications, computer programming/consultancy, information service activities
K64 - K66	Financial and insurance activities
L68	Real estate activities
M69, M70, M73, N77 - N82	Legal/accounting activities, consultancy, advertising/market research, rental/employment/security activities, travel agency
M71, M72, M74, M75	Architectural/engineering/other professional activities, technical testing, scientific R&D, veterinary activities

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

NACE Rev. 2 Sector	
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n	Trailing DEPV/EBIT Multipless									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
204	11.24	5.26	10.80	5.59	8.39	15.53	[-8,58 ; 31,06] (26,1)	0.66	0.70	$\hat{y}$ = 3,623 x EBIT + 1.346.545	0.59	4,387,809
32	7.20	5.89	7.20	4.90	5.77	9.98	[-1,55 ; 15,94] (5,7)	0.54	0.46	$\hat{y}$ = 5,884 x EBIT + 363.827	0.47	2,741,469
156	8.66	1.73	8.35	5.15	6.14	12.00	[-2,63 ; 19,94] (14,5)	0.79	0.64	$\hat{y}$ = 5,928 x EBIT + 216.645	0.96	1,198,850
338	12.22	5.09	11.80	6.86	11.53	16.74	[1,09 ; 23,36] (37,2)	0.53	0.55	$\hat{y}$ = 8,351 x EBIT + 384.558	0.99	1,610,571
322	9.35	5.33	8.53	5.45	8.21	12.15	[0,21 ; 18,49] (21,4)	1.17	0.64	$\hat{y}$ = 2,907 x EBIT + 260.603	0.70	1,159,644
408	11.93	6.42	11.30	4.02	11.61	17.15	[-2,12 ; 25,97] (49,3)	0.49	0.66	$\hat{y}$ = 20,318 x EBIT - 255.366	1.00	376,401
349	9.97	4.71	8.92	3.82	6.37	15.48	[-5,15 ; 25,10] (35,4)	0.96	0.79	$\hat{y}$ = 19,766 x EBIT - 467.010	0.99	1,083,051
64	10.82	5.66	10.77	5.67	10.91	15.62	[-12,33 ; 33,98] (9,2)	0.07	0.59	$\hat{y}$ = 14,202 x EBIT + 24.656	0.97	975,705
70	11.06	5.03	11.44	8.31	11.18	13.32	[-1,16 ; 23,29] (5,0)	-0.41	0.43	$\hat{y}$ = 14,009 x EBIT + 164.764	0.98	673,161
558	11.38	5.85	10.59	5.75	7.99	15.53	[-0,31 ; 23,07] (60,3)	0.77	0.69	$\hat{y}$ = 5,564 x EBIT + 853.141	0.33	2,503,078
832	10.37	5.09	9.61	4.43	8.34	14.26	[1,88 ; 18,86] (90,3)	0.80	0.71	$\hat{y}$ = 11,940 x EBIT - 270.814	0.97	2,000,499
284	11.09	6.80	10.03	5.02	8.45	14.93	[-5,41 ; 27,58] (27,5)	1.13	0.71	$\hat{y}$ = 8,863 x EBIT + 324.263	0.77	1,098,086
612	12.91	6.97	12.53	6.88	11.11	19.10	[2,09 ; 23,73] (77,8)	0.39	0.59	$\hat{y}$ = 8,722 x EBIT + 197.794	0.97	1,369,976
853	11.96	5.16	11.48	6.32	10.19	18.16	[3,05 ; 20,86] (97,3)	0.56	0.63	$\hat{y}$ = 10,602 x EBIT - 17.663	0.95	2,914,638
1,299	10.61	1.85	9.94	5.85	8.79	14.43	[4,39 ; 16,83] (121,5)	0.84	0.66	$\hat{y}$ = 6,526 x EBIT + 145.814	0.71	506,489
301	16.84	12.75	16.94	13.13	15.47	21.53	[5,63 ; 28,05] (29,4)	0.01	0.39	$\hat{y}$ = 11,716 x EBIT + 773.223	0.70	2,119,425
810	10.77	4.67	10.08	5.65	8.29	15.98	[2,41 ; 19,12] (85,0)	0.80	0.67	$\hat{y}$ = 17,254 x EBIT - 156.328	0.95	392,403
349	14.39	7.06	14.23	7.14	12.41	21.69	[-3,27 ; 32,04] (49,8)	0.17	0.59	$\hat{y}$ = 8,299 x EBIT + 330.088	1.00	753,636

n	Forward DEPV/EBIT Multiples									Forward EBITD 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
166	8.91	6.36	8.25	4.58	8.27	11.60	[-0,93 ; 18,74] (17,8)	1.62	0.59	$\hat{y}$ = 4,281 x EBIT + 1.115.455	0.95	5,581,606
75	5.95	4.22	5.88	3.02	6.77	7.34	[1,18 ; 10,73] (9,6)	0.18	0.51	$\hat{y}$ = 6,627 x EBIT - 234.106	0.80	1,300,924
107	8.44	4.82	7.58	4.27	5.89	10.77	[-9,36 ; 26,24] (10,5)	1.08	0.75	$\hat{y}$ = 4,520 x EBIT + 307.157	0.99	716,898
676	8.81	4.58	8.15	5.22	7.04	11.98	[2,80 ; 14,81] (61,5)	1.00	0.67	$\hat{y}$ = 4,541 x EBIT + 216.169	0.94	5,509,462
204	4.37	3.16	4.23	3.23	3.99	5.33	[2,87 ; 5,87] (7,1)	1.02	0.50	$\hat{y}$ = 3,535 x EBIT + 15.314	0.63	114,274
445	10.55	6.24	10.06	5.70	10.35	12.96	[2,42 ; 18,68] (37,3)	0.71	0.58	$\hat{y}$ = 12,582 x EBIT - 193.801	0.99	562,590
553	7.23	3.78	6.48	2.69	6.86	9.16	[1,97 ; 12,49] (34,3)	1.19	0.72	$\hat{y}$ = 8,864 x EBIT - 1.658.517	0.70	4,669,886
91	16.50	10.80	16.91	10.31	20.38	22.46	[-8,20 ; 41,19] (12,7)	-0.85	0.44	$\hat{y}$ = 6,737 x EBIT + 180.056	1.00	115,891
86	6.65	3.80	6.44	3.91	6.87	7.90	[-1,44 ; 14,74] (6,2)	0.59	0.61	$\hat{y}$ = 16,023 x EBIT - 1.026.196	0.97	648,028
778	8.00	4.85	7.25	4.29	6.31	9.21	[3,13 ; 12,88] (67,0)	1.21	0.68	$\hat{y}$ = 6,729 x EBIT + 548.987	0.45	2,481,330
891	8.25	5.57	7.93	4.97	7.43	10.56	[5,25 ; 11,25] (63,6)	0.74	0.54	$\hat{y}$ = 4,925 x EBIT + 1.378.228	0.92	6,977,605
327	7.97	6.77	7.75	6.34	7.41	9.73	[5,54 ; 10,40] (15,4)	0.78	0.39	$\hat{y}$ = 6,000 x EBIT + 649.342	0.86	1,671,920
719	10.48	4.90	9.83	6.58	8.58	14.06	[4,88 ; 16,08] (51,6)	1.00	0.55	$\hat{y}$ = 8,001 x EBIT + 155.485	0.98	1,065,857
977	10.64	7.33	10.11	6.51	9.51	14.46	[5,79 ; 15,49] (70,2)	0.83	0.54	$\hat{y}$ = 9,692 x EBIT - 224.251	0.89	3,793,210
612	6.91	1.23	6.66	3.53	6.86	9.83	[3,96 ; 9,85] (47,5)	0.54	0.58	$\hat{y}$ = 5,797 x EBIT + 132.336	0.69	1,312,284
419	14.09	9.55	14.37	8.65	15.23	19.07	[6,57 ; 21,61] (51,1)	-0.46	0.41	$\hat{y}$ = 13,947 x EBIT + 94.658	0.62	2,076,717
580	7.25	4.21	6.70	4.41	5.96	8.35	[3,63 ; 10,88] (97,0)	1.82	0.60	$\hat{y}$ = 10,365 x EBIT - 249.346	0.85	881,716
526	7.74	4.91	7.73	5.53	8.06	9.70	[5,21 ; 10,27] (52,8)	-0.05	0.46	$\hat{y}$ = 6,764 x EBIT + 299.671	0.98	1,498,551

News from IVSC

Free Access to International Valuation Standards

The IVSC has made the International Valuation Standards (IVS) freely available, marking a major step in supporting the global adoption of best practices in valuation. This initiative ensures that all stakeholders—including valuers, regulators, investors, and policymakers—have unrestricted access to the latest standards, helping to drive consistency, transparency, and quality in valuations worldwide. The decision aligns with the release of the latest edition of IVS, effective January 2025, and is intended to facilitate its implementation across markets.
Access the IVS for free here.

