Business Valuation is a Question of Trust

EBVM

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Independent business valuation professional focusing on judicial valuation in the context of corporate, tax and marital laws

The Cost of Debt – A Primer on Understanding Important Implications of SME Debt Financing for Business Valuers

This article explores the complexities and implications of estimating the cost of debt (COD) for small and medium enterprises (SMEs) in business valuation. In business valuations of SMEs, a market price for the cost of debt of a company is often not available due to the private nature of SME debt.

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Calculation of Equity Risk Premium Based on European Data

The article addresses the estimation of the equity risk premium for medium-sized companies outside Aaa-rated European countries, such as Czechia, Portugal, or Austria. It highlights the key challenges associated with relying on traditional data sources, particularly those derived from the U.S. market, which may result in skewed estimates. The article presents a methodology for calculating the implied equity risk premium based on current aggregated data1 from European companies. Using a bottom-up approach, this calculation eliminates the need for additional premiums for country risk and company size. Regular updates of the implied equity risk premium estimates for large and medium-sized companies are regularly published on the European Valuation Institute website (www.evalin.org).

Value of Lost Profits Equals the Diminution in Business Value Under Certain Assumptions

A mathematical proof with commentary for practitioners in disputes contexts

This article challenges the conventional distinction between business valuation and lost profits quantification, despite their shared foundation in risk and valuation theory. This article demonstrates that under certain assumptions, lost profits and diminution in business value are mathematically and economically equivalent, with business valuation principles providing a robust framework for discount rate selection. By determining the discount rates of the uninjured and injured business (but for and actual scenarios), the uninjured business's profits and lost profits, we can determine the appropriate discount rate for lost profits, reinforcing the applicability of valuation methodologies in damages quantification.

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From the Editors

People, Machines, and Added Value: The Future of Business Valuation

The world of business valuation is evolving. While project managers and their teams used to rely solely on experience, expertise, and analytical skills, artificial intelligence (AI) is now entering the arena.

AI can analyse data, identify correlations, and calculate scenarios much faster than humans ever could. However, it cannot replace the human ability of interpreting results, understanding context, and making informed, nuanced decisions – capabilities that remain essential for high-quality valuation outcomes.

The key question, then, is not whether AI will replace humans, but how we can best harness it to enhance our work. For project managers, this means becoming the conductor of a hybrid team of humans and machines. This expanded responsibility includes managing not just the valuation process, but also data quality, the review of AI-generated outputs, and the integration of digital tools into daily workflows.

The goal remains unchanged: delivering high-quality, persuasive expert opinions. While the path toward that goal is becoming more digital, more efficient, and more precise, its success still hinges on placing people at the center of the process.

To support you along this journey, we will continue to provide valuable insights through the *European Business Valuation Magazine (EBVM)*, *BewertungsPraktiker*, and the members-only section of the EACVA website – which will soon feature a refreshed layout and enhanced functionality. Stay tuned!

In this issue, we once again present current articles from across the globe: *Harri Seppänen* and *Timo Tenila* (Finland) explore the complexities and implications of estimating the cost of debt for SMEs in business valuation. *Jan Marek*, *Veronika Hnatova*, and *Petra Mazackova* (Czech Republic) delve into the estimation of the equity risk premium for mid-sized companies, using European data published by the EVI. *Peter Maras* (Singapore) shows how, under certain assumptions, lost profits and diminution in business value can be mathematically and economically equivalent – highlighting the importance of valuation principles in selecting discount rates.

We hope you enjoy reading this issue. As always, we welcome your feedback and encourage article submissions for future issues.

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Imprint

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The Cost of Debt – A Primer on Understanding Important Implications of SME Debt Financing for Business Valuers

This article explores the complexities and implications of estimating the cost of debt (COD) for small and medium enterprises (SMEs) in business valuation. In business valuations of SMEs, a market price for the cost of debt of a company is often not available due to the private nature of SME debt. Therefore, assumptions for valuations frequently simplify this issue to a degree that for very levered companies' valuations could be materially impacted. We propose a step-by-step method for the estimation of the cost of SME debt based on the costs that SME loans cause for their typical lenders, namely banks. Our method is straightforward, and uses publicly available information from banks and rating agencies, and provides valuers with a well-justified cost of debt when market prices are not available.

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I. Introduction – motivation and aim

In business valuation the cost of debt and the value of debt is often handled simplistically. Valuers commonly use the book value of debt as a proxy for the value of debt, usually valued at its nominal amount or using the effective interest method, and rarely at fair market value.

Further, there is little explicit guidance in the academic or practitioner literature on determining the cost of debt (COD) for a (SME private) company with no publicly traded debt, beyond common suggestions that COD should reflect a company's credit rating,[1] which is subject to significant information constraints. Unfortunately, there is little consistent empirical evidence on how private company credit ratings or credit scores translate into spreads (margins) and yields other than for publicly traded bonds with credit ratings.[2] It is not uncommon to see situations where debt pricing offers from different lenders to the same SME borrower, particularly in emerging markets countries, diverge even by 1% p.a. or more in the same maturity.

Since the goal of valuation is to provide useful information to the intended users of valuation reports, it is important that the analyses and conclusions are accurate, reliable, and defendable.[3] This applies not only to the estimation of the cost of equity, which undeniably is one of the most challenging tasks in business valuation, but also to the cost of debt. We recognize that while a divergence or error in the cost of debt estimate is likely to have only a modest impact on the enterprise value and value of equity, the impact can be material for highly levered companies and companies with high credit risk.[4]

There is a method or system to making (logical) sense of debt pricing, but like many other things in finance, such as firm valuation, debt pricing is not an exact science. This paper discusses how companies, particularly SMEs, use debt, how lenders behave and what drives market behaviour, to help form an understanding of how the COD for a company can be determined, and through this, help a valuer to (i) determine COD and (ii) value its debt as part of the business valuation. In line with the above, the paper will suggest information sources to establish a well-reasoned estimate for an SMEs cost of debt and how to make assumptions, even when we have limited access to details of loan contracts.

Before the technical details, it is important to understand that the cost or value of debt depends also (i) on the context of the enterprise and (ii) the perspective of the one answering the question. These questions are also linked in the fact that finance is a behavioural science.[5]

II. Perspectives and actors

This section provides some high-level information on what drives credit spreads. On the macro level, expectations of the evolution of defaults are an important driver, because that feeds into what bank lenders or bond investors expect to see as future credit losses. At the micro level, when you discuss what is an appropriate credit spread for a company, such views also reflect what is the perspective of the person you speak with. Understanding this helps you process the data you gather for assessing the cost of debt of a company.

1. Credit cycles and credit market spreads

A credit cycle describes the phases of access to credit by borrowers based on economic expansion and contraction. It is one of the major economic cycles in an economy, and the cycle length tends to be longer than the business cycle because of the time required for weakened fundamentals of a business to show up in defaults.[6] Illustrations of credit cycles and market spreads through credit cycles are provided in Figures 1 and 2.

Figure 1 shows the annual proportion of defaulters among all corporate borrowers (default rates) rated by Standard & Poor's (S&P) sub investment grade (BB+ or lower) in years from 1981 to 2023 and the annual returns of the S&P 500 stock index.[7] S&P 500 stock market returns include two components: the return generated by dividends and the return generated by price changes in the index.

As shown in Figure 1, the 43-year period from 1981 to 2023 saw three dramatic, relatively short-lived peaks in defaults in the

1 For example, leading professional textbooks on private company valuation, Pratt (Pratt, Valuing a Business: The Analysis and Appraisal of Closely Held Companies, ASA Educational Foundation, 6th ed. 2022) and Trugman (Trugman, Understanding Business Valuation Workbook: A Practical Guide To Valuing Small To Medium Sized Businesses, Wiley, AICPA, ed. 2017) provide no discussion on the estimation of cost of debt for privately held companies. Damodaran (Ch. 24; Damodaran, Investment Valuation: Tools and Techniques for Determining the Value of Any Asset, Wiley, 3rd ed. 2012) and McKinsey (Ch. 15; McKinsey/Koller/Goedhart/Wessels, Valuation: Measuring and Managing the Value of Companies, Wiley Finance, University Edition, McKinsey & Company, 7th ed. 2020) suggest the use of a synthetic credit rating method and yield spreads based on large companies' publicly traded debt yield spreads. However, the cost of debt for private companies is likely to be higher for small and riskier, information constrained private companies. Damodaran also suggests that for private companies one could use subject company's recently raised loans' interest rate, and McKinsey suggests asking a subject company's lenders for a company's loan refinancing interest rate as a proxy for true cost of debt.

2 The Pepperdine Private Capital Markets Report (Everett, 2023 Private Capital Markets Report, 04.05.2023, Link ») provides some survey-based empirical evidence on expected yields, but it is very general and based on US data.

3 McKinsey (p. 386) op. cit. (fn. No. 1) states that they typically aim for a valuation range of +/-15% (also used by investment bankers), given the inherent uncertainty in valuations. Nevertheless, a range of 85 to 115 around a value of €100 million represents a significant amount for a buyer and seller especially if it is due to an estimation error.

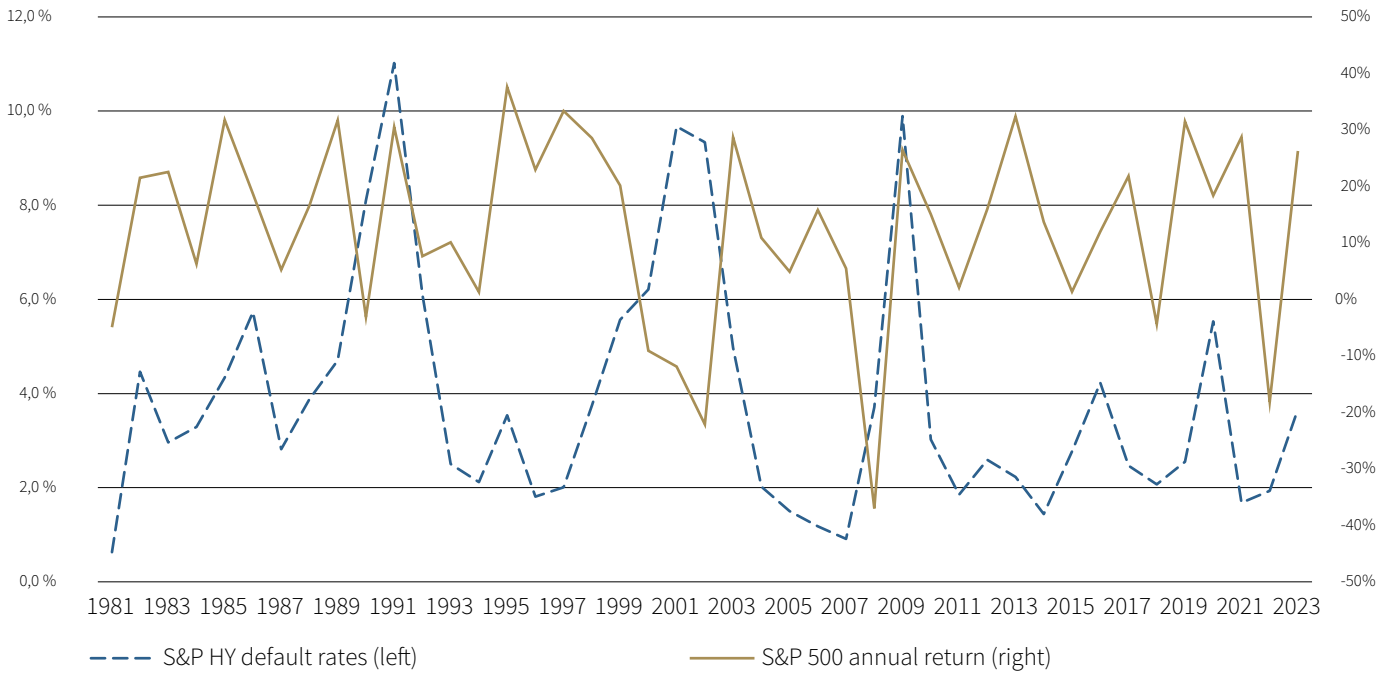
4 For example, for a bond with 10-year time to maturity and current 5% yield to maturity (YTM), a change of +/-1%-points in YTM will change the present value of the bond slightly less than -/+10%. For low credit ratings a change in credit rating category can result in a change of 2-3% p.a. in credit spread, resulting in a change of roughly 20% in the value of 10-year debt. Depending on the market value-based capital structure, the impact on value of equity will less than that.

5 One should also recognize that the understanding a company's financial strength and flexibility, which is reflected in its credit rating and cost of debt, is an essential part of business analysis in valuation. Consequently, understanding lenders' logic and thought process is important for developing credible financial projections for the company (e.g., access to financing and its provisions when a company is planning to expand and invest).

6 Hayes, Credit Cycles: Definition, Factors, and Use in Investing, 23.07.2024, Link ».

7 Proportion of all high yield bond issuers defaulting in that calendar year, not weighted by amount.

Figure 1: Default rates (S&P sub-investment grade corporates) vs. Equity market returns (S&P 500)



Source: Global Corporate Default and Rating Transition Study, S&P Global Ratings, 28.03.2024, © 2024 S&P Global Ratings (default rates), and S&P 500 annual returns.

sub-investment grade corporate bond universe,[8] about ten years apart, whereas the stock market returns saw five periods of negative returns, and the last two occurrences of negative returns coincided with relatively low default rates (2015 and 2022). The average of the annual default frequencies was 3,88% over the whole period, and the high point was 11,02%, in 1991, whereas in 1991 the stock returns were very strong. This chart shows that defaults, a key driver of credit pricing, are not correlated with equity returns. The correlation coefficient for these 43-year annual time series is marginally negative at -0.06.

We caution from relying solely on the rating agency default rate data when other data is available, given that corporate ratings in Europe appear still rarer than in North America, and given differences in observed default rates in S&P's data for US vs. European borrowers.[9]

How lenders and debt investors react to actual and expected default rates shows in Figure 2.

Figure 2 shows how since 1998 secondary market average credit spreads of bonds issued by European sub-investment grade corporates have moved compared to default frequencies. There are a number of phases where spreads spiked significantly. This data suggests that credit markets tend to overreact to negative news or expectations. Particularly noteworthy are the peak spreads around 2009, when average high yield credit spreads exceeded 20%, suggesting that the cost of debt was similar to the cost of equity, and implying that the equity of many of the underlying borrowers was considered nil.

These movements matter also to companies who don't struggle with debt service. A calculation on a 5-year equally amortizing term loan shows that if its market yield moves from 6,82% to 5,48%,[10] or 1,34%-points, then the loan's (market) value increases by about 3,5%.[11] When equity value is derived by deducting the value of debt from the enterprise value, for leveraged companies this can be a material difference.[12]

Furthermore, interest rate fluctuations matter too. Figure 3 shows the volatility of short-term Euribor rates which over the

8 We regard that for the purposes of this article sub-investment grade universe is an appropriate reference. Investment grade companies are typically very large, and not SMEs by most definitions. Furthermore, as an example, Commerzbank, one of the largest internationally active German banks reported about 85% of its on-balance sheet SME loan exposures to have a probability of default (LGD) of 0.25% or higher, and the same figure for UniCredit, another internationally active European bank, was 86% as of 30 Jun 2024. Long term average annual default rates for BB+ rated companies by S&P was 0.28%, i.e. close to the aforementioned 0.25% threshold.

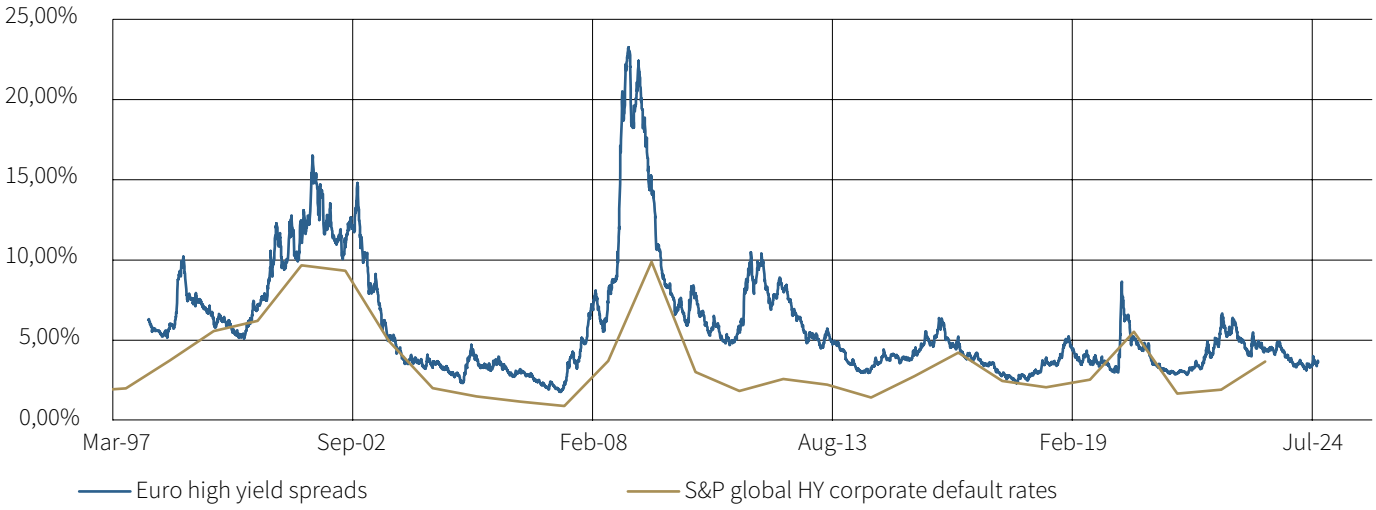
9 Explicit data on the number of rated entities is scarce. Based on S&P's Global Corporate Default And Rating Transition Study, March 2024 (© S&P Global Ratings), we estimate the number of S&P-rated US high yield corporate borrowers to be at least 5 times that of the number of rated European high yield borrowers. Estimation errors are on account of the authors. The same report shows that for BB and B letter category rated borrowers the longer-term cumulative default rates for European corporates are significantly lower than for US borrowers for the same rating category pools of S&P.

10 Such decline was observed in average yields on US BB-rated high yield bonds between 18.04.2024 and 20.09.2024. Source: Federal Reserve Bank St. Louis, Link ».

11 Assuming a fixed rate loan, that yield moves because of change in perceived risk, and no move in risk free interest rate.

12 This should be partly or fully offset by lower interest rates leading to lower cost of capital and higher valuations when the discounted cash flow method is used. On significance, McKinsey (p.386) op. cit. (fn. No. 1) states that they typically aim for a valuation range of +/-15% (as also used by investment bankers), given the inherent uncertainty in valuations.

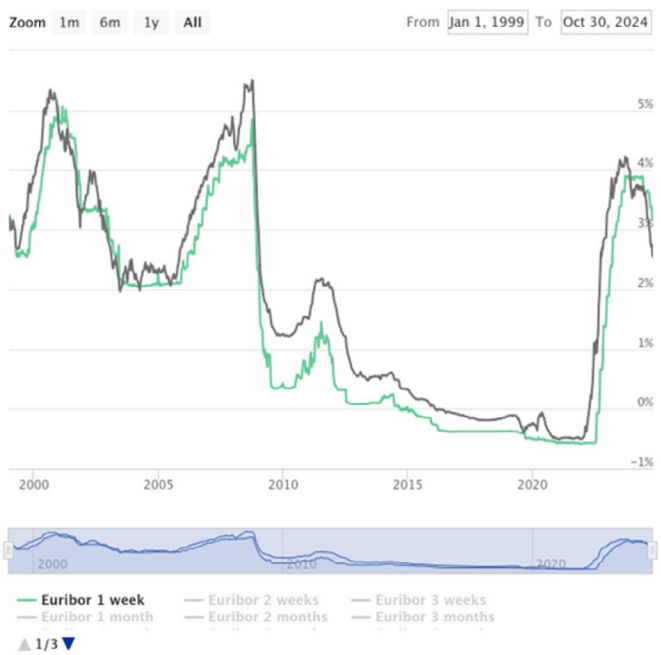
Figure 2: Credit spreads vs. sub-investment grade default rates



Sources: Global Corporate Default and Rating Transition Study, S&P Global Ratings, 28.03.2024, (for annual default rates) and ICE BofA Euro High Yield Index Option-Adjusted Spread (daily, no seasonal adjustment), Federal Reserve Bank of St. Louis FRED Database, downloaded 13.09.2024 (for spreads).

last 24 years fluctuated between about -0.5% and +5,5%. For the cost of capital and cost of debt calculations, we recommend, consistently with the business valuation literature in general, using the 10-year or longer rates.[13] Even these more stable long-term rates fluctuate. Over the last 10 years to October 2024, the € 10-year interest-rate swap rate saw a high of about +3,60% and a low of about +0.40%.[14]

Figure 3: Euribor rates



Source: www.euribor-rates.eu/en/euribor-charts

13 Note that, for example, Kroll suggests using the spot 15-year German government bond yield as the proxy for the risk-free rate: Link ».

14 Investing, EUR 10 Years IRS Interest Rate Swap, Link ».

To summarize; it matters at what point of the credit cycle we consider the cost of debt, and market prices don't always reflect longer term economic realities of the borrowers.

2. Perspectives on borrowing costs and debt value

Not all debt is alike, and not all actors see it the same way. From the valuation perspective, debt prices that have been contracted in the past are not reliable to use as a company's cost of debt for establishing its equity value today assuming the company's shares were bought and sold. The valuation assumptions may include that the whole business will be sold, and that the company would need to refinance its debt under a new owner. Such situation may lead to different costs of debt, depending how lenders assess the new owner's track record and intentions compared to the previous owners. Then even current market prices, particularly if an intended sale is not public knowledge, may not be appropriate estimates for the cost of debt going forward.

The next section discusses different forms of debt, costs involved with them, and how different actors approach the price or cost of debt of a company. This should help you interpret different data points on costing debt.

What debt is in question? Let us now consider what debt we are discussing about. Is it the cost or value of the debt currently on the books of the company, or is it about the cost of new (incremental) debt? And, how should we treat intra-year fluctuations in debt use by a company?

On existing debt, one may argue that the cost of the debt is what the company has contracted, since that is what it is committed to pay until maturity, and therefore, the book value of debt is a reasonable valuation. However, a counterargument could be that the value of the debt is what it is in the secondary market, and from that one can calculate the current cost (yield) of it. Except for distress situations in which it is necessary to

reprice debt, this second argument is intellectually sound, but impractical when borrowers have no traded debt. Particularly SMEs are information constrained, making credit analysis on them difficult for would-be lenders with no relationship. Often, SMEs have only one or a very few relationship banks, making the potential universe of secondary buyers for their debt small.

Furthermore, a lot of SME debt is short term because it is used for financing working capital. Banks often prefer to lend short term to relatively risky borrowers, so that they can control their exposure better. Therefore, a lot of the debt of smaller companies is borrowed under short term credit lines (limits), at set conditions, including credit spreads.[15] If debt market conditions for a company improved, then borrowers could renegotiate their credit lines, suggesting that the current credit pricing can often be justified for valuation purposes.

Case A – Intra-year debt

Company Food Matters Ltd. is an SME producing packaged foods for large retailers under their own labels. It has a 40-year track record, and its recent annual revenue and profit growth has been around inflation plus 1-2%. Capex requirements are steady, mainly for maintenance and modernisation, with no significant expansion planned. The founder now wants to retire and is willing to sell. The buyer has been the COO of the business and the founder's right hand for the last 10 years and sees himself as very capable of running the business. The buyer has no intention of changing the company's strategy and the advisors of the buyer and seller have agreed on an enterprise value of €20 million for the sale of all shares of the company. The buyer will fund his purchase from an inheritance plus his savings. The company's house bank knows him well and is fine with the planned ownership change. Now a question has come up about the valuation of the debt.

The buyer's advisor pointed out that since the valuation was based on a financial model that is built on six-months accounts, and because the business has two seasonal peaks in working capital in Q1 and Q3, and troughs in Q2 and Q4, the financial statements only show the outstanding balances of the term loan, currently standing at about €30 million, that was raised two years ago for some new production machinery, but not the fact that on average the revolving working capital credit line from its house bank has an annual daily average utilization of about €10 million, which however is typically zero or close to zero at the end of Q2 and Q4. The advisor believes that this average daily balance should be deducted from the enterprise value in determining equity value, and reduce the tentatively agreed price for the shares of the company. The enterprise value of €50 million was one of the metrics used to determine the equity value.

The seller's advisor argued that the cost of maintaining and utilizing the revolving credit line is built into the financial model, interest charges reducing net income, and leading to a correct estimation of earnings and the DCF calculation. Further, the seller's advisor argued that the working capital line is repaid from the seasonal liquidation of working capital, and not from EBITDA, therefore, it is not necessary to deduct the balance from the EBITDA based enterprise value. Lastly, the advisor pointed out that the bank has already agreed not to call the loan or the revolving working capital line, so that the cost of those loans will not change post-transaction. After reviewing the financial model and its assumptions, the parties amicably agreed not to adjust for the revolving working capital credit line in the equity valuation.

In conclusion, if the valuation was only based on EV/EBITDA, there would be a risk of an inaccurate equity valuation.

Whose perspective? Another important aspect of assessing the cost or value of debt is to understand from whose perspective we are looking at it. Even when it is not your own perspective, it helps to understand how your possible discussion partner or client may approach the subject. Also, remember that SMEs are informationally opaque and bank dependent. In SME lending, banks largely rely on soft information (e.g. management skill and quality), because the scale and scope of hard information are limited (*Grunert/Norden*).[16] These soft assessments frequently involve some subjectivity.

The CFO or corporate treasurer of a medium-sized enterprise with a track record, not facing major changes to the business and looking at a business-as-usual scenario, is likely to have established banking relationships. As long as the business doesn't deliver negative surprises to its banks, he or she counts on being able to borrow amounts that are in line with the company's past financial behavior, at spreads that are similar to the past. The company's view of appropriate borrowing rates may also be calibrated against what it learns from its peers what they pay for their debt. From their perspective, the current rate of debt is often the forward-looking cost of debt.

Lenders and debt investors lie on a spectrum in terms of risk tolerance. All of them have low tolerance for credit losses because credit returns are asymmetric, but a relationship bank has typically a very low tolerance and prefers stable earnings at a relatively low return and with no markdowns or impairments. At the other end of the range, a trader that actively trades in credit instruments and tries to anticipate how perceptions of borrowers' credit quality change, is used to occasional losses in the trading book, and can book them as trading (market) losses rather than as credit impairments.

A bank's relationship manager considers the bank's own cost recovery pricing and overall relationship with the borrower, and how to make the most out of the range of products that the corporate client may need from its bank. Particularly when a company makes a request for a large loan, it is tempting for a bank to use the situation to cross-sell other services. For a relationship manager, the bank's cost recovery pricing is an important point for the pricing discussion, but loan pricing may also reflect a willingness to subsidise the loan with real or expected revenues from selling other products.

15 In general, the valuation literature suggests that the cost of capital and debt should match the investors investment horizon (which is typically assumed to be long-term) and the length of the projected free cash flows. As a result, a 10-year risk free rate is commonly recommended.

16 Grunert/Norden, Bargaining power and information in SME lending, Small Business Economics, vol. 39 (2011): 401–417.

An institutional bond market investor, such as an insurance company or a pension fund typically has no relationship with the borrower beyond the bond investment. His or her concern is if the bond offers good relative value in terms of risk (credit rating) and return compared to similar risks available in the market. If the value is deemed unattractive, the bond investor can sell an existing bond position in the secondary market and switch to a position that appears to offer a better risk-return profile. Such investor may have invested some time into analysing the borrower, but that is a sunk cost, and such investors have generally lower administrative costs for holding credits than a bank has. This is due to bonds typically having simpler covenants that are easier to monitor, and because institutional bond investors can hold larger positions than loans on average would be in a bank's SME loan portfolio, so that the operating expenses of an institutional bond investor in relative terms are often shouldered by significantly a larger volume of credit. Such an investors' most important pricing references are current bond market spreads or spreads in the secondary market for traded loans and private placements, and how he or she expects market spreads to evolve.

III. What does a borrower pay for when raising debt?

Another perspective on the cost of debt, is to consider what a borrower aims to obtain with a specific debt arrangement. When raising debt, the following are relevant considerations.

- **Risk**: By raising debt, a company leverages to enhance its return on the more expensive equity, and it can fund larger operations than using only equity funding. This leverage creates financial risk and within bounds, the company can borrow more by accepting a higher cost of debt for the increased financial risks that the higher leverage means. The borrower is risk graded by its lenders, either with a public credit rating from an agency like Fitch, Moody's, or Standard & Poor's, or by its lender bank's own risk grading model. The rating or risk grade provides an estimate for the expected credit loss the requested loan causes for the lender, and which cost needs to be covered.
- **Flexibility**: Companies with strongly fluctuating working capital requirements may need access to credit facilities at short notice for relatively short (e.g. seasonal) drawdowns. Issuing long-term bonds or raising long-term loans doesn't offer such flexibility, and could lead to a company at times carrying significant cash reserves at very low yields and at the same time paying high interest rates for the long-term debt. These types of companies may use revolving credit facilities for flexibility. They pay for the facilities a spread when they draw down on the facility, and a commitment fee on the unused amount. Depending on the level of financial conservatism of a company, such facility may be large, to provide headroom for significant contingencies, or they may be sized more tightly to reduce commitment. Lenders who provide such credit facilities will price in the fact that the facility is not expected to be fully utilized through its life.
- **Stability**: For some borrowers, stability of funding is important. For example, an asset intensive business in the middle of a large investment program may have to wait a few years before operating cash flow becomes positive. Such a company may not want to run into a situation where expected cash flows have gotten delayed, and are not yet available for debt service payments. In other words, the company by raising long term debt wants to ensure that it does not have to refinance debt at a time when cash flows are particularly uncertain. This comes at a cost, since typically spreads for long-term debt are higher than for short-term debt.

The point of discussing these perspectives and factors is that understanding the purpose of a company's borrowing helps understand its debt pricing. A company's and its owners' risk appetite can be quite subjective, and has an impact on debt pricing. Rather than try to quantify these aspects individually, our fundamentals-based approach for the cost of debt estimation later on suggests to capture these elements or nuances indirectly, through the overall cost structure of the typical SME lenders, namely banks, as these costs are ultimately charged to clients.

There are numerous papers on the impact of debt pricing individual factors. As an example, a New York Federal Reserve research paper (*Kovner/Wei*)[17] documented the presence of a private premium in public bonds, finding that spreads were 0.31% p.a. higher for public bonds of private companies than for bonds of listed companies, even after controlling for observable differences, including rating, financial performance, industry, bond characteristics and issuance timing. The estimated private premium increased to 0.40% to 0.50% when a propensity matching methodology was used to control for fixed issuer effects.

Based on US and German SME loan data, *Grunert/Norden* suggest that soft information represents an important and direct determinant of borrower bargaining power, affecting the outcomes of the loan contracting process. However, as the terms suggest, quantifying soft information is a soft thing, and there could be many ways to do it, each of them justified by business logic, but hard to compare, and therefore, subject to debate.