From Bitcoin to Blockchain: Transformations in Financial Systems

The IVSC has published a new Professional Insights paper examining the impact of cryptocurrencies like Bitcoin and the broader adoption of blockchain technology on global financial systems. The paper explores how these innovations are reshaping financial transactions by enhancing transparency, security, and efficiency. It also considers the implications for valuation professionals, highlighting the need to adapt to these evolving technologies in valuation practices.
Read the full paper here.

ESG Integration in Valuation: Insights from IVSC's 2024 Survey

The IVSC has published the findings of its 2024 ESG Survey, providing insights from valuation professionals worldwide on the integration of Environmental, Social, and Governance (ESG) factors into valuation practices. The survey highlights the growing importance of ESG considerations, identifies key trends and challenges, and explores how professionals are adapting to these evolving expectations. The results offer valuable guidance for those seeking to align their valuation approaches with emerging global standards.
Explore the survey findings here.

Leigh Miller Joins IVSC Board of Trustees

The IVSC is pleased to announce the appointment of Leigh Miller to its Board of Trustees. With over 30 years of experience in valuation services, Leigh has held several leadership roles within the profession and currently serves as Ernst & Young's Global Conflicts Leader within the firm's Risk Management function.

A long-standing advocate for high-quality valuation standards, Leigh has played an active role in shaping the profession, including previous service on the IVSC Standards Review Board and leadership positions within RICS. His appointment reinforces IVSC's commitment to strengthening international valuation best practices and promoting the continued development and adoption of International Valuation Standards (IVS). His expertise will be invaluable in supporting IVSC's mission to enhance transparency, consistency, and professionalism in valuation worldwide.

IVSC Academic Forum – Expressions of Interest Invited from Academic Institutions

The IVSC Academic Forum is expanding its efforts to strengthen collaboration between academia and the valuation profession. The Forum provides a platform for academic institutions to engage in meaningful dialogue, contribute to research, and support the development of training materials that enhance the integration of valuation theory and practice.

IVSC is seeking expressions of interest from universities and academic institutions that wish to be part of this initiative. The Forum will focus on key areas, including joint research projects, the development of educational resources aligned with International Valuation Standards (IVS), and fostering engagement between academic institutions and organisations working in valuation and related financial disciplines. Find out more.

Discounts for Lack of Marketability

Professor Dr. Stefan O. Grbenic, StB, CVA

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Over the years, a variety of Option Pricing Models (hereinafter OPM) have been introduced to estimate Discounts for Lack of Marketability (hereinafter DLOM), capturing the key value drivers stock price volatility, period of illiquidity, and dividend yield.[1] The DLOM are computed employing three OPM generally proved to generate DLOM estimates that comport with DLOM empirically observed on the European market[2] according to varying assumptions about the period of illiquidity, the size of the underlying DLOM benchmarks, the volatility of the underlying stock return and, the dividend yield (employing closed-form solution formulae):[3]

- Lookback Put OPM:[4]

$$DLOM_i = \frac{1}{P_i} P_i[\theta_i] \qquad \text{with } \theta_i = \left(2 + \frac{\sigma_i^2 T}{2}\right) N\left(\frac{\sqrt{\sigma_i^2 T}}{2}\right) + \sqrt{\frac{\sigma_i^2 T}{2\pi}} e^{-\frac{\sigma_i^2 T}{8}} - 1$$

- Adjusted Lookback Put OPM:[5]

$$DLOM_i = \frac{P_i[\theta_i]}{1 + P_i[\theta_i]}$$

- Perpetual Exchange Put OPM:[6]

$$DLOM_i = \frac{1}{P_i}\left(\frac{P_i}{-\psi_i - \frac{1}{2}}\right)\left(\frac{-\psi_i - \frac{1}{2}}{\frac{1}{2} - \psi_i}\right)^{\left(\frac{1}{2} - \psi_i\right)} \qquad \text{with } \psi_i = \sqrt{\frac{1}{4} + \frac{2q_i}{\sigma_i^2}}$$

where $\mathbf{i}$ is the index on the stocks related to DLOM estimates, $\mathbf{P_i}$ is the current price of the underlying stock as on end of computation period date, σ_i is the volatility of the underlying stock return, $\mathbf{T}$ is the period of illiquidity (holding period) indicating the period the stock is expected to remain non-marketable, $\mathbf{q_i}$ is the dividend yield of the underlying stock and, $\mathbf{N()}$ is the cumulative normal distribution function.

1 For a theoretical analysis see e. g. Hitchner/Aldering/Angell/Morris, Discount for Lack of Marketability, 2011, pp. 305-351.
2 See Grbenic/Baumüller, Zum Fungibilitätsabschlag am europäischen Markt, Wpg, 2022, vol. 75 iss. 22, pp. 1291-1301.
3 See Grbenic, The Performance of Option Pricing Models Estimating the Marketability Discount in a Pre-IPO Real-World Data Setting: Evidence from Europe, Journal of Business Valuation and Economic Loss Analysis, 2022, vol. 17 iss. 1, pp. 1-37.
4 See Longstaff, How Much Can Marketability Affect Security Values?, The Journal of Finance, 2005, vol. 50 iss. 5, pp. 1767-1774.
5 See Abbott, Discount for Lack of Liquidity: Understanding and Interpreting Option Models, Business Valuation Review, 2009, vol. 28 iss. 3, pp. 114-148.
6 See Ghaidarov, The Cost of Illiquidity for Private Equity Investments, Working Paper, 2010, pp. 1-28.

The computations are based on stock and company data directly collected from the stock exchanges as well as from yahoo!finance.

When using the data, please consider the following:

- DLOM are computed employing (stock and company) data for the year 2023.
- DLOM reported in the tables for all three OPM are computed employing the arithmetic mean of all values available.
- The tables for all three OPM are separated for various periods of illiquidity (holding periods) 3 months, 6 months, 9 months, 1 year, 1,5 years and 2 years with the choice on the holding period depending on the specific valuation. The final table for the Perpetual Exchange Put OPM holds irrespective of choosing a specific holding period.
- Countries with less than 20 observations (10 observations for the Perpetual Exchange Put OPM) remain unreported, but are included in the regional breakdown.
- The various regions (see bottom of the tables) 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 volatility σ_i of the underlying stock return is computed by the standard deviation of daily logarithmic stock returns (adjusted close prices) over the year 2023. To avoid distortions by thin trading, stocks with too many observations missing were either omitted or missing or invalid stock returns, respectively, were replaced employing the Uniform (Average) Returns Procedure

$$r_{i,t} = \sqrt[d+1]{\frac{p_{i,t+1+j}}{p_{i,t-d+j}}}$$

where **i** is the index on the stocks related to DLOM, $r_{i,t}$ is the return of stock i at day **t**, $p_{i,t}$ is the price of stock **i** at day **t**, **d** is the length (number of days) of the non-trading interval and, **j** is the number of remaining days without trading at day **t** in the non-trading interval.

The dividend yield q_i of the underlying stock is computed in a sustainable shape[7]

$$q_i = ln\left[\left(1 + \frac{EPS_i}{PPS_i}\right) * \left(1 - \frac{g_i}{ROE_i}\right)\right]$$

where EPS_i are the earnings per share of stock **i**, PPS_i is the price of stock **i** as on end of computation period date, ROE_i is the return on equity of stock **i** and, g_i is the compound annual growth rate of operating sales over the preceding 5 years.

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

Notes for application:

n indicates the number of DLOM (sample size) computed. $\bar{x}_a$ 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 downside)

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

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 computed DLOM. Using this information, the effectively employed DLOM may be related to the group of the 25% lowest (highest) discounts computed. Q_2 indicates the median of the DLOM computed. The confidence interval reports the range (lower confidence limit to upper confidence limit) of the DLOM applying a 95% confidence level. Assuming the DLOM to be normally distributed, this indicates all DLOM lying within these limits. To evaluate the assumption of normally distributed DLOM computed, the results of the p-value for the Jarque-Bera Test for Normality

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

is reported in brackets. P-values below (above) the defined level of significance (0.01, 0.05 or 0.10) indicate that the null hypothesis of the DLOMs being normally distributed is rejected (accepted). Consequently, a p-value above (below) the defined level of significance indicates the DLOMs (not) to be normally distributed.

The skewness **sk** indicates the symmetry of the distribution of the computed DLOM. 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 kurtosis kurt indicates the weight in the tails of the distribution of the computed DLOM (for the normal distribution, the kurtosis is 3). The standard deviation sd indicates the dispersion of the computed DLOM. Finally, the coefficient of variation cv indicates the dispersion of the computed DLOM adjusting for the scale of units in the DLOM, expressed by the standard deviation as a percentage of the mean. It allows for a comparison of the dispersion of the DLOM across countries/regions. A lower (higher) coefficient of variation indicates a lower (higher) dispersion of the computed DLOM and, similarly, a higher (lower) reliability. ◆

7 See Ghaidarov, Analysis and Critique of the Average Strike Put Option Marketability Discount Model, White Paper, 2009, pp. 1-15; Ghaidarov, The Cost of Illiquidity for Private Equity Investments, Working Paper, 2010, pp. 1-28.