Teinilä [18] lists a number for factors that in academic literature or professional press have been cited as affecting the pricing of corporate debt. These include, among others, (i) the general interest rate level and its volatility, (ii) market spreads and their volatility, (iii) credit quality (rating) of the borrower, (iv) transaction costs, (v) expected incremental borrowing by the company, (vi) market liquidity risk, (vii) information asymmetry, (viii) trend of credit rating, (ix) maturity of the debt, (x) seniority of the debt, (xi) quality of management and its presentations to debt investors, (xii) whether the borrower is a first time debt issuer or not.

As much as all of these and some further factors intuitively make a lot of sense, and have justification in the theory of finance, we have not come across usable documentation about how these factors' impact on loan pricing have been or should be quantified. However, they can still give readers some tools to build their rationales for their specific cases of interest.

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17 Kovner/Chenyang, The Private Premium in Public Bonds, Federal Reserve Bank of New York Staff Reports, no. 553, March 2012.

18 Teinilä, Marketing Corporate Debt, Turku School of Economics A- 9:2012, Turku, 2012.

Table 1: Priority of debt pricing approaches

Available data	Method	Caveats
Current market pricing for the company's debt is available (preferred)	Use this pricing as it provides a verifiable view of the debt yield that debt investors are willing to fund the company	May have to adjust for tenor, as for equity valuations, longer term rates should be used. Cannot be applied or must be adjusted if it is assumed that the company's financial risk (leverage) materially changes in the foreseeable future.
Company does not have current debt yields for its debt, but has a credit rating from its banks or a rating agency	Use market spreads for debt instruments issued by companies in the same sector and with the same credit rating	If no ratings available, compare financials of the peer companies and use as peers such companies whose recent financial indicators (size, leverage, coverage) are similar to the company you are analysing. May need to adjust spreads to reflect longer tenor. Recommend adjusting annual spreads by 0,40% to 0,80% upwards for SMEs due to higher operating costs given SME loans are usually smaller than traded bond issues.
No market pricing or credit rating for the company or its peers (least preferred)	Use fundamental approach, as explained in this article. This will provide an informed view on the pricing that in theory, over a medium or longer time horizon should provide a typical SME lender with a yield that adequately compensates it for the risk and operating costs of the loan.	

The last point before explaining our fundamental approach to estimating the cost of debt, we remind of our view of the appropriate priority of the approaches, as outlined in Table 1. Whenever there is a market price, or a sound method of deriving the cost of debt from market prices, we would use those. Our proposed approach is mostly relevant for SMEs which don't have public credit ratings, and for whom it is not possible to source market prices or adequate proxies for such.

IV. Debt pricing in steps for Case B – My Heating Ltd.

Case B – Cost of debt in business-as-usual scenario.
My Heating Ltd. is a mid-sized company with niche heating products that are distributed nationally to construction companies and DIY retailers. The company has recently posted an average annual turnover of about €30 million, and its balance sheet total at the end of 2023 was about €30 million. Some €10 million of its balance sheet is funded with a bank loan that is not traded, and its equity totalled €17 million. It is founder-owned, and since the founder is thinking of preparations for his retirement, and only two of his children are working in the company and are interested in running it after their father's retirement, the founder wants an estimation of the value of the company. In other words, there is no imminent transfer of ownership of the company, and which could trigger a need to refinance the company's debt at a possibly different cost than it has recently achieved for its borrowings.

We start explaining our fundamental approach with a simplified view of **banks' pricing models for corporate loans**. These have typically at least the following elements

- The bank's own funding cost;
- Cost of credit risk, which is derived from probability of default (PD), loss given default (LGD, and exposure at default (EAD), and LGD also reflecting security/collateral and ranking); and
- Administrative or operational costs of processing the loan.

Banks' funding cost. Unless the relationship banks of the company publish a specific long-term lending rate that applies to this company, we will use market rates. Questions related to this include: what is the right reference, should they be current rates or longer-term averages, and for what tenor?

One could argue we need to use the risk-free rate, such as the German Government Bonds' (Bund), yield for the respective tenor, as this is the starting point for estimating the cost of equity. However, this is not a rate at which banks usually fund themselves or would use as a basis for pricing loans to SMEs. Since we don´t have a bond market spread for the company, we don´t have a spread over the risk-free rate. Furthermore, all the company's financial debt is bank loans, and given its size, it is an unlikely candidate for issuing publicly traded bonds. Consequently, we will use a rate that is close to the funding cost of banks. This is the interest rate swap rate, which can be found on many websites[19] and at the time of writing this, it was 2,28% p.a. for the 10-year swap.

One could argue that since the company does not borrow debt for 10 years, the 10-year cost of debt is not appropriate for this exercise. Our argument for using the 10-year rate is that the projections used for the equity valuation are based on the future cash flows of the company, and its long-term prospects. From this perspective, we consider 10 years an appropriate time horizon.

Spread over funding cost. The spread over funding costs should at least include the cost of risk, i.e., expected credit loss, and administrative and other non-credit risk costs of the loan.

Cost of risk. This represents the expected credit loss to the lender. Such loss estimation is based on the idea that a given credit rating has expected default probability, and if these borrowers on average are charged a risk premium commensurate

19 Markets.ft, Indices, Link ».

with their probability of default, then cumulatively for all borrowers with the same rating, the lender over time will be able to cover the cost of defaults.

For estimation of the cost of credit we revert to the formula:

$$\text{Excepted Loss (EL)} = \text{Probability of Default (PD)} \times \text{Loss Given Default (LGD)} \times \text{Exposure at Default (EAD)}$$

For our purposes we need the first two, and EAD, for the purposes of this exercise is the amount of the company's debt in Euros, as we assume that the company maintains stable leverage so wo don't need to worry about a debt maturity structure.

Estimating the rating. Since we haven't been disclosed what credit rating the banks use for their loans to My Heating Ltd., we estimate it using Moody's Rating Methodology – Manufacturing,[20] and 3-year historical average values for the factors in the methodology.[21] Since we expect no change in the company's financial and business strategy, the use of historical values is appropriate. If financial projections for the valuation would suggest significant changes from historical turnover, growth, profitability or leverage, then these should be reflected in the rating estimation. However, we caution from upgrading the rating based on projections as compared to the rating suggested by historical values, unless the justification for the improved expectations is very solid, such as large contracted future revenues with safe margins leading to improved financial profile, or a committed equity increase leading to reduced leverage.

Table 2 shows the factors the Moody's Rating Methodology – Manufacturing methodology scorecard uses for a first cut estimate of the rating. The third (from the right) and fourth columns show the factor values we assigned or calculated for these factors, and the rating they imply, leading to the score in the sum of the weighted average of the factors. The bottom row of the table shows the weighted average of the factor-implied ratings.

Table 2: Rating estimation for My Heating Ltd. using Moody's Rating Methodology – Manufacturing (2021)

Factor	Weight	Value	Factor score
Scale	20%	€30 million	Ca
Business profile	25%	Qualitative	Ba
EBITA Margin	5%	10,6%	Ba
Debt / EBITDA	10%	1,9x	Baa
RCF / Net Debt	10%	51%	Aa
FCF / Debt	5%	16%	A
EBITA / Interest expense	10%	6,2x	Ba
Financial policy	15%	Qualitative	Baa
		Weighted average	*Ba1 to Ba2**

**Equivalent with BB+ or BB by S&P's or Fitch Ratings.*

Further details of this rating estimation are shown in Appendix A, and the scorecard itself is explained in the source document which was downloaded from Moody's website (done by one

20 Moody's Corporation, Moody's Investors Service, Inc., Moody's Analytics, Inc. and/or their licensors and affiliates, Rating Methodology – Manufacturing, 10.09.2021, Link ».

21 The valuation literature commonly relies on a single financial ratio like Interest Coverage to determine a company's credit rating. See, for example, Damodaran, op. cit. (fn. No. 1) on his web-site (Link »). Our method is likely to estimate the credit rating more accurately than by relying on a single financial indicator, and as a result, yield a more reliable and defendable outcome. However, we caveat that our estimation should not be considered as equal to the rating assigned by a credit rating agency, since we still make this estimate based on a more limited data set compared to what rating agencies use in their process.

Table 3: S&P's Global corporate average cumulative default rates by rating modifier (1981 to 2023)

Global, 1981-2023										
By credit rating	1 yr	2 yrs	3 yrs	4 yrs	5 yrs	6 yrs	7 yrs	8 yrs	9 yrs	10 yrs
BBB+	0,09%	0,24%	0,43%	0.61%	0.81%	1.04%	1.21%	1.41%	1.66%	1.90%
BBB	0,14%	0,34%	0,53%	0.84%	1.14%	1.45%	1.74%	2.02%	2.31%	2.59%
BBB-	0,21%	0,62%	1,15%	1.75%	2.36%	2.89%	3.36%	3.80%	4.15%	4.48%
BB+	0,28%	0,87%	1,56%	2.29%	3.02%	3.74%	4.35%	4.76%	5.25%	5.75%
BB	0,45%	1,4%	2,72%	3.92%	5.17%	6.20%	7.14%	7.99%	8.83%	9.57%
BB-	0,88%	2,74%	4,68%	6.67%	8.41%	10.07%	11.48%	12.87%	13.98%	14.91%
B+	1,86%	5,06%	8,21%	10.92%	13.14%	14.85%	16.39%	17.69%	18.86%	19.95%
B	2,73%	6,44%	9,79%	12.60%	14.88%	16.88%	18.25%	19.26%	20.21%	21.15%
B-	5,33%	11,35%	16,13%	19.58%	22.19%	24.05%	25.48%	26.59%	27.42%	28.10%

Source: Default, Transition, and Recovery: 2023 Annual Global Corporate Default And Rating Transition Study, S&P Global Ratings, 28.03.2024.

of the authors on 16 Nov 2024). With the significant weight of qualitative factors (40%), there is room for interpretation, and it is quite feasible that two experts can draw different conclusions. However, note that if we pulled the two qualitative factors down by one notch, the rating estimate by the scorecard would still be within one notch, i.e., not very different. Since this article is about estimating the cost of debt, we keep the part on credit analysis deliberately short.

With this rating estimation, we now estimating PDs. For these, we can use accepted PD tables. Table 3 shows an excerpt of PDs observed by S&P in its global corporate ratings.

The data in S&P's table is relevant, because typically banks' rating models use similar methodologies as the main credit rating agencies, and those models also use similar equivalencies between the ratings and expected default rates. As S&P's data is deep in time and number of rated entities, the global corporate PD data is relatively stable from year to year, and covers multiple credit cycles.

For our cost of credit estimation, we take the S&P's BB and BB+, equivalents of Moody's Ba2 and Ba1, which we estimated to be My Heating Ltd.'s credit rating, and focus on the line for PDs of BB and BB+ rated borrowers in Table 2. The figures start from 0.45% (BB) and .28% (BB+) for 1 year, and end at 9.57% (BB) and 5.75% (BB+) for 10 years.

Which tenor should we now use? We argue that since we look at the risk into the long future, we should take the 10-year PD, and as is it cumulative, divide it by 10, giving us an annual average PD of 0.58% for BB+ and 0.96% for BB. This implies that the company is expected to maintain its financial policies and stable leverage with regular refinancing of debt. Given the varying shapes of the PD tenor curves for different credit ratings, the selection of the appropriate PD tenor can in some constellations have a material impact on the credit risk element of the spread.

Loss given default. Next, we estimate LGD. This is a function of the expected recovery of the loan in a default situation, i.e.:

$$\text{LDG} = 1 - \text{recovery rate}$$

Unfortunately, this is an imprecise exercise, because the recovery depends on such as the value of the assets(s) at default, or the level of seniority of the loan, as key drivers and which can be very specific to a borrower or the debt contract and can be observed only post default. Publicly available data from the rating agencies is very limited, and shows that between different types of debt and between debt issuers, recovery rates can vary a lot. A 2007 report by Moody's[22] shows a mean recovery rate for bank loans at 82% and for bonds at 37%, in a heavily North America-weighted dataset. The differences between the two types of debt reflect the fact the frequently banks are contractually secured and sometimes transactionally secured (e.g., in trade finance products), and loans carry covenants that give bank lenders more leverage to manage their credit if they are uncomfortable with a borrower's business evolution.

Since we focus on SMEs which typically have most of their borrowings from banks, we use bank data. The Pillar 3 disclosures of banks' regulatory reports on Compliance with Capital Requirements provide useful data. Appendix B carries an extract from such disclosure by Commerzbank as of 30 June 2024.

Data as of 30 June 2024 from four very large European banks; Barclays, Commerzbank, Nordea, and Unicredit, shows LGDs in their SME lending ranging between 22% and 38%.[23] These statistics are based on very large datasets. As the banks ultimately will have to cover these costs of credit risk, we believe that utilizing these as a reference is appropriate. For our example, we assume that the banks are representative of the banks from whom the company typically borrows. For our example, we take the average of these four banks' data on SME LGDs. This is 28%, and it gives us a cost of credit risk between 0.16% and 0.27% p.a. (0.58% x 28% and 0.96% x 28%). If you know the specific lenders to the company, then using their data as a basis appears appropriate.

We assume that My Heating Ltd. will continue to borrow on a secured basis, providing its bank lenders a lien on fixed assets, thus justifying our assumption of an LGD of 28%. If the debt would be unsecured, we would use an LGD between 50% and 60%, which would increase the credit spread by 0.13% to 0.23% p.a., depending on which rating and what LGD we use. The higher the leverage of the borrower, the lower you should assume LDGs to be, particularly for unsecured debt.

Non-credit risk elements of the credit spread. The different non-credit risk factors suggested as influencing credit premia are in our view related to a small number of broader factors: default risk, operating costs related to the loan or bond for the investor, and liquidity-related costs. For example, the private premium suggested by Kovner/Wei (2021) may reflect the extra effort needed for information acquisition on non-listed companies, leading to relatively higher processing costs, and to a smaller number of potential debt investors for such companies, as some investors are not willing to take on the extra (operating) cost of information acquisition on non-listed SMEs.

Bank lenders incorporate typically their direct costs of lending either into credit spreads or fees on a loan. Some of the fees may be upfront (one-off at inception) such as arrangement fees, some may be recurring (e.g., monitoring fees), and some may be contingent (e.g., waiver fees or prepayment fees). The upfront fees can be capitalized in accounting and amortized over the expected life of the loan. However, there are also other costs that a bank may not be able or is not keen to build into a loan pricing, such as the cost of the relationship banker involved in originating the loan, the cost of internal credit analysis, or IT costs related to loan processing.

22 Moody's Corporation, Moody's Investors Service, Inc., Moody's Analytics, Inc. and/or their licensors and affiliates, Moody's Ultimate Recovery Database, April 2007.

23 See, for example, Barclays PLC, Interim Pillar 3 Report, 30.07.2024, Link »; Commerzbank, Disclosure report as at 30.07.2024 in accordance with the Capital Requirements Regulation (CRR), Link »; Nordea Bank Abp, Capital and Risk Management Report, Second Quarter 2024, Link »; UniCredit Group, Disclosure (Pillar III) as at 30.06.2024, Link »

We consider it impractical to try to build a model that captures these varied factors in detail. Therefore, we take an indirect way, and propose an approach based on the fact that when it comes to SMEs, their main lenders are banks, and we should use available data on those banks cost bases to assess the non-credit risk costs of a loan.

For this, we looked at the costs of operations of four large European banks, namely ABN Amro, Barclays, Commerzbank, and Nordea. Specifically, we used their latest available quarterly financial statements and the costs of their corporate or business banking operations, or the area where they cover SMEs. We calculated (i) the share of net interest earnings as a % of the total operating earnings of the area, then (ii) deducted from the net interest earnings of the business area the beforementioned %-share of the area's total operating costs for a proxy for net interest income after operating costs. After that (iii) we divided this proxy operating income by the loan assets of the business area. This in our view provides an acceptable guesstimate for how much a loan needs to earn to cover direct and indirect operating costs of a bank lender. The average for this number for these four banks was 1,20% (annualized), and the range was from 0.53% to 1.82%. Because the sample size is small and the range is wide, we are cautious, and use a range 0.40% wide. Setting the aforementioned average at the midpoint of the range gives us a range of 1.00% to-1.40% p.a.

We caveat that the numbers are assembled from four banks who do not all define the business area in the same way, so that uniformity of the cost base per a loan volume can't be assumed between them. Also, the relative operating costs for a loan can vary within the same bank, given that even in SME banking loan sizes can vary from far less than a million to tens of millions of € equivalent. Lastly, as data from only one quarter was used, there may be one-off effects in it. The purpose of this proposal is to give a fact-based methodology, which can be applied to the specific case. Knowing who the SMEs bank lenders are, or at least what country it is in, allows you to use a more relevant bank sample.

Cost of debt for My Heating Ltd. Using assumptions described in the preceding sections, we arrive at the following components and total for the estimated cost of debt for My Heating Ltd.

Bank's funding cost:	2.28%
Cost of credit risk:	0.16% – 0.27%
Cost of non-credit elements:	1.00% – 1.40%
Total cost of debt (p.a.):	3.44% – 3.95%

A just question could now be: Why is the credit spread so low, when Figure 2 shows significantly higher spreads?

Firstly, market pricing, as reflected in the chart in Figure 2, is understood as the spread over a risk-free rate. Typically, banks' funding costs are higher than the risk-free rate of high-quality government (AAA rated) bonds. Further, market spreads incorporate all costs and risks that lenders or debt investors expect to incur, be it credit risk related or not. This is shown by the fact that spreads are significantly higher than default rates (see Figure 2), whereas the cost of credit risk should be lower than default rates, because LGDs are non-negative, and often defaulted bonds achieve significant recovery. Our proposed approach constructs the credit and other costs separately. Data in Figure 2 represents different geographical samples, and the average credit ratings in the two samples probably have fluctuated, but not synchronously, in addition to the limitations of our proxies. While our data has imperfections, we believe that given the overall size of the data we have used, our data provides meaningful information for the case.

A further relevant question is, does our estimation include an equity return to the lender in the cost of debt? This is partially covered, since we assume that loans are 100% funded by debt in bank's pricing models. This means that while for a loan a bank needs to hold some equity, we would not need to charge for the full 100% debt funding, and add a charge for the cost of the lender's equity. Furthermore, as the equity is needed for covering the unexpected (credit) loss, for which we don't have a model, we do adjust the cost estimate here.[24] However, adjusting for this should in most cases add not more than 0.25% p.a. to our cost of debt estimate, and often less.

Lastly, we refer to the other pricing factors or drivers mentioned at the beginning of Section III of this article. If a valuer regards the debt of the company has particular features that are not captured in the cost of debt estimate, directly, or through the credit rating, he or she can make a further adjustment for example, for particularly long tenor debt, a well-evidenced trend in the credit rating, or particularly low-quality information. Such adjustments should be based on recent and documented benchmarks from peers or at least companies in the same sector, and we recommend that cumulatively, such adjustments should be kept within a range of -0.25% to +0.25%. To not compromise the rigor of the method we have proposed, we recommend treating such adjustments as an exception.

Next, we take on a case where leverage is expected to change, but there is no market pricing for the incremental debt.

V. Leverage and debt capacity

If the terms *leverage* and *debt capacity* are not siblings, they are cousins. Unused debt capacity is potential future leverage, and the higher a company's leverage, the more it has used its debt capacity. Finance theory provides a method to assess a company's optimal capital structure, which gives it a leverage ratio at which the company's weighted cost of capital is optimized to maximise equity value. The answer to how much debt a company can raise is not straightforward, as the deployment of leverage can have different purposes, with different implications for the company's risk profile. Incremental leverage will always introduce higher financial risk, by making the company's ability to service its debt more vulnerable to cash flow shortfalls.

If a company performs as expected, with low risk of financial distress, and wants to borrow significantly more, for ex-

24 We assume that in the long run, actual credit losses of a lender should equal expected credit loss, if the lender's credit rating system has been accurate. Consequently, spreads that charge for the expected credit loss are adequate. Unexpected credit loss refers to the volatility of default frequencies around the long-term average.

ample to fund an expansion investment or an acquisition, debt pricing is likely to go up. Important questions to solve for "by how much?" are then; how will the actual or implied credit rating react to that, and does the borrower need new lenders because existing lenders may reach their risk appetite limit for this name? There will be further questions to resolve if the company wants to borrow more than it has used to do in the past simply to leverage itself for example, to accommodate higher dividends to owners who want to see the company deploy more financial risk. Acquisitions or large capex are expected to generate new operating cash flows, even if with a time delay particularly for large and lumpy capex, whereas dividends don't generate new operating cash flows. Consequently, the assessment of leverage and debt capacity needs to factor in how the business risk of the company will change. Business risk includes aspects like the degree of cyclicality in the business, competitive position of the company, level of technology risk, granularity of sales, diversification of the products range etc., all of which can affect the volatility and visibility of a company's operating cash flows.

Incremental leverage may no longer lie within the existing lenders' risk appetite because of the preceived change in the risk of the borrower, or because of their internal constrains (obligor limits by policy or regulation). In such case, the company may have to find new lenders or agree to higher borrowing rates or both. This is something that optimal capital structure models may not address.

Ideally, a company should know much more banks are willing to lend to it at an incremental cost, but sometimes these answers are not readily available. For example, banks don't like to publicly disclose their ratings of borrowers, and even what they tell the borrower is caveated and may be vague. As a shortcut, we can use the most recent rate at which the company has borrowed new debt, and then estimate the incremental pricing for the new debt. If the incremental debt doesn't materially change the financial risk profile of the borrower, then debt pricing may not change much at all. The next question then is, what is a material change in the financial risk profile?

According to finance theory, a company can increase its debt by accepting a lower credit rating and a higher cost of debt. For example, Moody's manufacturing companies' scorecard[25] suggests that for manufacturing companies rated Ba1 to Ba3, Debt / EBITDA typically is in the range 3.25x – 4.75x, and for companies rated B1 to B3 in the range of 4.75x – 6.25x. This range involves 5 rating intervals,[26] so we make a simplifying assumption that an increment of about 0.6x EBITDA[27] represents a one notch change in the rating. However, we caution against assuming that a company could easily go from increasing leverage by a multiple of 3 times EBITDA, even if a theoretical market price for the new debt was available. This is because such a debt increase would be scrutinized hard as a statement of the company's increased risk appetite, and if involving large investments, it would trigger questions about the company's management capacities to operate at a new scale.

As a simple rule of thumb, we suggest that in most sectors a sustained debt increment of about 0.6x to 0.9x of EBITDA in total debt is material enough to change the rating by one notch, assuming a similar shift in other indicators. A one notch change means that for example a BB rating drops to BB-.[28]

Next, we will take you through our Case C.

Case C – Incremental leverage

Company My Heating Ltd., case B modified. Let us assume that My Heating Ltd. wants to continue its business with hig-

25 Moody's Investors Service: Rating Methodology – Manufacturing, op. cit. (fn. No. 20). Please note that the quoted ratio is only one of the indicators in the scorecard, to drive an initial score. In addition to the indicators leading he the score, qualitative considerations are included in Moody's final rating assessment.

26 Ba1 to Ba2, Ba2 to Ba3, Ba3 to B1, B1 to B2, and B2 to B3. Moody's Ba1 rating equals S&P's and Fitch' BB+ and B3 equals S&P's and Fitch' B-.

27 (6.25 – 3.25)/5 = 0.6; this is a gross approximation.

28 The same view is also expressed in the data from Damodaran's website (Link ») with an average change of 0.6x–0.9x in EBIT-to-Interest expense ratio implying a one notch change in the credit rating category, and smaller change in the interest coverage ratio, say around 0.3x–0.5x, can result in change in the credit rating for Baa2/BBB or lower rated companies.

Table 4: Rating estimations for My Heating Ltd. using Moody's Rating Methodology for Manufacturing for original case and leveraged case

Factor	Weight	Factor values	Original case (Case B) factor scores	Leveraged case factor values	Leveraged case (Case C) factor scores
Scale	20%	€30 million	Ca	€30 million	Ca
Business profile	25%	Qualitative	Ba	Qualitative	Ba
EBITA Margin	5%	10,60%	Ba	10,60%	Ba
Debt / EBITDA	10%	1,9x	Baa	2,4x	Baa
RCF / Net Debt	10%	51%	Aa	32%	Baa
FCF / Debt	5%	16,50%	A	9,80%	Ba
EBITA / Interest expense	10%	6,2x	Ba	4,8x	Ba
Financial policy	15%	Qualitative	Baa	Qualitative	Ba
	Weighted average score		*Ba1 to Ba2**		*Ba2 to Ba3*

**Equivalent with BB+ or BB on S&P's and Fitch' scale.*

her leverage, so that it can pay a special dividend to the owner family and from the year after that, maintain its historical dividend levels. The founder wants a new calculation of the company's equity value, and for this we need to re-estimate the long-term cost of debt. The assumed special dividend would increase the current debt position from about €13 million to €20 million.

As in Case B, we start by estimating the credit rating using the same approach as in Case B. In Table 4, we show our estimate of the changes to the factors in Moody's rating methodology for manufacturing. The first two factors, scale and business position do not change, and for the last factor, financial policy, we assume a change because the decision to use more financial leverage going forward indicates a more aggressive financial policy. The ratios we calculated assume that the recent financial performance (sales, margins) continues and that the incremental debt would be serviced from the cash flows (sources) the company currently has.

Our calculations suggest that the rating would decline by one to two notches, as the calculated score moved down by 1.4 notches. This would translate into an estimated rating of Ba2 or Ba3 on Moody's scale, and BB or BB- in S&P's and Fitch' scale. Please note that the values for the factors did not move exactly in parallel, even if changes were directionally the same. Some indicators are more sensitive to a change in borrowings. This shows how it may be misleading to rely on a single indicator when estimating a rating.

With these updated ratings we take to the Table 3, for PDs of 0.96% (Ba2/BB) and 1.49% (Ba3/BB-). To assess the new cost of credit risk, we must also consider if we need a revised LDG assumption. We observed that the company's net debt would rise to about €17 million, against a base of fixed assets and net working capital, of about €22 million, which means that the security cover on the new total debt is about 1.3x, from about 1.7x currently. While we don't have a formula, we consider it appropriate to adjust the LDG to 50% because of lower cover. With this adjustment, the cost of credit risk increases to 0.48% (Ba2/BB) or 0.75% (Ba3/BB-), which compared to the original case means an increase by 0.32% to 0.47% p.a.

Lastly, we ask if there is a need to adjust the assumption for the loan's administrative costs.

On those, one could argue that riskier credits need more monitoring, which sometimes is also contractual. For example, loan covenants may prescribe more documents to be submitted more frequently and financial covenants to be tested more frequently for lower rated credits. Particularly when credits are closer to showing distress signs, B3/B- or lower, then monitoring frequency is intensified in many banks' loan departments. However, My Heating Ltd. shows no imminent risk of becoming a distressed credit, and has some buffers in its cash flow coverage and liquidity reserves. Therefore, we assume only a small increase of 0.10% in the administrative cost to reflect that banks could likely have some costs, and for example demand waiver fees to process for this increased debt.

Consequently, we arrive at the following cost of debt estimate for **My Heating Limited.** in this more leveraged scenario:

Bank's funding cost:	2.28%
Cost of credit risk:	0.48% - 0.75%
Cost of non-credit elements:	1.10% - 1.50%
Total cost of debt (p.a.):	3.86% - 4.56%

This approach for the cost of debt provides an absolute value range for the cost of debt. It is also important to look at the difference or increase between the original case and leveraged case.

The swings in market spreads shown in Figure 2 demonstrate that market reactions to expected or actual changes in credit quality can be significantly stronger than the actual change in default frequencies. Consequently, our approach could understate the change in lending spreads if a company's debt funding came mainly from capital markets.

Anecdotal evidence from work experience suggests that lending spreads by banks for (private) loans to SMEs are not as volatile as spreads of traded bonds, thus justifying our approach. However, we caveat that we haven't seen research on this subject.

Lastly, in cases where you have a current market spread, but no useful data points for the spreads after the company's expected credit downgrade, this methodology can give you a minimum value for how much the spread should increase to compensate for the higher risk. However, as Figure 2 shows, the market reaction to the increased leverage could be a multiple of 2x or more compared to the fundamentals-based change in the cost of risk.

VI. Conclusion

We have presented an approach to estimate the cost of debt for firms with no public credit ratings or market prices for their debt are not available. This can be relevant in the context of SMEs' who typically don't have either of the two. We cannot guarantee perfect agreement with prices that companies would actually obtain when asking their house banks or potential new lenders for loans, since there are always particular circumstances to be considered, and the lending appetite of banks can be affected by the stage of the credit cycle, the banks' own capital situation, intensity of competition between banks, and other factors.

We believe to have provided a fact-based methodology to estimate the costs that banks incur in their lending to SMEs, and using consistent long-term data observed by rating agencies, and data from banks' own financial statements. If competition in corporate landing is efficient, then over the medium to long run, the costs of banks we have explained will be recovered by banks' lending activities through the long-term average spreads and other charges or revenues the banks levy from their borrowers.

As we are not aware of similar papers outlining this kind of approach to estimating the cost of debt, particularly for SMEs, we hope it will generate comments and feedback which allow us to refine the approach for greater accuracy.◆

Appendix A
Moody's Rating Methodology – Manufacturing scorecard filled out for My Heating Ltd.