Lookback Put OPM, Adjusted Lookback Put OPM and Perpetual Exchange Put OPM, 2023, Holding Period = 3 months

Country / Region	n	$\bar{x}_a$	$\bar{x}_h$	$\bar{x}_t$	Q_1	Q_2	Q_3	95% (JB)	sk	kurt	sd	cv
Austria	118	17.30%	11.50%	16.04%	9.88%	12.34%	22.95%	[15,07% ; 19,54%] (0,0000)	1.92	3.74	0.12	0.71
Belgium	263	21.24%	14.15%	19.10%	10.23%	13.92%	24.94%	[19,13% ; 23,36%] (0,0000)	2.51	9.30	0.17	0.82
Bosnia and Herzegovina	36	17.47%	8.05%	16.63%	9.92%	17.92%	22.18%	[13,66% ; 21,29%] (0,0000)	1.75	5.89	0.11	0.65
Bulgaria	32	10.99%	10.33%	10.91%	9.75%	10.78%	12.09%	[10,05% ; 11,93%] (0,0373)	0.36	0.90	0.03	0.24
Croatia	24	9.99%	8.82%	9.86%	8.22%	10.24%	11.69%	[8,62% ; 11,36%] (0,0452)	0.33	0.60	0.03	0.32
Cyprus	116	17.90%	8.84%	14.94%	9.07%	13.26%	19.23%	[13,76% ; 22,04%] (0,0000)	6.23	50.89	0.22	1.26
Czech Republic	47	17.88%	9.48%	15.59%	7.50%	13.28%	18.08%	[12,62% ; 23,13%] (0,0000)	2.99	11.37	0.18	1.00
Denmark	349	25.49%	16.36%	21.31%	11.91%	18.02%	28.49%	[19,84% ; 31,13%] (0,0000)	16.55	295.87	0.54	2.10
Estonia	60	13.81%	8.62%	12.00%	6.19%	10.20%	15.18%	[10,59% ; 17,04%] (0,0000)	2.67	8.47	0.12	0.90
Finland	415	18.93%	14.25%	17.51%	11.33%	14.75%	21.78%	[17,74% ; 20,12%] (0,0000)	2.54	9.76	0.12	0.65
France	1,126	21.77%	14.14%	19.19%	10.85%	15.61%	25.07%	[20,56% ; 22,98%] (0,0000)	5.56	51.32	0.21	0.95
Germany	1,261	24.77%	15.17%	22.55%	12.83%	17.33%	30.63%	[23,66% ; 25,87%] (0,0000)	2.92	17.93	0.20	0.81
Greece	258	19.60%	13.24%	16.13%	11.01%	13.93%	18.50%	[14,97% ; 24,23%] (0,0000)	13.95	212.24	0.38	1.93
Hungary	61	18.10%	13.73%	17.31%	9.67%	14.74%	23.98%	[15,49% ; 20,70%] (0,0000)	1.06	0.32	0.10	0.56
Iceland	60	16.80%	10.82%	14.38%	8.68%	10.28%	15.89%	[12,68% ; 20,91%] (0,0000)	2.67	7.75	0.16	0.95
Ireland	144	25.75%	15.65%	20.97%	11.31%	14.72%	32.12%	[18,65% ; 32,84%] (0,0000)	9.73	107.46	0.43	1.67
Italy	742	15.96%	12.00%	14.54%	10.50%	12.87%	16.98%	[15,21% ; 16,71%] (0,0000)	3.10	13.16	0.10	0.65
Kazakhstan	29	11.70%	8.87%	10.98%	7.84%	10.19%	12.72%	[8,95% ; 14,45%] (0,0000)	2.32	6.83	0.07	0.62
Lithuania	51	9.02%	7.65%	8.74%	6.69%	7.87%	9.59%	[7,85% ; 10,19%] (0,0000)	1.56	1.86	0.04	0.46
Luxembourg	134	21.87%	14.35%	20.57%	13.38%	16.40%	24.74%	[19,36% ; 24,38%] (0,0000)	1.89	3.92	0.15	0.67
Malta	21	18.91%	14.66%	18.35%	9.60%	17.43%	24.04%	[14,77% ; 23,06%] (0,0118)	0.67	0.11	0.09	0.48
Netherlands	310	21.93%	14.61%	20.29%	11.21%	15.87%	28.79%	[20,20% ; 23,66%] (0,0000)	1.85	4.47	0.15	0.70
North Macedonia	93	10.69%	1.97%	8.91%	3.43%	7.87%	13.35%	[7,76% ; 13,61%] (0,0000)	5.26	37.16	0.14	1.33
Norway	466	23.93%	16.98%	21.79%	13.52%	18.55%	28.28%	[22,28% ; 25,58%] (0,0000)	3.27	17.71	0.18	0.76
Poland	1,276	22.16%	18.28%	21.14%	14.44%	19.51%	27.14%	[21,56% ; 22,76%] (0,0000)	2.01	7.73	0.11	0.49
Portugal	57	14.81%	11.34%	13.73%	8.76%	12.04%	17.34%	[12,16% ; 17,46%] (0,0000)	2.78	10.16	0.10	0.67
Romania	162	14.26%	11.75%	13.22%	9.16%	12.29%	16.09%	[12,94% ; 15,59%] (0,0000)	4.03	26.03	0.09	0.60
Russia	314	20.89%	15.20%	19.94%	12.46%	18.25%	26.79%	[19,44% ; 22,35%] (0,0000)	5.47	59.27	0.13	0.63
Slovenia	32	21.39%	6.63%	17.63%	7.81%	12.22%	17.06%	[10,42% ; 32,36%] (0,0000)	3.31	11.89	0.30	1.42
Spain	312	17.83%	12.60%	16.03%	10.02%	12.80%	19.97%	[16,27% ; 19,38%] (0,0000)	2.96	13.26	0.14	0.78
Sweden	1,892	30.48%	22.77%	28.69%	17.10%	25.37%	38.18%	[29,66% ; 31,31%] (0,0000)	1.79	5.20	0.18	0.60
Switzerland	534	19.99%	12.39%	18.15%	9.43%	13.26%	25.47%	[18,62% ; 21,36%] (0,0000)	1.78	3.06	0.16	0.81
Turkey	914	26.27%	24.36%	25.03%	21.00%	24.16%	28.23%	[25,62% ; 26,91%] (0,0000)	4.40	27.78	0.10	0.38
United Kingdom	3,199	20.74%	12.57%	19.17%	10.52%	16.06%	26.62%	[20,20% ; 21,29%] (0,0000)	3.48	35.96	0.16	0.76
Central and Western Europe	**3,754**	**22.35%**	**14.11%**	**20.12%**	**11.14%**	**15.78%**	**26.97%**	**[21,74% ; 22,95%] (0,0000)**	**3.82**	**30.93**	**0.19**	**0.85**
Southern Europe	**2,476**	**20.48%**	**14.50%**	**18.93%**	**11.77%**	**18.32%**	**25.07%**	**[19,80% ; 21,17%] (0,0000)**	**16.28**	**496.63**	**0.17**	**0.85**
Scandinavia	**3,182**	**27.21%**	**19.11%**	**25.07%**	**14.56%**	**21.46%**	**34.06%**	**[26,35% ; 28,07%] (0,0000)**	**19.27**	**720.99**	**0.25**	**0.91**
Britain	**3,343**	**20.96%**	**12.68%**	**19.24%**	**10.60%**	**16.02%**	**26.85%**	**[20,35% ; 21,56%] (0,0000)**	**8.29**	**181.84**	**0.18**	**0.85**
Eastern Europe	**2,189**	**20.38%**	**11.64%**	**18.75%**	**11.91%**	**17.06%**	**25.10%**	**[19,25% ; 21,51%] (0,0000)**	**31.08**	**1,233.22**	**0.27**	**1.32**
Total	**14,944**	**22.48%**	**14.16%**	**20.47%**	**11.82%**	**17.58%**	**27.41%**	**[22,13% ; 22,82%] (0,0000)**	**18.83**	**798.24**	**0.21**	**0.95**

Lookback Put OPM, Adjusted Lookback Put OPM and Perpetual Exchange Put OPM, 2023, Holding Period = 6 months