Shaded cells represent the author's view on where the case company's factors place on the scoring criteria in Case B (no incremental leverage)

Rating category	Scale (Revenue, USD bn) (20% weight)	Business profile (25%)	EBITA / Revenue (5%)
Aaa	≥50	Unassailable market positions across essentially all of its business segments globally and extremely stable revenue and margins, supported by extremely stable end-markets; a highly diverse portfolio of products in multiple business segments; and entire cost structure is extremely efficient and effective.	≥ 35%
Aa	30-50	Commanding and defensible market positions across most of its business segments globally and highly stable revenue and margins, supported by highly stable end-markets; a highly diverse portfolio of products in multiple business segments; and a highly efficient and effective cost structure.	25% - 35%
A	15-30	Extremely strong and defensible market positions across its core business segments and stable revenue and margins, supported by mostly stable end-markets; a diverse portfolio of products in multiple business segments; an efficient and effective cost structure.	17% - 25%
Baa	5-15	Strong and defensible market positions in most of its core business segments and moderately stable revenue and margins, supported by end-markets that are characterized by solid long-term demand but subject to short-term volatility; a diverse portfolio of products in only one or two business segments; some volatility in input costs, but cost management that substantially mitigates the margin impact.	12% - 17%
Ba	1.5-5	Operates in one or few business segments with leading market positions that are defensible in the near term but are subject to long-term competitive threats and revenue and margin volatility due to end-markets that are characterized by moderate short-term volatility; a somewhat concentrated portfolio of products; input costs that are volatile and cost management that only partially mitigates the margin impact.	7% - 12%
B	0.5-1.5	Operates in a highly competitive and fragmented market with a moderate ability to defend its position and is subject to high revenue and margin volatility due to end-markets that are characterized by high short-term volatility; a concentrated portfolio of products; input costs that are volatile and the company has little ability to mitigate the margin impact.	2.5% - 7%
Caa	0.25-0.5	Operates in a highly competitive and fragmented market characterized by product substitution and is subject to extremely high and unpredictable revenue and margin volatility due to weak and highly volatile end-markets; offers one or few products; input costs are volatile and the company essentially has no ability to mitigate the margin impact.	0% - 2.5%
Ca	<0.25	Operates in an intensely competitive market that is approaching obsolescence.	< 0%

Source: Moody's Rating Methodology – Manufacturing, 10 September 2021, Link », © 2021 Moody's Corporation, Moody's Investors Service, Inc., Moody

Appendix B
Extract from Pillar 3 disclosure of Commerzbank, as of 30 June 2024: EU CR6_part 2: IRB approach – Credit risk exposu

PD Scale	On-balance sheet exposures (€m)	Off-balance sheet exposures pre-CCF (€m)	Exposure weighted average CCF	Exposure post CCF and post CRM (€m)	Exposure weighted average PD (%)	Number of
0.00 to < 0.15	595	412	0.51	776	0.09	
0.00 to < 0.10	351	279	0.52	475	0.07	
0.10 to < 0.15	244	133	0.49	301	0.13	
0.15 to < 0.25	418	235	0.49	492	0.21	
0.25 to < 0.50	1,137	584	0.48	1,345	0.35	
0.50 to < 0.75	619	386	0.43	755	0.62	
0.75 to < 2.50	2,145	1,039	0.47	2,442	1.42	
0.75 to < 1.75	1,582	784	0.47	1,809	1.20	
1.75 to < 2.50	563	255	0.45	632	2.04	
2.50 to 10.00	1,077	387	0.46	1,210	4.41	
2.5 to < 5	780	314	0.46	893	3.43	
5 to <10	296	73	0.45	317	7.17	
10.00 to < 100.00	259	55	0.44	249	21.45	
10 to < 20	192	37	0.43	178	13.41	
20 to < 30	32	10	0.45	36	22.94	
30 to < 100	35	8	0.46	36	59.64	
100.00 (default)	401	103	0.41	402	100.00	
Subtotal	6,650	3,202	0.47	7,671	7.23	

Source: Commerzbank, Disclosure report as at 30 June 2024 in accordance with the Capital Requirements Regulation (CRR), Link »

Debt / EBIT-DA (10%)	RCF / Net Debt (10%)	FCF / Debt (5%)	EBITA / Inter. Exp. (10%)	Financial Policy (15%)
≤ 0.5x	≥ 60%	≥ 25%	≥ 20x	Expected to have extremely conservative financial policies (including risk and liquidity management); very stable metrics; essentially no event risk that would cause a rating transition; and public commitment to a very strong credit profile over the long term.
0.5x - 1x	45% - 60%	20% - 25%	15x - 20x	Expected to have very conservative financial policies (including risk and liquidity management); stable metrics; minimal event risk that would cause a rating transition; and public commitment to a strong credit profile over the long term.
1x - 1.75x	35% - 45%	15% - 20%	10x - 15x	Expected to have predictable financial policies (including risk and liquidity management) that preserve creditor interests; although modest event risk exists, the effect on leverage is likely to be small and temporary; strong commitment to a solid credit profile.
1.75x - 3.25x	25% - 35%	10% - 15%	7x - 10x	Expected to have financial policies (including risk and liquidity management) that balance the interests of creditors and shareholders; some risk that debt-funded acquisitions or shareholder distributions could lead to a weaker credit profile.
3.25x - 4.75x	15% - 25%	5% - 10%	4x - 7x	Expected to have financial policies (including risk and liquidity management) that tend to favour shareholders over creditors; above-average financial risk resulting from shareholder distributions, acquisitions or other significant capital structure changes.
4.75x - 6.25x	7.5% - 15%	0% - 5%	1.5x - 4x	Expected to have financial policies (including risk and liquidity management) that favour shareholders over creditors; high financial risk resulting from shareholder distributions, acquisitions or other significant capital structure changes.
6.25x - 7.75x	0% - 7.5%	(5)% - 0%	0.75x - 1.5x	Expected to have financial policies (including risk and liquidity management) that create elevated risk of debt restructuring in varied economic environments.
> 7.75x	< 0%	< (5)%	< 0.75x	Expected to have financial policies (including risk and liquidity management) that create elevated risk of debt restructuring even in healthy economic environments.

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res by exposure class and PD range (A-IRB) – Section: Corporates, thereof SMEs

obligors	Exposure weighted average LGD (%)	Exposure weighted average maturity years	Risk weighted exposure amount after supporting factors (€m)	Density of risk weighted exposure amount	Expected loss amount (€m)	Value adjustments and provisions (€m)
515	45.72	3.7	171	0.22	0.3	-0.2
355	41.22	3.6	74	0.16	0.1	-0.1
160	52.82	3.8	98	0.32	0.2	-0.1
337	41.32	3.4	134	0.27	0.4	-0.3
830	39.19	4.0	476	0.35	1.8	-1.2
530	38.30	3.9	345	0.46	1.8	-2.4
2,262	37.00	3.4	1,398	0.57	12.6	-12.5
1,656	36.52	3.3	979	0.54	7.7	-7.5
606	38.37	3.5	419	0.66	4.9	-5.1
1,173	37.70	3.4	966	0.80	19.6	-18.3
907	38.10	3.0	670	0.75	11.3	-9.9
266	36.55	4.3	296	0.93	8.3	-8.4
227	36.83	5.3	288	1.15	18.5	-15.4
165	37.17	5.0	200	1.12	8.5	-8.8
29	38.42	5.8	54	1.53	3.1	-3.3
33	33.56	6.2	34	0.95	6.9	-3.3
301	50.32	5.0	347	0.86	208.0	-181.6
6,175	39.47	3.7	4,125	0.54	263.1	-231.9

Calculation of Equity Risk Premium Based on European Data

The article addresses the estimation of the equity risk premium for medium-sized companies outside Aaa-rated European countries, such as Czechia, Portugal, or Austria. It highlights the key challenges associated with relying on traditional data sources, particularly those derived from the U.S. market, which may result in skewed estimates. The article presents a methodology for calculating the implied equity risk premium based on current aggregated data[1] from European companies. Using a bottom-up approach, this calculation eliminates the need for additional premiums for country risk and company size. Regular updates of the implied equity risk premium estimates for large and medium-sized companies are regularly published on the European Valuation Institute website.

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1 The information in this article has been gathered with the utmost care from sources deemed reliable; however, its completeness, accuracy, and timeliness cannot be guaranteed. The authors and the European Valuation Institute expressly disclaim any liability for potential losses or consequential damages resulting from the use of this material or from any errors or omissions it may contain.

I. Introduction

This article examines the methods for calculating the equity risk premium (ERP) and the challenges associated with estimating the ERP for the valuation purposes in Europe. It also presents the calculation of the equity risk premium using aggregated European data for non Aaa-rated countries.

The primary contribution of this article is its examination of the key challenges associated with relying on traditional data sources, particularly those from the U.S. market, which may result in distorted risk premium estimates. The article presents a tailored approach for calculating the implied risk premium using current data that can be applied when valuing medium-sized companies in European countries that are not Aaa-rated but are still within an investment grade. By applying the bottom-up approach that utilizes a broad sample of smaller companies, the implied equity risk premium estimate eliminates the need for additional adjustments related to country risk and company size.

II. Methods for Calculating the Equity Risk Premium

In valuation practice, the equity risk premium can be estimated using two main approaches:

1. **Historical Average** – This method is based on historical data from the stock and bond markets. The risk premium is calculated as the average difference between historical returns of a stock index and government bonds, relying solely on historical data.
2. **Implied Premium** – This method uses current stock prices (or prices of a stock index) and expected dividends or cash flows to estimate the ERP.[2]

Considering the growing popularity of the implied premium and its ability to reflect current market conditions, this article focuses on this method. The implied premium is derived from equating the value of a stock (or stock index) with the expected discounted dividends or cash flows attributed to that stock (or index). Utilizing this equation, the implied cost of equity can be calculated, which allows the derivation of the implied equity market risk premium. The principle of calculating the implied cost of equity can be, in a simplified manner, described on the following example that assumes dividends growing at a stable and constant rate, denoted as g:

$$V_0 = \frac{D_1}{r - g} \qquad (1)$$

A Single Unknown Variable: Implied Cost of Equity

with: V_0: current stock value, D_1: expected dividend in next period, g: long-term growth considered, r: implied cost of equity

In this model, the implied cost of equity (r) can be calculated as:

$$r = \frac{D_1}{V^0} + g \qquad (2)$$

According to the model, the cost of equity increases with an increase in expected dividends or their growth rate, whereas a rise in stock prices leads to a reduction in the cost of equity. However, it is important to note that in practice, the situation is often more complex, necessitating the use of more sophisticated models.

Models for Deriving the Implied Equity Risk Premium

Several methods exist for estimating the implied equity risk premium, including:

1. **Dividend Discount (DD) model** – This model relies on expected future dividends.

$$V_0 = \frac{D_1}{(1+r)^1} + \frac{D_2}{(1+r)^2} + \frac{D_3}{(1+r)^3} + \frac{D_4}{(1+r)^4} + \frac{D_5}{(1+r)^5} + \frac{D_6}{(r-g)\cdot(1+r)^5} \qquad (3)$$

2. **Discounted Free Cash Flow to Equity (FCFE) model** – In this approach, the implied risk premium is derived from expected future free cash flows:

$$V_0 = \frac{FCFE_1}{(1+r)^1} + \frac{FCFE_2}{(1+r)^2} + \frac{FCFE_3}{(1+r)^3} + \frac{FCFE_4}{(1+r)^4} + \frac{FCFE_5}{(1+r)^5} + \frac{FCFE_6}{(r-g)\cdot(1+r)^5} \qquad (4)$$

Both models operate with a single unknown variable – the implied cost of equity. If no further adjustments (such as for country risk) are made and the beta coefficient is equal to 1, the implied equity risk premium can be determined as follows:

$$\text{Equity Risk Premium} = \text{Cost of Equity} - \text{Risk-free Rate} \qquad (5)$$

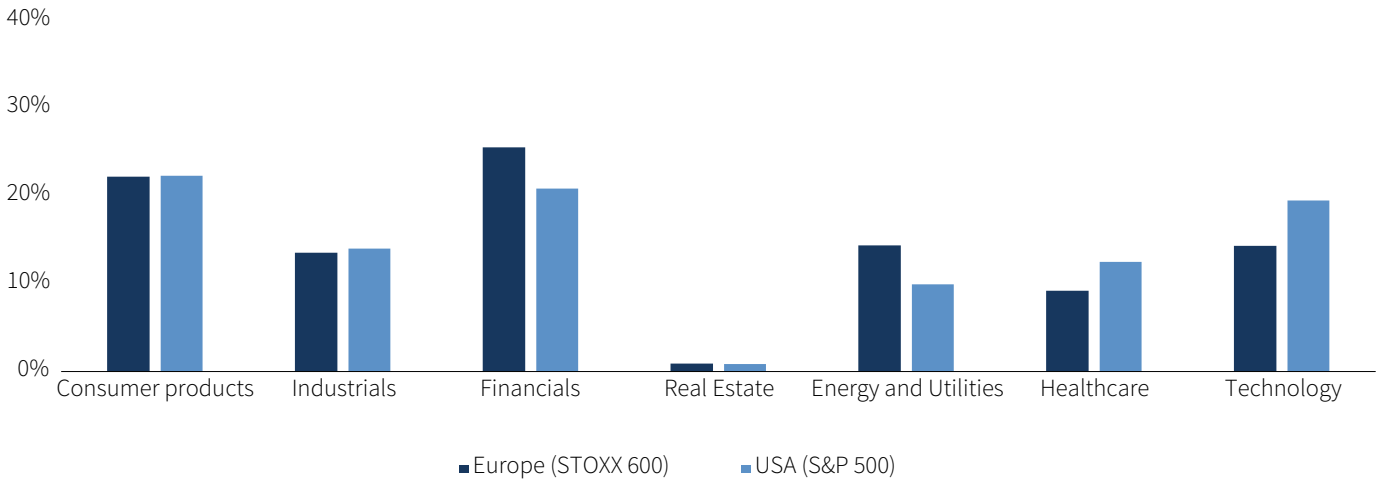
The models can be applied at different data levels. Using individual stock data yields the implied ERP for a specific company, which is referred as the bottom-up approach. Conversely, applying stock index data provides the implied ERP for the entire market, known as the top-down approach. The top-down approach is more commonly used as it is methodologically and computationally less demanding.

III. Challenges in Estimating the Implied Equity Risk Premium

Estimating the ERP for the valuation of medium-sized companies in European countries without an Aaa rating (such as Czechia, Portugal, or Austria) presents distinct challenges. These companies may encounter particular market conditions and risk factors. Additionally, the discount rate for medium-sized companies can differ significantly from that for large and well-diversified companies. Accurately estimating the ERP in these contexts is essential for ensuring valuations that appropriately reflect the characteristics and operating environments of these companies.

2 Estimates of implied equity risk premium are published by a number of authorities, including prof. Astwath Damodaran, European Valuation Institute, European Central Bank, Fenebris, KPMG, Rabel & Partner, or ValueTrust.

Figure 1: Sector Breakdown of the STOXX 600 and S&P 500 Stock Indices as of 31 December 2004



In our article, we examine key factors to consider when estimating the ERP for such companies. We focus on:

1. Suitability of data
2. Distortion of the risk premium due to individual companies
3. Timeliness of source data
4. Country risk considerations

We will explore various options and considerations for selecting an appropriate ERP estimate in the following sections.

1. Suitability of Data for ERP calculation

One approach in European valuation practice is to apply the ERP derived from the U.S. stock market. Several advantages support this method. The U.S. market is the most liquid and long-time series of data are available. Additionally, these ERP estimates are extensively covered in valuation literature. However, emerging structural differences between the U.S. and European stock markets pose numerous challenges. The gap between these markets in terms of structure, returns, and other key characteristics has been widening.

It is important to note that the implied ERP calculation, as opposed to the historical approach, primarily relies on current market data. Therefore, any distortion of current market data might create a significant issue. We will examine whether sector decomposition and concentration might distort the data used for ERP calculation by comparing key stock market indices, such as the STOXX 600, representing the 600 largest publicly traded companies in Europe, and the S&P 500, comprising the 500 largest publicly traded companies in the U.S.

We present our finding using several charts that highlight key differences. The figures 1 and 2 show the sector breakdown of the STOXX 600 and S&P 500 indices as of 31 December 2004 and 31 December 2024. While sector distributions were similar in 2004, notable differences have developed over time. By the end of 2024, the European STOXX 600 index primarily consists of companies from the consumer, industrial, and financial sectors, whereas the U.S. S&P 500 index is mainly concentrated in the technology sector.

Figure 2: Sector Breakdown of the STOXX 600 and S&P 500 Stock Indices as of 31 December 2024

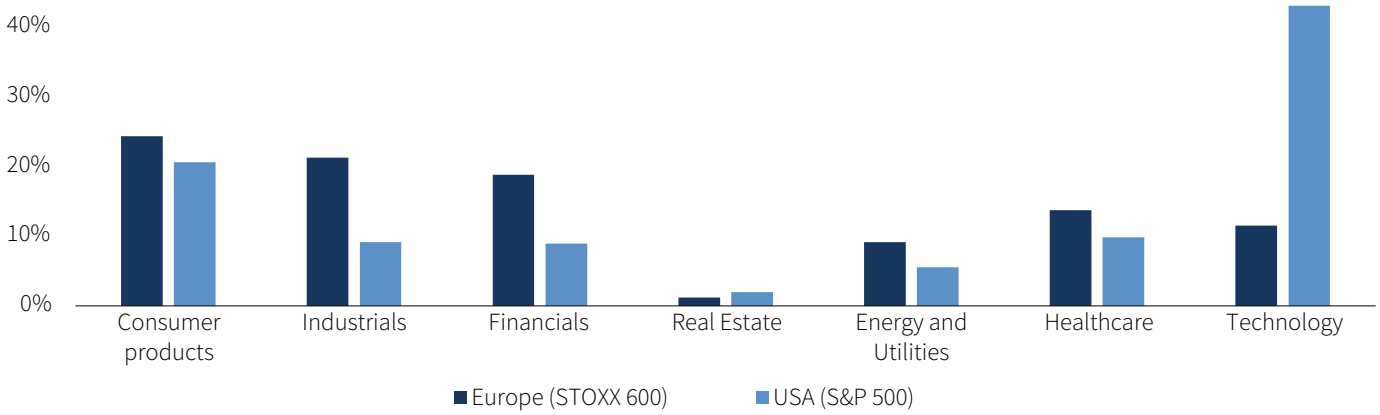
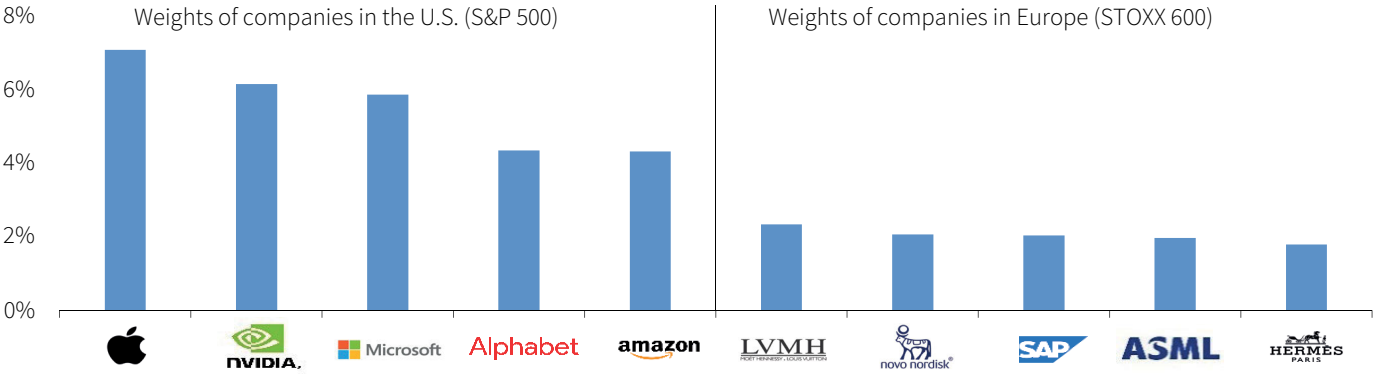


Figure 3: Weights of the Five Largest Companies in the STOXX 600 and S&P 500 Stock Indices as of 31 December 2024, by Market Capitalization



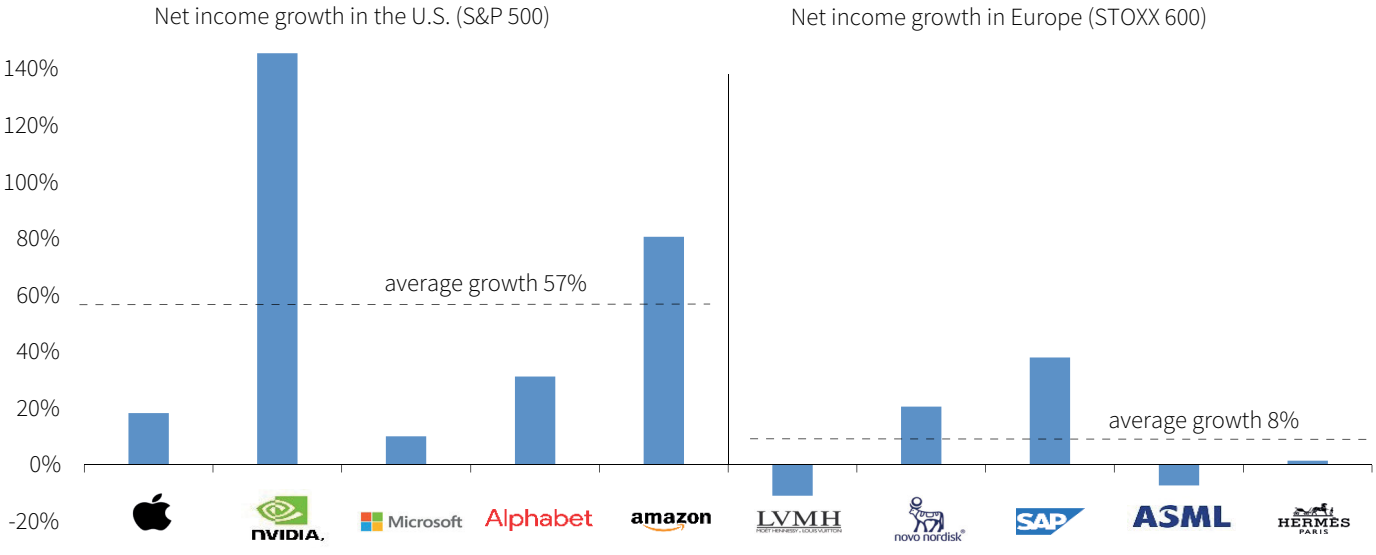
The U.S. index's equity risk premium is heavily influenced by one single sector, while the European index has a more balanced sector composition. This structure affects both the ERP and the beta coefficient, as beta is calculated from a regression of stock price returns against a selected index. Therefore, estimating the discount rate for European companies from U.S. data could lead to significant distortions in both the ERP and beta.

Market concentration shall also be considered in ERP selection for valuing European companies. In the S&P 500, the largest company (Apple Inc.) has three times the weight of the largest company in the STOXX 600 (LVMH – Moët Hennessy Louis Vuitton SE). The five largest U.S. companies represent about 28% of the S&P 500's market capitalization, versus 10% for the top five in the STOXX 600.[3] Higher concentration in the U.S. market increases the risk of distortion, as the ERP may disproportionately reflect the dynamics of a few dominant firms.

Another important consideration is the expectation of future growth and how investors assess risk. The following chart compares the expected net income growth for the next year for the five largest companies in the STOXX 600 and S&P 500 indices, indicating that the largest U.S. companies in the S&P 500 have considerably higher expected growth rates than their European counterparts.

3 The weights of individual companies in stock indices fluctuate daily; however, the S&P 500 continues to exhibit significantly higher concentration compared to the STOXX 600. In recent years, this gap has been steadily widening.

Figure 4: Expected Net Income Growth of the Five Largest Companies in the STOXX 600 and S&P 500 Stock Indices as of 31 December 2024



Figures 1-4 illustrate the varying structures of companies and the differences in their expected future performance. The preferences of investors, as reflected in their valuations, provide additional valuable insights. Factors such as investor preferences, risk assessment, higher expected growth, distinct sector compositions, and other elements are evident in the contrasting valuations of U.S. and European stocks.

For comparison, we examine the price-to-earnings (P/E) ratio.[4] As of 31 December 2024, the P/E ratio is 16.5 for the STOXX 600 compared to 30 for the S&P 500. Other valuation multiples follow this pattern, consistently showing significantly higher figures of companies in the U.S. These disparities raise questions about using the implied ERP estimate based on U.S. market data for valuing companies in European countries.

An alternative approach to using U.S. market data could theoretically involve applying the ERP derived from local European markets at the national level. However, there is insufficient data available for most countries due to factors such as the size and depth of these stock markets or their relatively short histories. The quality of data is illustrated in the following table, which compares the number of companies included in the U.S. S&P 500 and selected European national indices. It is evident that smaller countries have a limited number of listed companies, and this number further diminishes when applying quality criteria such as sufficient stock liquidity.

Table 1: Liquidity of S&P 500 Stock Index and Selected European Stock Indices

Region	Index	Number of Companies	Free Float Market Cap over EUR 100 m
USA	S&P 500	500	500
Austria	ATX	20	20
Belgium	BFX	20	20
Czech Republic	PX	11	8
Portugal	PSI-20	15	15
Slovakia	SAX	6	3

We have shown the issue of concentration within the U.S. market, which has emerged due to specific developments in technology sector. Similarly, smaller European stock markets are inherently more susceptible to this problem due to the limited number of publicly traded companies. Consequently, not only are there companies with significant weight in the index, but the index can also be dominated by specific industries. For instance, in the Austrian ATX index, the largest company, ERSTE Group Bank AG, with a market capitalization of €23 billion, accounts for 24% of the index. In the Belgian BFX index, the largest company represents 31% of total market capitalization, while in the Czech PX index, the largest company comprises 39%. As of 31 December 2024, the financial sector (banking and insurance) accounts for 43% of the total market capitalization in the ATX, 60% in the PX and 74% in the Slovakian SAX index. The Belgian BFX index is primarily concentrated in the consumer products sector, while the Portuguese PSI-20 index is dominated by the energy and utilities sector. Even relatively large local markets may therefore provide an incomplete or biased basis for ERP estimation due to such sectoral concentration. Thus, relying solely on data from a single European country for estimates does not appear to be the optimal solution either.

2. Distortion of the ERP Due to Individual Companies

The analyses above focus on data that provide a suitable basis for estimating the ERP used for valuing a medium-sized company in a European country that is not Aaa-rated. The method of calculating the implied ERP is another factor that should be evaluated. As discussed in the theoretical introduction, the implied ERP can be estimated using two primary approaches: the bottom-up approach (based on individual stocks) and the top-down approach (based on a stock index). The top-down approach does not enable a detailed analysis of individual companies to determine whether their specific characteristics distort the equity risk premium. For instance, this distortion may occur due to large-cap companies with projections of negative profits or free cash flows. Conversely, there may also be companies with smaller market capitalization and high expected profits. These outliers can result in unrealistic equity risk premium values—whether negative, near zero, or excessively high—which can significantly impact the overall calculation.

3. Timeliness of Source Data

The timeliness of the data is an important factor when evaluating the suitability of the implied risk premium. Outdated information, such as obsolete forecasts for earnings or dividends, can lead to inaccurate ERP estimates that fail to reflect current market expectations. This misalignment can distort valuation results. In the implied ERP calculation, outdated information may appear in several places. Firstly, since the ERP is not usually calculated daily, the figure is naturally outdated because the valuation date differs from the day on which the ERP was calculated. Furthermore, the implied ERP calculation requires multiple inputs such as stock or index prices, estimates of future net income, and other financial figures, as well as historical data (e.g., information about stock buybacks, dividends, and ROE). Thus, the valuer should carefully assess the timeliness of the ERP estimate and verify the dates of all the inputs used in the calculation. Some inputs might have newer data available, making the given ERP estimate outdated and not reflective of the current data.

4. Country Risk Considerations

Accurately accounting for country risk is equally important when selecting an ERP estimate. It is necessary to ensure that country risk is neither underestimated nor double-counted in the discount rate calculation. Failure to address country risk accurately can lead to biased valuations and incorrect value conclusions.

There are several common approaches to incorporating country factors into a cost of equity estimate. One approach

4 The PE ratio of a stock index is calculated as the sum of the market capitalization of all companies in the index divided by the sum of the most recently reported net income of all companies in the index.

involves gathering empirical data and directly estimating the cost of equity capital from the observed stock prices by country or region. In this case, the ERP estimate reflects the premium required by the market. Alternatively, the ERP can be calculated for a market with a different country risk premium, and then an additional premium might be added on top of the basic CAPM model. The country risk premium on a standalone basis cannot be directly measured, so theoretical models are used to estimate the premium. These models typically utilize premiums from debt markets (such as sovereign CDS spreads or spreads for a given rating) or risk scores (such as ratings from the Institutional Investor, Political Risk Services or Economist Intelligence Unit) and rather subjective adjustments reflecting different volatility or translating risk scores to risk premium. Thus, this latter approach may not be suitable if the calculation is not performed correctly or if the inputs reflect other risks that are not comparable with equity investment.

5. Summary of the Challenges Analysis

The foregoing analysis identifies several significant challenges encountered by valuers in selecting the ERP for the valuation of medium-sized companies in European countries that do not possess an Aaa credit rating, such as Czechia, Portugal, or Austria. Due to the structural changes in global stock markets, it is paramount to carefully select data sources when estimating the ERP. The U.S. S&P 500 index, for example, is heavily influenced by a handful of large technology companies, potentially skewing the ERP. In contrast, the European stocks, as represented by the STOXX 600 index, provide a more balanced sector composition, mitigating such risks. Furthermore, the notable differences in growth expectations and stock pricing between the U.S. and European markets further underscore the necessity for meticulous data selection.

When analysing individual European markets, challenges can occur due to the limited data available for smaller markets, as ERP estimates based on national indices may depend on a limited number of companies. This issue is compounded by low liquidity in certain stocks and market concentration in specific sectors.

The top-down approach introduces further risks of distortion, especially when large companies predict extremely low or extremely high future cash flows. The issue of data obsolescence is also significant; without regular updates, the accuracy of the ERP estimate decreases. Furthermore, correctly incorporating country risk into the overall discount rate calculation is essential for obtaining an accurate valuation. These issues can distort the whole valuation. To address this, we have developed a new complex calculation of the implied ERP, which mitigates these challenges. Details are in the next section.

IV. Equity Risk Premium Calculation Based on European Data Outside Aaa-Rated Countries

The ERP calculation presented in the following sections, using data of European companies headquartered outside Aaa-rated countries, is grounded in the widely accepted concept of the implied ERP. We update this analysis on monthly basis to ensure it accurately reflects current market conditions. By incorporating aggregated data from both large and medium-sized companies, this approach provides a more robust and reliable estimate compared to calculations relying solely on limited local data. Our approach assumes the perspective of an investor applying the discounted cash flow (DCF) model to evaluate investment.

To address the challenges of valuing medium-sized European companies outside Aaa-rated countries, our methodology adheres to the following principles:

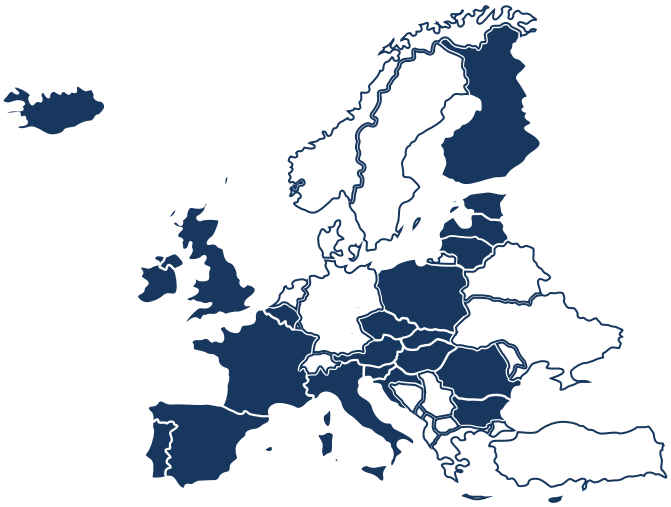
1. The analysis is based on data of a broad sample of European companies.
2. It employs a bottom-up approach, starting with the calculation of the implied ERP for individual companies, from which the final ERP is derived.
3. It uses up-to-date data available as of the calculation date.
4. The method directly incorporates country risk into the ERP estimate by relying on data of companies headquartered outside Aaa-rated countries.