Country / Region	n	$\bar{x}_a$	$\bar{x}_h$	$\bar{x}_t$	Q_1	Q_2	Q_3	95% (JB)	sk	kurt	sd	cv
Austria	118	21.33%	15.62%	20.28%	13.67%	17.62%	24.01%	[19,10% ; 23,56%] (0,0000)	1.71	2.86	0.12	0.57
Belgium	263	26.39%	19.04%	23.45%	14.46%	19.34%	30.57%	[23,72% ; 29,06%] (0,0000)	4.34	29.22	0.22	0.83
Bosnia and Herzegovina	36	24.71%	11.34%	23.31%	13.70%	24.38%	31.63%	[19,06% ; 30,36%] (0,0000)	2.10	7.89	0.17	0.68
Bulgaria	32	15.50%	14.53%	15.36%	13.44%	15.23%	17.10%	[14,12% ; 16,87%] (0,0472)	0.49	1.10	0.04	0.25
Croatia	24	14.09%	12.41%	13.87%	11.51%	14.44%	16.48%	[12,12% ; 16,05%] (0,0674)	0.43	0.85	0.05	0.33
Cyprus	116	25.12%	12.13%	20.64%	12.27%	18.26%	27.62%	[18,50% ; 31,74%] (0,0000)	7.46	67.67	0.36	1.43
Czech Republic	47	25.34%	13.25%	21.53%	10.58%	18.11%	25.38%	[17,30% ; 33,37%] (0,0000)	3.43	14.80	0.27	1.08
Denmark	349	35.31%	22.42%	28.12%	16.79%	24.52%	37.14%	[24,75% ; 45,86%] (0,0000)	17.71	324.76	1.00	2.84
Estonia	60	19.57%	12.14%	16.79%	8.64%	14.32%	21.53%	[14,80% ; 24,35%] (0,0000)	3.00	10.91	0.18	0.94
Finland	415	24.46%	19.08%	22.74%	16.01%	20.16%	27.82%	[22,99% ; 25,93%] (0,0000)	4.04	28.27	0.15	0.62
France	1,126	28.36%	19.27%	24.68%	15.16%	21.20%	32.33%	[26,56% ; 30,16%] (0,0000)	8.46	100.31	0.31	1.09
Germany	1,261	31.27%	20.74%	28.61%	17.79%	24.12%	37.36%	[29,88% ; 32,66%] (0,0000)	5.73	67.34	0.25	0.80
Greece	258	27.26%	18.34%	21.71%	15.42%	19.60%	25.97%	[18,88% ; 35,64%] (0,0000)	15.11	237.31	0.68	2.51
Hungary	61	25.36%	19.20%	24.02%	13.80%	20.68%	32.18%	[21,58% ; 29,14%] (0,0000)	1.31	1.23	0.15	0.58
Iceland	60	22.22%	14.67%	19.04%	12.08%	14.62%	21.56%	[17,06% ; 27,38%] (0,0000)	2.76	8.04	0.20	0.90
Ireland	144	35.21%	21.45%	27.27%	15.77%	20.30%	38.63%	[22,62% ; 47,80%] (0,0000)	10.91	126.26	0.76	2.17
Italy	742	21.52%	16.70%	20.01%	14.60%	18.13%	23.90%	[20,60% ; 22,44%] (0,0000)	3.60	21.61	0.13	0.59
Kazakhstan	29	16.29%	12.39%	15.14%	11.13%	14.04%	17.64%	[12,33% ; 20,25%] (0,0000)	2.64	8.98	0.10	0.64
Lithuania	51	12.55%	10.74%	12.17%	9.49%	10.91%	13.53%	[10,99% ; 14,12%] (0,0000)	1.56	2.22	0.06	0.44
Luxembourg	134	28.16%	19.72%	26.72%	18.42%	22.94%	30.80%	[25,22% ; 31,10%] (0,0000)	2.80	13.64	0.17	0.61
Malta	21	25.44%	19.77%	24.34%	13.78%	23.43%	30.00%	[19,37% ; 31,52%] (0,0247)	1.18	1.31	0.13	0.52
Netherlands	310	28.25%	19.90%	26.10%	15.74%	22.07%	35.00%	[26,06% ; 30,43%] (0,0000)	2.69	11.87	0.20	0.69
North Macedonia	93	15.16%	2.79%	12.47%	4.88%	11.27%	19.26%	[10,68% ; 19,63%] (0,0000)	6.02	46.72	0.22	1.43
Norway	466	32.10%	23.03%	28.67%	18.44%	25.03%	37.32%	[29,68% ; 34,52%] (0,0000)	4.63	32.79	0.27	0.83
Poland	1,276	31.34%	25.55%	29.63%	20.04%	27.07%	37.81%	[30,43% ; 32,25%] (0,0000)	2.39	10.45	0.17	0.53
Portugal	57	19.30%	15.58%	18.32%	12.40%	17.08%	21.75%	[16,49% ; 22,10%] (0,0000)	2.04	5.38	0.11	0.55
Romania	162	20.15%	16.51%	18.58%	12.81%	17.41%	22.97%	[18,18% ; 22,13%] (0,0000)	4.60	33.30	0.13	0.63
Russia	314	29.44%	21.14%	27.84%	17.39%	25.18%	36.24%	[27,16% ; 31,73%] (0,0000)	6.80	81.50	0.21	0.70
Slovenia	32	31.08%	9.34%	24.64%	10.82%	17.04%	24.29%	[13,57% ; 48,59%] (0,0000)	3.68	14.58	0.49	1.56
Spain	312	22.71%	17.24%	20.66%	14.02%	17.97%	26.45%	[20,85% ; 24,57%] (0,0000)	4.76	39.77	0.17	0.73
Sweden	1,892	40.95%	30.95%	38.02%	23.87%	34.52%	49.29%	[39,78% ; 42,12%] (0,0000)	2.61	11.90	0.26	0.63
Switzerland	534	23.98%	16.75%	22.28%	13.23%	18.49%	30.49%	[22,58% ; 25,38%] (0,0000)	2.06	7.15	0.16	0.69
Turkey	914	36.82%	33.85%	35.25%	28.40%	33.77%	40.75%	[35,90% ; 37,74%] (0,0000)	4.51	35.48	0.14	0.38
United Kingdom	3,199	26.91%	17.12%	24.89%	14.57%	21.89%	33.82%	[26,18% ; 27,63%] (0,0000)	6.43	111.77	0.21	0.77
Central and Western Europe	**3,754**	**28.32%**	**19.21%**	**25.55%**	**15.58%**	**21.82%**	**33.97%**	**[27,52% ; 29,12%] (0,0000)**	**7.22**	**95.76**	**0.25**	**0.88**
Southern Europe	**2,476**	**28.12%**	**20.09%**	**26.06%**	**16.36%**	**25.14%**	**34.58%**	**[27,01% ; 29,23%] (0,0000)**	**23.92**	**869.28**	**0.28**	**1.00**
Scandinavia	**3,182**	**36.53%**	**25.92%**	**33.08%**	**20.02%**	**28.99%**	**43.89%**	**[35,11% ; 37,96%] (0,0000)**	**28.90**	**1,266.46**	**0.41**	**1.12**
Britain	**3,343**	**27.26%**	**17.27%**	**24.98%**	**14.66%**	**21.80%**	**34.18%**	**[26,39% ; 28,14%] (0,0000)**	**15.52**	**467.95**	**0.26**	**0.95**
Eastern Europe	**2,189**	**29.06%**	**16.32%**	**26.24%**	**16.66%**	**23.74%**	**34.67%**	**[26,99% ; 31,14%] (0,0000)**	**35.33**	**1,474.90**	**0.49**	**1.70**
Total	**14,944**	**29.91%**	**19.43%**	**27.11%**	**16.47%**	**24.05%**	**36.32%**	**[29,36% ; 30,45%] (0,0000)**	**30.88**	**1,621.99**	**0.34**	**1.14**

Lookback Put OPM, Adjusted Lookback Put OPM and Perpetual Exchange Put OPM, 2023, Holding Period = 9 months