The following sections provide a detailed step-by-step explanation of the ERP calculation.

Step 1: Selection of Companies used in the Calculation of the ERP

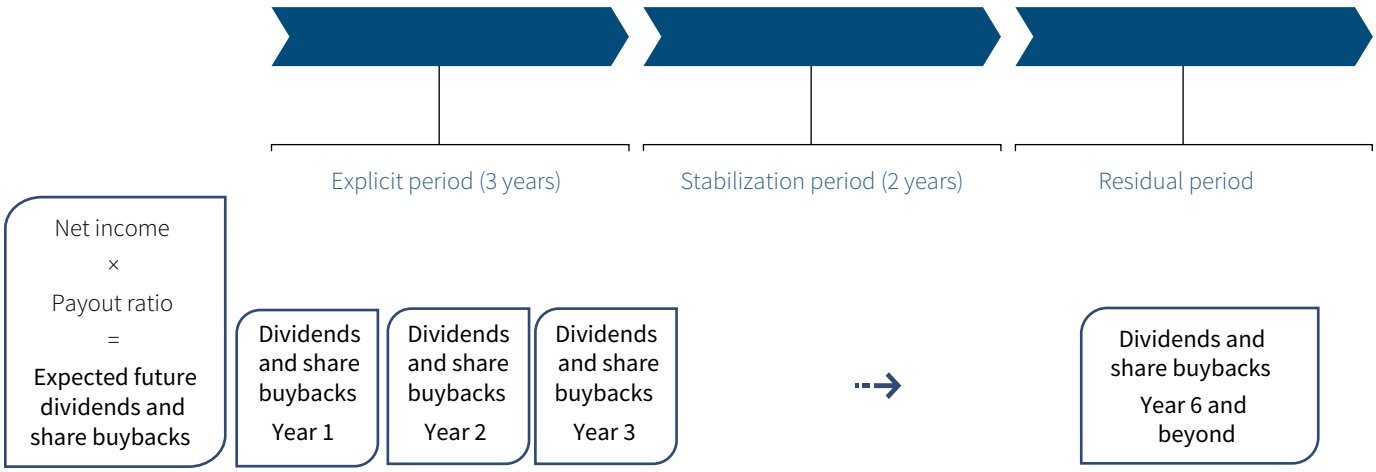
The calculation relies on data from publicly traded European companies headquartered in countries with an investment-grade credit rating, excluding those rated Aaa. Therefore, the analysis covers countries with credit ratings ranging from Aa1 to Baa3. The map below illustrates the geographical distribution of the companies considered.

Figure 5: Geographical Distribution of Publicly Traded European Companies Used in the ERP Calculation



Companies lacking the necessary data to calculate the implied equity risk premium (e.g., stock market price as of the calculation date, relevant forecasts, and other components needed for free cash flow calculations) are excluded. Additionally, companies with negative forecasted cash flows (e.g., companies reporting negative net income in the final year of projections) are also omitted. To ensure that extreme values do not distort the overall results, companies with implied equity risk premiums that are negative or exceed 20% are excluded from the analysis.

Figure 6: Building Expected Future Cash Flows in the Dividend Discount (DD) Model



Step 2: Building Expected Future Cash Flows

Expected future cash flows are derived from analysts' forecasts published in LSEG Workspace platform, which retrieves this data from the I/B/E/S database. To reflect the standard investor perspective — one that typically relies on the Discounted Cash Flow (DCF) model — cash flows for all companies, except those in the financial sector, are modelled using the Free Cash Flow to Equity (FCFE) method. For companies in the financial sector, the Dividend Discount (DD) model is applied. In the DD model, future cash flows are the sum of discounted future dividends and share buybacks. In the FCFE model, future cash flows are calculated as net income minus net investments in long-term assets, minus investments in working capital, plus net borrowing.

In both models, expected future cash flows are estimated in three phases:

- the explicit period (3 years) utilizing analysts' forecasts;
- the stabilization period (2 years); and
- the residual period where the Gordon formula assuming the stable growth rate corresponding to the long-term inflation is applied.

Step 3: Calculation of the Implied Equity Risk Premium for Each Company

The implied ERP is calculated following the theoretical framework outlined at the beginning of the article. The total value of 100% of a company's shares[5] is set equal to the sum of the expected future discounted dividends or cash flows associated with those shares. In this equation, the implied discount rate (i.e., the cost of equity) is the only unknown variable.

5 In the DD model, the value of 100% of a company's shares is represented by its market capitalization, whereas in the FCFE model, it is calculated as the sum of the company's market capitalization and the value of its preferred shares.

Figure 7: Building Expected Future Cash Flows in the Free Cash Flow to Equity (FCFE) Model

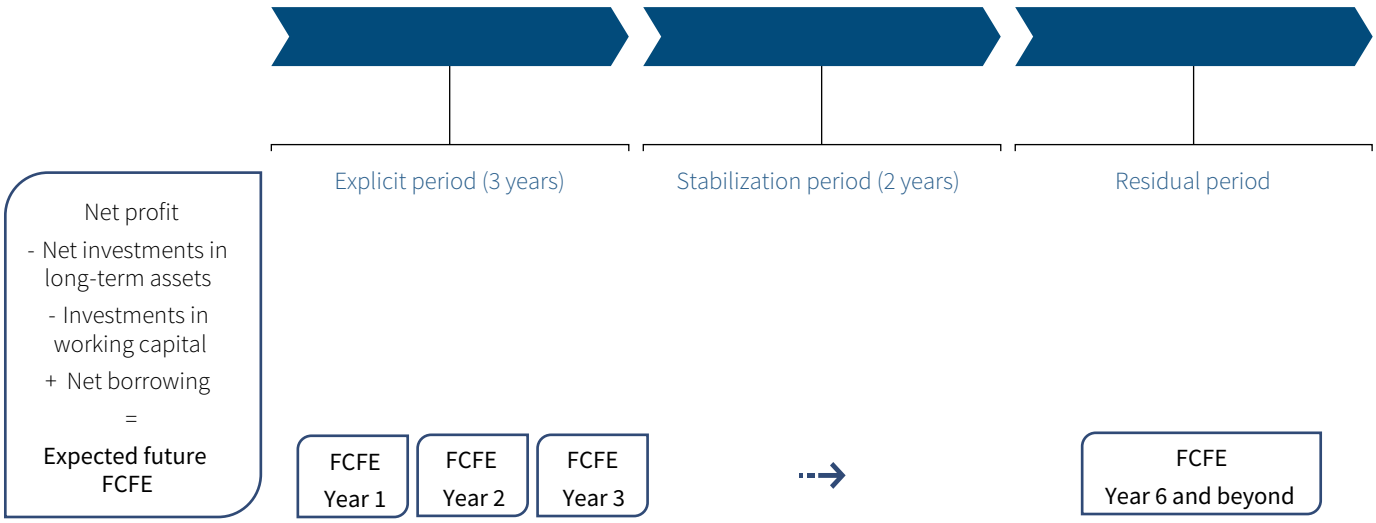
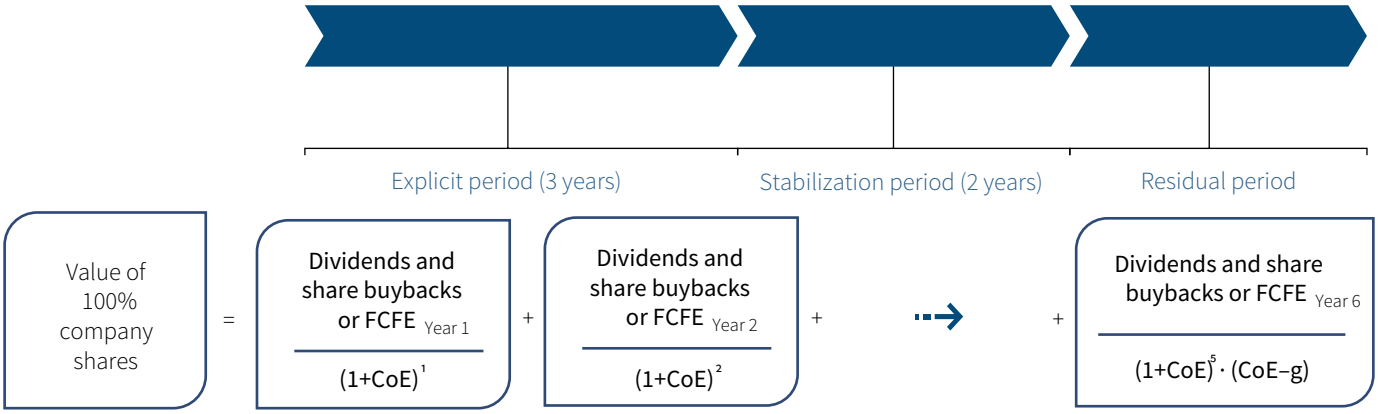


Figure 8: Illustrative Calculation of the Implied Cost of Equity*



** The exact length of the discounting period varies depending on the company's fiscal year and the month for which the implied ERP is being estimated. The example of discounting above serves only for illustrative purposes. CoE = cost of equity, g =long-term growth considered in residual period.*

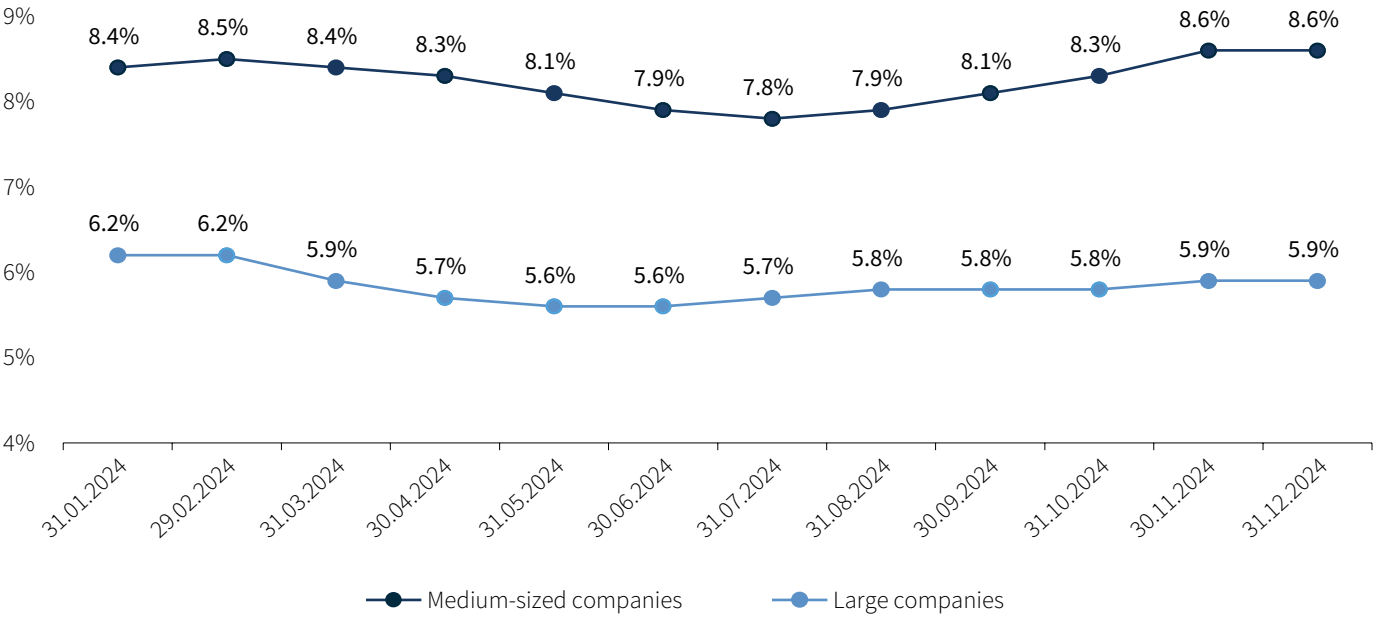
Once the implied cost of equity for a specific company is determined, the implied company risk premium is calculated as the difference between the implied cost of equity and the yield on local government bonds with a 10-year tenor. The government bond yield corresponds to the country where the company is headquartered.

Step 4: Determining the Equity Risk Premium

The equity risk premium is estimated using the bottom-up approach, based on individual company risk premiums. All companies with a meaningful calculated company risk premium are ranked by market capitalization and divided into two equally sized groups: one comprising large companies and the other medium-sized companies.

For each group, an equity risk premium is calculated as a market-cap-weighted average of all company risk premia. The final ERP for each group is determined as the arithmetic average of the premiums calculated over the last three months. For instance, the ERP as of 31 December 2024, is the average of the premiums calculated on October 31, November 30, and 31 December 2024.

Figure 9: ERP Estimates for Large and Medium-Sized European Companies



V. Results of ERP Estimates for European non Aaa-Rated Countries

The estimated equity risk premiums for the two groups of European companies – large companies and medium-sized companies — are presented in fugure 9.

As of 31 December 2024, approximately 1,100 companies are included in the ERP estimates for both groups. The table 2 shows the minimum, maximum, and average market capitalization for these groups.

Table 2: Characteristics of Publicly Traded Companies Used in the ERP Calculation as of 31 December 2024

Parameter	Medium-sized companies	Large companies
Market capitalization of the smallest company	€ 4 million	€ 1,081 million
Market capitalization of the largest company	€ 1,081 million	€317,461 million
Average market capitalization	€ 358 million	€ 15,308 million

VI. Conclusion

This article highlights the challenges encountered by valuation professionals when estimating the equity risk premium for European countries. Using U.S. market data poses issues due to the technology sector's influence, high market concentration, and varying growth expectations. Conversely, local European markets have limited data, low liquidity, and sector concentration problems.

We present a comprehensive calculation of the implied ERP using data from European companies headquartered outside Aaa-rated countries. This calculation employs a bottom-up approach and is updated monthly, based on analyst forecasts available on the LSEG Workspace platform.

To align with the perspective of an investor applying the DCF model, the future cash flows for all non-financial companies are modelled using the Free Cash Flow to Equity method. For companies in the financial sector, the Dividend Discount model is applied. The implied ERP is subsequently determined as the difference between the implied cost of equity and the yield on local government bonds.

Companies are categorized into two groups based on their market capitalization: large companies and medium-sized companies. For each group, we calculate a market-weighted ERP. The final estimate is derived by averaging the ERP over the past three months.