Country / Region	n	$\bar{x}_a$	$\bar{x}_h$	$\bar{x}_t$	Q_1	Q_2	Q_3	95% (JB)	sk	kurt	sd	cv
Austria	118	24.42%	18.57%	23.29%	16.54%	21.62%	27.32%	[22,07% ; 26,77%] (0,0000)	1.77	3.46	0.13	0.53
Belgium	263	30.43%	22.49%	26.74%	17.45%	22.71%	34.92%	[27,11% ; 33,75%] (0,0000)	5.61	44.76	0.27	0.90
Bosnia and Herzegovina	36	30.33%	13.83%	28.40%	16.45%	29.35%	39.69%	[23,10% ; 37,56%] (0,0000)	2.35	9.36	0.21	0.70
Bulgaria	32	18.95%	17.72%	18.76%	16.16%	18.89%	21.24%	[17,21% ; 20,68%] (0,0488)	0.59	1.23	0.05	0.25
Croatia	24	17.22%	15.14%	16.92%	14.14%	17.46%	19.91%	[14,78% ; 19,67%] (0,0862)	0.53	1.05	0.06	0.34
Cyprus	116	30.92%	14.52%	24.93%	14.86%	22.17%	33.27%	[21,90% ; 39,95%] (0,0000)	8.04	75.70	0.49	1.59
Czech Republic	47	31.25%	16.09%	26.02%	12.93%	21.66%	31.72%	[20,72% ; 41,77%] (0,0000)	3.71	17.02	0.36	1.15
Denmark	349	43.51%	26.81%	33.13%	20.48%	28.91%	42.95%	[27,99% ; 59,03%] (0,0000)	18.01	332.14	1.47	3.39
Estonia	60	24.05%	14.81%	20.33%	10.45%	17.46%	26.67%	[17,95% ; 30,16%] (0,0000)	3.24	12.69	0.24	0.98
Finland	415	28.75%	22.45%	26.59%	19.29%	24.21%	31.89%	[26,94% ; 30,56%] (0,0000)	5.15	42.71	0.19	0.65
France	1,126	33.61%	22.96%	28.70%	18.19%	25.05%	37.41%	[31,19% ; 36,03%] (0,0000)	9.77	124.47	0.41	1.23
Germany	1,261	36.38%	24.77%	33.04%	21.37%	29.17%	42.58%	[34,64% ; 38,12%] (0,0000)	7.86	110.39	0.32	0.87
Greece	258	33.60%	22.10%	25.73%	18.48%	23.78%	31.39%	[21,44% ; 45,75%] (0,0000)	15.42	244.04	0.99	2.95
Hungary	61	30.98%	23.32%	29.13%	16.74%	24.58%	40.40%	[26,18% ; 35,78%] (0,0000)	1.48	1.81	0.19	0.61
Iceland	60	26.45%	17.41%	22.56%	14.55%	17.83%	24.95%	[20,20% ; 32,70%] (0,0000)	3.12	10.84	0.24	0.92
Ireland	144	43.17%	25.66%	31.78%	19.18%	24.86%	42.12%	[25,02% ; 61,32%] (0,0000)	11.24	131.55	1.10	2.55
Italy	742	25.81%	20.19%	24.07%	17.89%	21.98%	29.15%	[24,70% ; 26,91%] (0,0000)	4.30	31.56	0.15	0.59
Kazakhstan	29	19.81%	15.02%	18.29%	13.42%	16.26%	21.92%	[14,84% ; 24,79%] (0,0000)	2.83	10.31	0.13	0.66
Lithuania	51	15.26%	13.09%	14.75%	11.49%	13.18%	16.51%	[13,35% ; 17,17%] (0,0000)	1.70	2.98	0.07	0.44
Luxembourg	134	33.04%	23.62%	31.14%	22.53%	27.35%	36.71%	[29,52% ; 36,56%] (0,0000)	3.76	23.60	0.21	0.62
Malta	21	30.50%	23.38%	28.91%	17.07%	24.67%	37.61%	[22,66% ; 38,34%] (0,0183)	1.39	1.81	0.17	0.56
Netherlands	310	33.17%	23.70%	30.25%	19.19%	25.52%	38.99%	[30,48% ; 35,87%] (0,0000)	3.40	18.10	0.24	0.73
North Macedonia	93	18.68%	3.41%	15.19%	6.01%	12.71%	23.41%	[12,81% ; 24,55%] (0,0000)	6.52	53.00	0.29	1.53
Norway	466	38.56%	27.34%	33.70%	21.48%	29.88%	43.21%	[35,37% ; 41,75%] (0,0000)	5.30	40.66	0.35	0.91
Poland	1,276	38.48%	30.98%	36.11%	24.18%	32.89%	45.49%	[37,29% ; 39,67%] (0,0000)	2.63	12.26	0.22	0.56
Portugal	57	22.74%	18.68%	21.71%	14.77%	19.45%	26.12%	[19,66% ; 25,82%] (0,0000)	1.78	3.79	0.12	0.51
Romania	162	24.70%	20.11%	22.65%	15.69%	21.06%	28.26%	[22,16% ; 27,24%] (0,0000)	5.02	38.66	0.16	0.66
Russia	314	36.11%	25.57%	33.90%	21.06%	30.28%	42.57%	[33,06% ; 39,16%] (0,0000)	7.64	95.97	0.27	0.76
Slovenia	32	39.11%	11.41%	30.11%	13.07%	20.65%	30.03%	[15,47% ; 62,74%] (0,0000)	3.88	15.98	0.66	1.68
Spain	312	26.50%	20.60%	24.10%	16.84%	21.55%	29.77%	[24,26% ; 28,74%] (0,0000)	6.34	65.46	0.20	0.76
Sweden	1,892	49.23%	36.79%	44.95%	28.74%	40.12%	57.30%	[47,70% ; 50,76%] (0,0000)	3.08	15.59	0.34	0.69
Switzerland	534	27.06%	19.83%	25.31%	15.95%	21.68%	33.34%	[25,56% ; 28,56%] (0,0000)	2.77	16.78	0.18	0.65
Turkey	914	45.03%	40.87%	43.10%	33.43%	40.95%	51.18%	[43,82% ; 46,24%] (0,0000)	4.76	40.68	0.19	0.41
United Kingdom	3,199	31.71%	20.38%	29.02%	17.54%	25.80%	38.89%	[30,80% ; 32,63%] (0,0000)	8.62	176.31	0.26	0.83
Central and Western Europe	**3,754**	**33.01%**	**22.87%**	**29.49%**	**18.74%**	**25.62%**	**38.28%**	**[31,98% ; 34,03%] (0,0000)**	**9.40**	**143.42**	**0.32**	**0.97**
Southern Europe	**2,476**	**34.10%**	**24.21%**	**31.38%**	**19.82%**	**29.89%**	**41.39%**	**[32,56% ; 35,64%] (0,0000)**	**27.45**	**1,056.59**	**0.39**	**1.15**
Scandinavia	**3,182**	**43.94%**	**30.76%**	**38.96%**	**23.99%**	**34.28%**	**50.94%**	**[41,93% ; 45,96%] (0,0000)**	**32.91**	**1,514.88**	**0.58**	**1.32**
Britain	**3,343**	**32.21%**	**20.56%**	**29.14%**	**17.74%**	**25.75%**	**39.07%**	**[31,04% ; 33,38%] (0,0000)**	**19.56**	**652.30**	**0.35**	**1.07**
Eastern Europe	**2,189**	**35.94%**	**19.85%**	**31.94%**	**20.25%**	**28.64%**	**41.49%**	**[32,93% ; 38,95%] (0,0000)**	**37.15**	**1,581.41**	**0.72**	**2.00**
Total	**14,944**	**35.77%**	**23.25%**	**31.97%**	**19.80%**	**28.55%**	**42.26%**	**[35,00% ; 36,53%] (0,0000)**	**36.30**	**2,039.89**	**0.48**	**1.33**

Lookback Put OPM, Adjusted Lookback Put OPM and Perpetual Exchange Put OPM, 2023, Holding Period = 1 year

Country / Region	n	$\bar{x}_a$	$\bar{x}_h$	$\bar{x}_t$	Q_1	Q_2	Q_3	95% (JB)	sk	kurt	sd	cv
Austria	118	27.03%	20.92%	25.73%	19.00%	23.90%	30.57%	[24,50% ; 29,57%] (0,0000)	1.99	5.12	0.14	0.51
Belgium	263	33.91%	25.20%	29.45%	19.83%	24.77%	37.08%	[29,91% ; 37,91%] (0,0000)	6.38	54.76	0.33	0.97
Bosnia and Herzegovina	36	35.12%	15.91%	32.69%	18.69%	32.88%	46.78%	[26,43% ; 43,82%] (0,0000)	2.54	10.47	0.26	0.73
Bulgaria	32	21.85%	20.38%	21.62%	18.54%	22.05%	24.73%	[19,79% ; 23,91%] (0,0454)	0.68	1.32	0.06	0.26
Croatia	24	19.87%	17.43%	19.49%	16.38%	19.81%	22.73%	[16,99% ; 22,74%] (0,0991)	0.61	1.22	0.07	0.34
Cyprus	116	36.02%	16.46%	28.46%	17.16%	25.46%	37.07%	[24,61% ; 47,43%] (0,0000)	8.38	80.47	0.62	1.72
Czech Republic	47	36.39%	18.44%	29.79%	14.34%	25.11%	37.25%	[23,49% ; 49,28%] (0,0000)	3.91	18.59	0.44	1.21
Denmark	349	50.90%	30.34%	37.25%	23.49%	32.67%	49.15%	[30,41% ; 71,39%] (0,0000)	18.14	335.37	1.95	3.82
Estonia	60	27.90%	17.04%	23.28%	11.95%	20.08%	30.91%	[20,55% ; 35,24%] (0,0000)	3.42	14.05	0.28	1.02
Finland	415	32.40%	25.08%	29.78%	21.62%	27.27%	36.30%	[30,24% ; 34,56%] (0,0000)	5.83	51.94	0.22	0.69
France	1,126	38.18%	25.91%	31.97%	20.83%	28.04%	41.19%	[35,13% ; 41,23%] (0,0000)	10.47	138.05	0.52	1.36
Germany	1,261	40.78%	27.99%	36.63%	24.28%	32.84%	46.57%	[38,67% ; 42,90%] (0,0000)	9.21	140.00	0.38	0.94
Greece	258	39.27%	25.18%	29.05%	21.13%	26.95%	36.16%	[23,33% ; 55,21%] (0,0000)	15.56	246.98	1.30	3.31
Hungary	61	35.77%	26.72%	33.44%	19.01%	28.65%	47.09%	[30,03% ; 41,52%] (0,0000)	1.61	2.22	0.22	0.63
Iceland	60	30.07%	19.59%	25.48%	16.90%	20.23%	28.83%	[22,73% ; 37,41%] (0,0000)	3.43	13.29	0.28	0.95
Ireland	144	50.39%	29.05%	35.56%	21.67%	28.22%	44.77%	[26,66% ; 74,12%] (0,0000)	11.38	133.91	1.44	2.86
Italy	742	29.44%	23.06%	27.40%	20.46%	25.22%	33.43%	[28,15% ; 30,74%] (0,0000)	4.86	39.23	0.18	0.61
Kazakhstan	29	22.80%	17.21%	20.92%	15.29%	18.78%	25.62%	[16,90% ; 28,70%] (0,0000)	2.97	11.33	0.16	0.68
Lithuania	51	17.54%	15.04%	16.91%	13.12%	15.04%	19.25%	[15,32% ; 19,76%] (0,0000)	1.81	3.52	0.08	0.45
Luxembourg	134	37.21%	26.78%	34.74%	24.90%	31.31%	42.71%	[33,06% ; 41,37%] (0,0000)	4.43	30.51	0.24	0.65
Malta	21	34.80%	26.22%	32.76%	18.93%	27.78%	43.00%	[25,32% ; 44,29%] (0,0137)	1.50	2.12	0.21	0.60
Netherlands	310	37.40%	26.74%	33.65%	21.69%	28.88%	42.09%	[34,17% ; 40,63%] (0,0000)	3.86	22.23	0.29	0.77
North Macedonia	93	21.72%	3.93%	17.47%	6.96%	14.50%	26.89%	[14,51% ; 28,93%] (0,0000)	6.88	57.49	0.35	1.61
Norway	466	44.16%	30.76%	37.93%	24.18%	33.86%	49.58%	[40,20% ; 48,12%] (0,0000)	5.69	45.48	0.43	0.98
Poland	1,276	44.60%	35.47%	41.58%	27.52%	37.41%	52.07%	[43,14% ; 46,05%] (0,0000)	2.80	13.58	0.26	0.59
Portugal	57	25.65%	21.19%	24.56%	17.03%	21.01%	29.38%	[22,24% ; 29,06%] (0,0000)	1.76	3.87	0.13	0.50
Romania	162	28.56%	23.11%	26.07%	18.23%	24.01%	32.74%	[25,50% ; 31,63%] (0,0000)	5.34	42.81	0.20	0.69
Russia	314	41.84%	29.20%	39.01%	24.30%	34.53%	47.61%	[38,05% ; 45,63%] (0,0000)	8.22	106.55	0.34	0.82
Slovenia	32	46.33%	13.13%	34.82%	14.97%	23.66%	35.24%	[16,73% ; 75,94%] (0,0000)	3.99	16.84	0.82	1.77
Spain	312	29.73%	23.30%	26.93%	19.12%	24.60%	33.27%	[27,07% ; 32,38%] (0,0000)	7.44	84.20	0.24	0.80
Sweden	1,892	56.43%	41.41%	50.83%	32.77%	44.13%	64.08%	[54,54% ; 58,33%] (0,0000)	3.34	17.71	0.42	0.74
Switzerland	534	29.67%	22.27%	27.77%	18.09%	24.26%	35.86%	[28,04% ; 31,30%] (0,0000)	3.61	29.07	0.19	0.65
Turkey	914	52.06%	46.60%	49.72%	37.31%	46.79%	60.48%	[50,56% ; 53,56%] (0,0000)	4.89	43.00	0.23	0.44
United Kingdom	3,199	35.84%	22.99%	32.40%	19.86%	28.62%	42.66%	[34,73% ; 36,96%] (0,0000)	10.15	225.63	0.32	0.90
Central and Western Europe	**3,754**	**37.06%**	**25.78%**	**32.70%**	**21.26%**	**28.86%**	**42.10%**	**[35,80% ; 38,32%] (0,0000)**	**10.71**	**174.28**	**0.39**	**1.06**
Southern Europe	**2,476**	**39.24%**	**27.58%**	**35.81%**	**22.58%**	**33.70%**	**46.82%**	**[37,27% ; 41,22%] (0,0000)**	**29.46**	**1,167.88**	**0.50**	**1.28**
Scandinavia	**3,182**	**50.40%**	**34.61%**	**43.91%**	**27.04%**	**38.43%**	**56.73%**	**[47,79% ; 53,01%] (0,0000)**	**35.10**	**1,655.15**	**0.75**	**1.49**
Britain	**3,343**	**36.47%**	**23.20%**	**32.52%**	**19.99%**	**28.62%**	**42.74%**	**[34,99% ; 37,94%] (0,0000)**	**21.99**	**771.17**	**0.44**	**1.19**
Eastern Europe	**2,189**	**41.91%**	**22.78%**	**36.73%**	**23.19%**	**32.70%**	**47.25%**	**[37,96% ; 45,86%] (0,0000)**	**38.16**	**1,641.18**	**0.94**	**2.25**
Total	**14,944**	**40.84%**	**26.33%**	**35.96%**	**22.47%**	**32.25%**	**47.04%**	**[39,86% ; 41,82%] (0,0000)**	**39.29**	**2,281.44**	**0.61**	**1.50**

Lookback Put OPM, Adjusted Lookback Put OPM and Perpetual Exchange Put OPM, 2023, Holding Period = 1.5 years

Country / Region	n	$\bar{x}_a$	$\bar{x}_h$	$\bar{x}_t$	Q_1	Q_2	Q_3	95% (JB)	sk	kurt	sd	cv
Austria	118	31.44%	24.62%	29.81%	22.81%	26.91%	35.37%	[28,44% ; 34,45%] (0,0000)	2.49	8.82	0.16	0.52
Belgium	263	39.94%	29.40%	33.83%	23.11%	29.80%	41.88%	[34,56% ; 45,33%] (0,0000)	7.20	65.90	0.44	1.11
Bosnia and Herzegovina	36	43.33%	19.37%	39.91%	22.28%	38.34%	59.29%	[31,90% ; 54,77%] (0,0000)	2.83	12.09	0.34	0.78
Bulgaria	32	26.73%	24.79%	26.40%	22.11%	26.70%	30.89%	[24,08% ; 29,38%] (0,0345)	0.80	1.42	0.07	0.28
Croatia	24	24.30%	21.23%	23.78%	20.16%	23.58%	28.10%	[20,67% ; 27,93%] (0,1075)	0.74	1.50	0.09	0.35
Cyprus	116	45.05%	19.54%	34.20%	20.58%	30.74%	43.85%	[28,90% ; 61,19%] (0,0000)	8.77	85.97	0.88	1.95
Czech Republic	47	45.39%	22.30%	36.12%	16.60%	30.51%	46.92%	[27,92% ; 62,86%] (0,0000)	4.18	20.69	0.59	1.31
Denmark	349	64.32%	35.93%	44.18%	28.19%	38.41%	58.99%	[33,87% ; 94,77%] (0,0000)	18.26	338.33	2.89	4.50
Estonia	60	34.50%	20.74%	28.18%	14.44%	24.46%	38.05%	[24,83% ; 44,16%] (0,0000)	3.69	15.98	0.37	1.08
Finland	415	38.63%	29.12%	35.00%	25.61%	31.72%	43.44%	[35,76% ; 41,51%] (0,0000)	6.56	62.35	0.30	0.77
France	1,126	46.20%	30.55%	37.34%	24.52%	33.15%	47.46%	[41,89% ; 50,50%] (0,0000)	11.20	152.85	0.74	1.59
Germany	1,261	48.42%	33.10%	42.38%	28.78%	38.62%	53.36%	[45,52% ; 51,32%] (0,0000)	10.68	175.07	0.52	1.08
Greece	258	49.48%	30.14%	34.60%	25.03%	32.01%	43.17%	[25,94% ; 73,02%] (0,0000)	15.68	249.65	1.92	3.88
Hungary	61	43.96%	32.29%	40.69%	23.37%	33.83%	53.59%	[36,43% ; 51,48%] (0,0000)	1.77	2.74	0.29	0.67
Iceland	60	36.30%	23.00%	29.91%	20.92%	24.65%	33.56%	[26,79% ; 45,81%] (0,0000)	3.84	16.57	0.37	1.01
Ireland	144	63.59%	34.43%	41.76%	26.55%	33.54%	49.11%	[28,66% ; 98,51%] (0,0000)	11.52	136.08	2.12	3.33
Italy	742	35.61%	27.72%	32.88%	24.46%	30.49%	40.02%	[33,93% ; 37,29%] (0,0000)	5.58	49.25	0.23	0.65
Kazakhstan	29	27.85%	20.79%	25.31%	18.32%	22.82%	32.02%	[20,27% ; 35,44%] (0,0000)	3.18	12.84	0.20	0.72
Lithuania	51	21.37%	18.28%	20.51%	15.78%	18.66%	22.61%	[18,59% ; 24,14%] (0,0000)	1.96	4.27	0.10	0.46
Luxembourg	134	44.35%	31.81%	40.67%	29.55%	37.87%	49.56%	[38,88% ; 49,82%] (0,0000)	5.16	38.12	0.32	0.72
Malta	21	42.15%	30.62%	39.24%	23.43%	32.66%	49.27%	[29,59% ; 54,71%] (0,0084)	1.63	2.52	0.28	0.65
Netherlands	310	44.68%	31.52%	39.26%	25.07%	33.51%	48.56%	[40,39% ; 48,97%] (0,0000)	4.38	27.07	0.38	0.86
North Macedonia	93	27.00%	4.80%	21.29%	8.57%	17.39%	32.69%	[17,22% ; 36,78%] (0,0000)	7.37	63.53	0.47	1.76
Norway	466	53.95%	36.09%	45.03%	28.71%	40.29%	57.97%	[48,48% ; 59,42%] (0,0000)	6.14	51.37	0.60	1.11
Poland	1,276	55.10%	42.78%	50.82%	33.37%	45.00%	62.53%	[53,14% ; 57,06%] (0,0000)	3.03	15.41	0.36	0.65
Portugal	57	30.56%	25.20%	29.18%	19.85%	25.57%	35.39%	[26,43% ; 34,69%] (0,0000)	1.93	5.25	0.16	0.51
Romania	162	35.12%	28.07%	31.79%	22.48%	29.20%	40.74%	[31,06% ; 39,18%] (0,0000)	5.80	48.91	0.26	0.74
Russia	314	51.71%	35.09%	47.61%	29.20%	41.58%	57.95%	[46,47% ; 56,96%] (0,0000)	9.02	121.34	0.47	0.91
Slovenia	32	59.52%	16.00%	43.01%	18.22%	28.61%	44.11%	[18,15% ; 100,89%] (0,0000)	4.13	17.83	1.15	1.93
Spain	312	35.24%	27.58%	31.52%	22.78%	29.27%	37.77%	[31,74% ; 38,74%] (0,0000)	8.71	107.04	0.31	0.89
Sweden	1,892	69.05%	48.63%	60.90%	38.26%	51.48%	74.50%	[66,44% ; 71,66%] (0,0000)	3.60	20.13	0.58	0.84
Switzerland	534	34.10%	26.06%	31.68%	21.25%	28.20%	40.10%	[32,14% ; 36,07%] (0,0000)	5.09	52.22	0.23	0.68
Turkey	914	64.14%	55.82%	60.84%	43.17%	56.41%	76.53%	[62,05% ; 66,23%] (0,0000)	4.98	44.72	0.32	0.50
United Kingdom	3,199	42.95%	27.09%	37.96%	23.48%	33.72%	49.45%	[41,44% ; 44,47%] (0,0000)	12.12	295.13	0.44	1.02
Central and Western Europe	**3,754**	**44.08%**	**30.37%**	**37.88%**	**24.94%**	**33.90%**	**47.86%**	**[42,34% ; 45,83%] (0,0000)**	**12.13**	**210.20**	**0.54**	**1.23**
Southern Europe	**2,476**	**48.12%**	**33.00%**	**43.19%**	**27.12%**	**39.57%**	**55.22%**	**[45,27% ; 50,97%] (0,0000)**	**31.70**	**1,294.96**	**0.72**	**1.50**
Scandinavia	**3,182**	**61.74%**	**40.59%**	**52.30%**	**31.97%**	**44.84%**	**65.40%**	**[57,93% ; 65,54%] (0,0000)**	**37.45**	**1,810.29**	**1.09**	**1.77**
Britain	**3,343**	**43.84%**	**27.34%**	**38.10%**	**23.63%**	**33.68%**	**49.45%**	**[41,76% ; 45,93%] (0,0000)**	**24.76**	**914.27**	**0.62**	**1.40**
Eastern Europe	**2,189**	**52.32%**	**27.60%**	**44.78%**	**27.91%**	**39.66%**	**56.32%**	**[46,48% ; 58,15%] (0,0000)**	**39.24**	**1,705.91**	**1.39**	**2.66**
Total	**14,944**	**49.66%**	**31.22%**	**42.56%**	**26.52%**	**37.79%**	**54.57%**	**[48,24% ; 51,09%] (0,0000)**	**42.48**	**2,548.85**	**0.89**	**1.79**

Lookback Put OPM, Adjusted Lookback Put OPM and Perpetual Exchange Put OPM, 2023, Holding Period = 2 years

Country / Region	n	$\bar{x}_a$	$\bar{x}_h$	$\bar{x}_t$	Q_1	Q_2	Q_3	95% (JB)	sk	kurt	sd	cv
Austria	118	35.20%	27.51%	33.15%	24.45%	30.23%	39.11%	[31,67% ; 38,72%] (0,0000)	2.86	11.45	0.19	0.55
Belgium	263	45.24%	32.63%	37.44%	25.97%	33.21%	46.30%	[38,45% ; 52,03%] (0,0000)	7.60	71.80	0.56	1.24
Bosnia and Herzegovina	36	50.45%	22.25%	46.06%	25.16%	42.51%	70.16%	[36,39% ; 64,51%] (0,0000)	3.02	13.20	0.42	0.82
Bulgaria	32	30.85%	28.46%	30.43%	24.97%	30.00%	36.26%	[27,64% ; 34,06%] (0,0251)	0.88	1.45	0.09	0.29
Croatia	24	28.04%	24.39%	27.38%	22.98%	27.06%	32.95%	[23,73% ; 32,36%] (0,1006)	0.85	1.70	0.10	0.36
Cyprus	116	53.15%	21.98%	39.05%	23.55%	34.45%	51.78%	[32,28% ; 74,03%] (0,0000)	8.99	89.09	1.13	2.14
Czech Republic	47	53.39%	25.47%	41.49%	18.85%	34.14%	55.48%	[31,46% ; 75,33%] (0,0000)	4.34	22.06	0.75	1.40
Denmark	349	76.67%	40.35%	50.07%	31.41%	42.49%	63.68%	[36,25% ; 117,09%] (0,0000)	18.31	339.74	3.84	5.01
Estonia	60	40.24%	23.82%	32.27%	16.44%	28.03%	44.24%	[28,36% ; 52,12%] (0,0000)	3.87	17.31	0.46	1.14
Finland	415	44.01%	32.20%	39.36%	28.72%	35.42%	48.18%	[40,43% ; 47,60%] (0,0000)	6.94	68.14	0.37	0.84
France	1,126	53.33%	34.19%	41.80%	27.35%	37.09%	52.74%	[47,76% ; 58,90%] (0,0000)	11.58	160.92	0.95	1.79
Germany	1,261	55.13%	37.12%	47.14%	32.22%	42.59%	59.54%	[51,44% ; 58,83%] (0,0000)	11.44	194.75	0.67	1.21
Greece	258	58.80%	34.14%	39.27%	28.17%	36.00%	48.87%	[27,65% ; 89,94%] (0,0000)	15.74	250.89	2.54	4.32
Hungary	61	51.03%	36.86%	46.86%	27.33%	39.76%	58.28%	[41,82% ; 60,24%] (0,0000)	1.88	3.07	0.36	0.70
Iceland	60	41.73%	25.65%	33.61%	23.67%	28.60%	38.04%	[30,08% ; 53,37%] (0,0000)	4.09	18.49	0.45	1.08
Ireland	144	75.82%	38.68%	47.05%	30.02%	38.17%	54.87%	[29,67% ; 121,96%] (0,0000)	11.58	137.11	2.80	3.69
Italy	742	40.89%	31.52%	37.47%	27.61%	34.56%	45.19%	[38,83% ; 42,95%] (0,0000)	6.01	55.38	0.29	0.70
Kazakhstan	29	32.16%	23.73%	28.99%	20.78%	26.67%	37.61%	[23,01% ; 41,31%] (0,0000)	3.33	13.92	0.24	0.75
Lithuania	51	24.60%	20.96%	23.53%	17.94%	21.36%	26.43%	[21,31% ; 27,88%] (0,0000)	2.07	4.80	0.12	0.47
Luxembourg	134	50.53%	35.80%	45.67%	32.85%	43.32%	56.14%	[43,73% ; 57,33%] (0,0000)	5.51	41.90	0.40	0.79
Malta	21	48.49%	34.02%	44.80%	23.43%	36.46%	57.38%	[33,04% ; 63,94%] (0,0056)	1.72	2.78	0.34	0.70
Netherlands	310	51.04%	35.27%	44.01%	28.03%	36.82%	54.82%	[45,70% ; 56,39%] (0,0000)	4.66	29.82	0.48	0.94
North Macedonia	93	31.64%	5.53%	24.50%	9.87%	19.99%	38.09%	[19,34% ; 43,95%] (0,0000)	7.68	67.43	0.60	1.89
Norway	466	62.64%	40.23%	51.09%	32.06%	44.67%	64.29%	[55,67% ; 69,61%] (0,0000)	6.39	55.03	0.77	1.22
Poland	1,276	64.26%	48.73%	58.74%	37.69%	50.73%	72.70%	[61,81% ; 66,70%] (0,0000)	3.17	16.68	0.45	0.69
Portugal	57	34.73%	28.39%	32.99%	21.96%	29.39%	38.95%	[29,86% ; 39,59%] (0,0000)	2.12	6.51	0.18	0.53
Romania	162	40.76%	32.18%	36.58%	25.59%	32.91%	46.66%	[35,74% ; 45,77%] (0,0000)	6.13	53.22	0.32	0.79
Russia	314	60.33%	39.86%	54.97%	33.37%	47.87%	67.20%	[53,65% ; 67,02%] (0,0000)	9.54	131.40	0.60	1.00
Slovenia	32	71.74%	18.39%	50.26%	20.79%	32.71%	52.09%	[18,71% ; 124,78%] (0,0000)	4.20	18.39	1.47	2.05
Spain	312	40.00%	30.97%	35.28%	25.67%	32.93%	41.86%	[35,63% ; 44,37%] (0,0000)	9.40	119.97	0.39	0.98
Sweden	1,892	80.29%	54.21%	69.63%	41.91%	56.90%	83.17%	[76,97% ; 83,61%] (0,0000)	3.75	21.61	0.74	0.92
Switzerland	534	37.90%	29.01%	34.81%	23.39%	31.58%	43.50%	[35,56% ; 40,23%] (0,0000)	6.12	69.35	0.27	0.72
Turkey	914	74.66%	63.21%	70.39%	47.57%	65.20%	90.61%	[71,98% ; 77,33%] (0,0000)	5.01	45.38	0.41	0.55
United Kingdom	3,199	49.15%	30.30%	42.64%	26.13%	37.42%	55.53%	[47,24% ; 51,07%] (0,0000)	13.36	342.45	0.55	1.12
Central and Western Europe	**3,754**	**50.26%**	**33.97%**	**42.13%**	**27.95%**	**37.61%**	**53.14%**	**[48,03% ; 52,49%] (0,0000)**	**12.88**	**230.44**	**0.70**	**1.39**
Southern Europe	**2,476**	**55.88%**	**37.37%**	**49.41%**	**30.57%**	**44.07%**	**62.89%**	**[52,15% ; 59,61%] (0,0000)**	**32.92**	**1,366.17**	**0.95**	**1.69**
Scandinavia	**3,182**	**71.85%**	**45.23%**	**59.53%**	**35.58%**	**50.03%**	**72.45%**	**[66,85% ; 76,84%] (0,0000)**	**38.72**	**1,895.59**	**1.44**	**2.00**
Britain	**3,343**	**50.30%**	**30.59%**	**42.81%**	**26.31%**	**37.46%**	**55.53%**	**[47,60% ; 53,00%] (0,0000)**	**26.32**	**998.16**	**0.80**	**1.58**
Eastern Europe	**2,189**	**61.52%**	**31.57%**	**51.63%**	**31.51%**	**45.13%**	**64.10%**	**[53,80% ; 69,24%] (0,0000)**	**39.81**	**1,740.27**	**1.84**	**2.99**
Total	**14,944**	**57.45%**	**35.10%**	**48.16%**	**29.83%**	**42.16%**	**60.73%**	**[55,58% ; 59,31%] (0,0000)**	**44.18**	**2,694.56**	**1.16**	**2.03**

Perpetual Exchange Put OPM, 2023

Country / Region	n	$\bar{x}_a$	$\bar{x}_h$	$\bar{x}_t$	Q_1	Q_2	Q_3	95% (JB)	sk	kurt	sd	cv
Austria	26	34.09%	29.37%	33.74%	23.98%	29.14%	42.18%	[28,56% ; 39,63%] (0,0007)	0.92	-0.16	0.14	0.40
Belgium	63	37.64%	31.70%	36.69%	24.62%	35.73%	47.06%	[33,77% ; 41,50%] (0,0001)	0.89	0.99	0.15	0.41
Denmark	41	41.82%	34.61%	40.89%	28.57%	39.32%	52.16%	[36,35% ; 47,30%] (0,0015)	0.74	0.67	0.17	0.41
Finland	71	32.66%	20.52%	32.50%	24.32%	30.66%	42.19%	[29,45% ; 35,86%] (0,0000)	0.31	0.31	0.14	0.41
France	188	38.47%	32.04%	37.58%	25.75%	35.52%	47.24%	[36,15% ; 40,79%] (0,0000)	0.83	0.47	0.16	0.42
Germany	235	50.03%	43.57%	49.65%	36.04%	46.32%	62.73%	[47,75% ; 52,31%] (0,0000)	0.43	-0.63	0.18	0.35
Greece	22	37.25%	33.44%	37.31%	27.18%	38.27%	47.01%	[32,14% ; 42,36%] (0,0002)	0.04	-1.31	0.12	0.31
Ireland	20	42.80%	38.87%	42.28%	33.21%	41.08%	47.83%	[36,49% ; 49,11%] (0,0650)	0.97	1.32	0.13	0.31
Italy	48	38.30%	31.13%	37.52%	27.60%	37.14%	48.71%	[33,68% ; 42,93%] (0,0063)	0.69	1.21	0.16	0.42
Luxembourg	20	44.88%	40.29%	44.90%	32.99%	47.86%	55.71%	[38,60% ; 51,16%] (0,0006)	-0.22	-1.21	0.13	0.30
Netherlands	54	38.97%	34.48%	38.15%	27.67%	35.44%	46.31%	[34,98% ; 42,95%] (0,0000)	1.05	0.58	0.15	0.37
Norway	60	36.18%	27.26%	36.02%	21.09%	36.07%	48.39%	[31,92% ; 40,45%] (0,0000)	0.21	-1.05	0.17	0.46
Spain	52	36.37%	31.55%	35.40%	26.97%	33.06%	42.55%	[32,20% ; 40,53%] (0,0001)	1.30	1.71	0.15	0.41
Sweden	222	48.87%	41.65%	48.75%	37.15%	47.46%	61.16%	[46,61% ; 51,13%] (0,0000)	0.17	-0.58	0.17	0.35
Switzerland	140	39.35%	32.38%	38.62%	25.47%	36.32%	49.33%	[36,51% ; 42,19%] (0,0000)	0.69	-0.24	0.17	0.43
Turkey	10	73.98%	68.12%	73.98%	66.63%	79.46%	88.24%	[61,19% ; 86,77%] (0,0458)	-1.14	-0.09	0.18	0.24
United Kingdom	531	36.07%	26.83%	35.39%	24.32%	34.02%	46.05%	[34,63% ; 37,51%] (0,0000)	0.62	0.14	0.17	0.47
Central and Western Europe	**728**	**42.34%**	**35.36%**	**41.56%**	**28.62%**	**39.40%**	**52.34%**	**[41,08% ; 43,61%] (0,0000)**	**0.66**	**-0.17**	**0.17**	**0.41**
Southern Europe	**148**	**38.71%**	**28.32%**	**37.68%**	**25.66%**	**36.02%**	**48.48%**	**[35,73% ; 41,70%] (0,0000)**	**0.92**	**0.77**	**0.18**	**0.47**
Scandinavia	**400**	**43.20%**	**31.54%**	**42.87%**	**29.80%**	**41.24%**	**55.30%**	**[41,44% ; 44,96%] (0,0000)**	**0.30**	**-0.37**	**0.18**	**0.42**
Britain	**551**	**36.31%**	**27.13%**	**35.65%**	**24.78%**	**34.60%**	**46.17%**	**[34,90% ; 37,72%] (0,0000)**	**0.61**	**0.14**	**0.17**	**0.46**
Eastern Europe	**13**	**21.46%**	**17.95%**	**21.46%**	**14.74%**	**20.77%**	**26.70%**	**[16,00% ; 26,92%] (0,0530)**	**0.71**	**0.03**	**0.09**	**0.42**
Total	**1,840**	**40.28%**	**30.91%**	**39.63%**	**27.11%**	**38.04%**	**50.69%**	**[39,48% ; 41,09%] (0,0000)**	**0.58**	**-0.08**	**0.18**	**0.44**

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