This approach addresses issues such as the inappropriate data selection, high market concentration, differing investor expectations when investing outside Europe, and data limitations. It also reduces the impact of company-specific factors and outdated data. Since the calculation is based on the stock prices of companies in countries outside Aaa-rated region, the resulting ERP reflects market-priced country risk. Additionally, the calculation provides a separate estimate for medium-sized companies with market capitalization ranging from approximately €4 million to €1 billion, eliminating the need for an additional premium for company size. This enables the application of the standard CAPM model, where the cost of equity depends solely on the risk-free rate, the equity risk premium, and the beta coefficient. Monthly ERP estimates are regularly published on the European Valuation Institute's website (www.evalin.org). ◆

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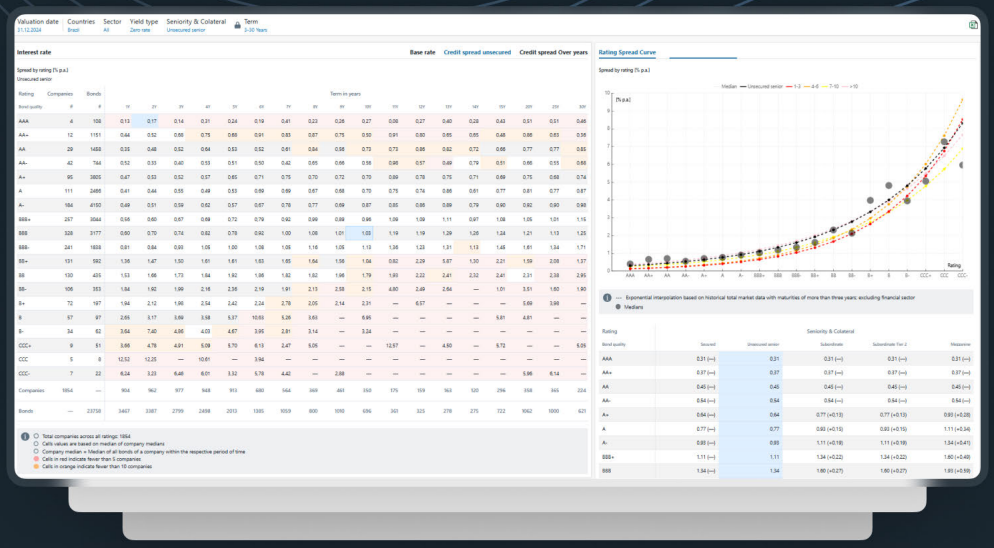

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Value of Lost Profits Equals the Diminution in Business Value Under Certain Assumptions

A mathematical proof with commentary for practitioners in disputes contexts

This article challenges the conventional distinction between business valuation and lost profits quantification, despite their shared foundation in risk and valuation theory. This article demonstrates that under certain assumptions, *lost profits* and *diminution in business value* are mathematically and economically equivalent, with business valuation principles providing a robust framework for discount rate selection. By determining the discount rates of the uninjured and injured business (*but for* and *actual* scenarios), the uninjured business's profits and lost profits, we can determine the appropriate discount rate for lost profits, reinforcing the applicability of valuation methodologies in damages quantification. Practitioners will gain insights into how these principles can enhance the assessment of lost profits, ensuring consistency, reliability, and defensibility in dispute contexts. Understanding this equivalence allows experts, lawyers, and stakeholders to critically evaluate valuation reports and refine their approach to claim framing, leading to more robust expert evidence and legal decision-making.

I. Introduction

When a business's prospects are considered to be harmed – whether due to breach of contract, regulatory action, or other legally qualifying events – it may suffer a loss in profits that were otherwise anticipated. This lost profitability is often central to remedies and causes of action in legal disputes, whereby claimants seek to be compensated for what the business would have earned in the future but for the profit-harming event.

At the same time, the relevant harmful event might also reduce the inherent value of the business itself (business valuations typically being heavily based on cashflows from which we can derive profit metrics).

A court or arbitral tribunal may therefore be faced with two predominant methods of calculating damages or compensation in this context: one based on the profits lost (what would – perhaps unsurprisingly – be termed a loss of profit basis); the other based on the now allegedly diminished value of the business as a whole (what we could often term a diminution in (fair) market value basis).

Typically either one or the other is pleaded and hence, there can be a perception in the legal world – particularly within the dispute resolution community – that the assessment of business values (including quantifying their diminution) and the quantification of lost profits[1] are separate issues[2] or distinct exercises. Further still, that they require the expertise of different sets of professionals. Often the former requiring business valuation experts and the latter requiring forensic accountants.[3]

This article explores how the two methods (what we shall call loss of profits and diminution in value) are not actually mutually exclusive or inconsistent. Rather, the author suggests they are in fact mathematically and economically equivalent under certain assumptions and, at least interlinked in others. This article contains a mathematical proof to demonstrate this relationship and some observations on the consequences of the requisite assumptions breaking down – particularly around risk and discount rates.

Moreover, the author considers that this proposed theoretical (and quantitative) equivalence more closely aligns with the fundamental understandings of risk and value in the context of an operating business suffering a loss of profits.[4]

Given the potential conceptual disconnect if we characterise lost profits and diminution in value as entirely separate enquiries or exemplars of loss, what if the disputes community were open to the notion that they are rather simply different ways of framing the claim?

II. What is missing in current lost profits thinking?

In the author's view lost profits may often – and it is suggested, erroneously – be thought of as a pure accounting exercise. That is, some kind of pure, numeric calculation to quantify the profits that should have been earned (as projected in financial forecasts) versus what was actually / currently expected to be earned.[5]

This approach tends to overlook a qualitative aspect of the lost profits – their riskiness or 'quality'. The author proposes that

1 While, in legal contexts they are often to referred to as lost profits, however many accountants and valuers will quantify the lost cash flows – this is because profits are an accounting entry – that is a record, whereas cash flows represent something tangible which have been lost. The intention is not to quantify the loss of accounting entries or data. We therefore refer to lost profits in this article as a surrogate for lost cash flows. Some might view this as mere semantics, however the difference between profits and cash flow is quite a fundamental concept for accountants – something often taught in the first year of an accounting degree.

2 See e.g. Kolaski/Kuga, Measuring Commercial Damages via Lost Profits or Loss of Business Value: Are these measures redundant or distinguishable?, Journal of Law and Commerce, vol. 18 no.1 (1996): 1-29, at 2:"*The courts have not always clearly, nor consistently, distinguished these two types of remedies and there frequently exists confusion as to whether or not the two damage measures are redundant or overlap one another.*"; Lloyd, Discounting Lost Profits in Business Litigation: What Every Lawyer and Judge Needs to Know, Transactions: The Tennessee Journal of Business Law, vol. 9 no. 1 (2007): 9-65, at 23: "*Technically, enterprise valuation, which involves determining the value of an ongoing business, is a separate issue from determining the value of lost profits. Nevertheless, the same economic principles govern both of these valuation exercises. Unfortunately, some courts have failed to realize this…*". And at 28: "*The relationship between enterprise valuation and lost profits is illustrated when a plaintiff tries to recover for both the profits it lost and the diminished value of its remaining business. Courts generally disallow one of these two claims, pointing out that the plaintiff is trying to recover twice for the same thing because the value of a business in most cases is the present value of the profits the business would earn in the future.*" Although it should be noted that these *Lloyd* does appear to acknowledge that the same economic principles govern both valuation exercises which we take to infer there is an acknowledgment of a common thread between these two issues that is understood by valuation practitioners – although it at least understood by Courts that claiming both is double dipping.

3 Of course there are many other words that have been or can be used to describe the skill set of such experts – each with perhaps their own nuance: an auditor, an accountant, a quantum expert, a valuation expert, a damages quantification expert, an economic damages expert, a loss of profits expert, a financial loss expert, a business appraiser, a financial expert, a financial valuation expert, a company valuer, a forensic valuation expert, a business interruption loss expert, a valuator and so on. It is perhaps no surprise that with different labels that there is an assumption that they are different things done by different experts which may imply a perception of limited overlap.

4 See e.g. Bodington, Discount Rates for Lost Profits, Journal of Forensic Economics, vol. 5 no. 3 (1992): 209–219, at 218: "*Estimating the appropriate discount rate for losses can be approached from two perspectives. First, line-item-specific discount rates can be considered. Alternatively, the firm's uninjured and injured costs of capital can be estimated. The general model shows that both approaches yield the same result.*"; Kolaski/Kuga, op. cit. (fn. no. 2): 23-24: "The current value of a business, or any asset, is the net present value of all future benefits (i.e. cash flows) that the owner may expect to derive from it, and 2) A decrease, or "loss," of future business profits results in a diminution of the current business value."; Lloyd, op. cit. (fn. no. 2): 23, 28; Cohen/Lobo, Business value as a measure of loss in litigation contexts: Reflecting business "reality" over hypothetical "fantasy", The Advocates' Journal (June 2011): 3-8, at 7:"There are similarities between a business value and lost cash flow approach; for instance, a projected/estimated stream of "forgone cash flow" is the foundation upon which either calculation is based. Indeed, a lost cash flow approach may be seen as a subset of the business value approach."

5 See e.g., Stephenson/Macpherson/Prakash-Canjels, Computing Lost Profits in Business Interruption Litigation: A General Model. Journal of Business Valuation and Economic Loss Analysis, vol. 7 no. 1 (2012): 1-16.

this is a critical[6] factor to examine so that we may more accurately and closely approximate the hypothetical but for scenario (i.e. the scenario in which the said profits were not 'lost'). We may quantitively represent these qualitative 'risk' factors in a variety of ways, including:

- via discount rates to be applied to future lost profits (in addition to a time value[7] – albeit risk free – discount component); and
- an appreciation that there would need to be a number of quality or risk assessments with respect to either (i) the lost profits on a standalone basis; or (ii) with respect to the operational profits of the business, in each case, undertaken for both the but for and actual scenarios. That is, through the profits or cash flows themselves (e.g. probability weighting scenarios).

It is in highlighting this risk element of lost profits that the mathematical and economic equivalence of lost profits and the diminution in the value of the business losing such profits, becomes more intuitive.

III. What is the relationship between lost profits and diminution in value damages/compensation enquiries?

In simple terms, the author proposes that one might characterise the distinction as a difference in approach or starting point: calculating lost profits is a direct but limited enquiry; the (diminution in) business valuation approach an indirect but more comprehensive enquiry.

One might even say that lost profits is a special case of a more general diminution in business value[8], but one which tends to arise in practice more frequently as it might be considered more efficient – i.e. a practitioners' 'short cut'.

Specifically, if we assume that the risk profile of the 'injured' business remains unchanged and that the income approach is appropriate[9], then the present value of lost profits is equal to the reduction in the injured business value – so long as valuation dates and the use of hindsight remain consistent across the scenarios. In other words, lost profits represent a specific, constrained case of business value diminution rather than a fundamentally distinct methodology. This approach is consistent with the conclusion in Bodington, despite the fact in some legal contexts these can be perceived as entirely separate issues from a numeric (as well as legal) standpoint.

The choice between claiming lost profits or diminution in value in practice can depend on: whether the profit losses are more temporary or permanent in nature (the former and the latter are said to warrant a lost profits and diminution in business value approach respectively[10]) but, also relevant are the applicable legal framework, jurisdiction, forum, stakeholder preferences, and, of course, cost and efficiency considerations. In some cases, either measure may be claimable, or the plaintiff / claimant may have the flexibility to 'frame the claim' under either category[11].

While legal principles may distinguish between these damages / compensation characterisations and practical considerations may drive the selection of one approach over the other, the objective in this article is to demonstrate that they are, under certain conditions, mathematically identical and this mathematical relationship can guide a potentially more nuanced approach to the assessment of lost profits or diminution in value.

IV. How can diminution in value help to give a more nuanced approach to discount rates in loss of profits claims?

The inherent risk profile of a business is a condition that may not always hold in practice between the but for and actual scenarios. For example, a business that has lost profits may have reduced competitiveness or increased operating leverage and risk[12] relative to the but for scenario. Or, the lost profits could have been higher quality, lower risk profits relative to the aggregate profit 'quality' of the business as a whole[13].

Further, it is also reasonable to state that profits – like cash flow streams – can have a risk profile of their own that may or may not be influenced by the overall risk profile of the business.

While there are a variety of tools business valuers can use to ascertain business risk and quantify discount rates, the risk and discount rate appropriate for particular lost profits may lack comparable data from which to quantify that risk objectively (and hence arguably more robustly and compellingly in a disputes context). This may seem an inherent challenge given there is generally no active market for lost profits. There is, however, a market for the trading of businesses or business interests, supported by well established practices for determining the discount rates appropriate for businesses.

So, the situation appears to be that we can more robustly determine risk and discount rates associated with the but for and actual scenarios in the diminution in value paradigm, but the equivalent risk and discount variables are more difficult or 'murkier' to derive for the lost profits paradigm.

Might a mathematical proof help to add further rigour and objectivity to the quantification of risk and discount rates applied in lost profits scenarios?

If we know that the quantification of lost profits and diminution in value of a business are mathematically and economically equivalent under certain assumptions (as the mathematical proof in

6 With time value risk free component discounting future lost profits to the present because money 'today' can earn a risk free return resulting in a higher value 'tomorrow', and the risky component discounting future lost profits to the present because money 'today' can be invested in assets with equally risky profits to achieve an, on average, higher return 'tomorrow'.

7 With time value risk free component discounting future lost profits to the present because money 'today' can earn a risk free return resulting in a higher value 'tomorrow', and the risky component discounting future lost profits to the present because money 'today' can be invested in assets with equally risky profits to achieve an, on average, higher return 'tomorrow'.

8 See e.g., Cohen/Lobo, op. cit. (fn. no. 4):7.

9 The income approach being perhaps the most common approach for quantifying lost profits and applied to the diminution in business value approach for consistency.

10 See e.g., Cohen/Lobo op. cit. (fn. no. 4): 4.

11 Ibid.: 7.

12 See e.g. Lev, On the Association Between Operating Leverage and Risk, The Journal of Financial and Quantitative Analysis, vol. 9 no.4 (1974): 627–641.

13 See e.g. Bodington, op. cit. (fn. no. 4): 216.

this article purports to do), this may permit us to solve for the discount rate representing the risk appropriate for the quantification of lost profits in a more structured way. Effectively, we use algebra to solve for 'x' given we assume (based on mathematical and conceptual arguments) that the formulae for calculating both damages bases yield a mathematically equivalent result.

The equivalence itself implies that lost profits may not be completely separable from the business context from which those profits arose – think of an apple without the apple tree – and hence, business valuation approaches may permit a lost profits risk assessment to be at least partly grounded in a business reality – where there is an abundance of business valuation principles and guidance publicly available.

Ultimately, one could argue that this analysis highlights that lost profits damages quantification can be characterised as a business valuation exercise or at least, casts doubt on the wisdom of the traditional view that it is perhaps an 'accounting only' exercise.

Further, business valuation experts may be more likely to have fluency with the tools to more objectively assess the risk of the lost profits and to quantify the appropriate discount rate[14]. This may be undertaken directly or indirectly (i.e. using the algebraic equivalence method described in this article).

A more rigorous, objective appreciation of the risk profile of lost profits can materially affect the quantum of the damages / compensation ultimately assessed[15], particularly in cases where the loss of profits is more permanent and less temporary. Even where it is temporary, if the risk profile of the lost profits deviates materially from the risk profile of the overall business (whether positively or negatively), then discount rate considerations may also be material and hence should be an integral part of the damages assessment rather than an afterthought.

V. A brief history

Before we go into the math and the literature review, it is perhaps useful to note how pervasive the concept of lost profits is throughout Europe and the world even going back to 3rd Century BC Roman law[16]. Later in 1918, Demogue states:

"*This notion that the person injured may claim the equivalent of the damnum emergens* ['actual' direct financial losses – but literally 'damages arising'] *and of the lucrum cessans* [lost profits – but literally 'ceasing gain'] *is, so to speak, classic in the codes of Europe and of America. The French Civil Code provides that "damages are due as a rule to the creditor for the loss which he has suffered and the gain of which he has been deprived." The Italian, the Venezuelan, and the Dutch Civil Codes contain like provisions. The Spanish Civil Code is inspired by the same principle, providing that "the indemnity for an injury comprises not only the amount of the loss which has been sustained but also the amount of the profits of which the creditor has been deprived."…The German Civil Code provides that "whoever is bound to make good an injury must restore the state of things which would have existed if the circumstances which gave rise to the obligation to make compensation had not occurred." Further: "the injury to be made good also comprises lost profits."…The revised Swiss Federal Code of Obligations includes the same principles… The English law admits that "where a party sustains a loss by reason of a breach of contract, he is, so far as money can do it, to be placed in the same situation, with respect to damages, as if the contract had been performed."* [footnotes references removed]"[17].

VI. Untangling the hindsight issue

It is worth clearly defining what we mean by 'actual' and but for scenarios, particularly as these terms may imply a specific degree of allowance for use of hindsight information (whether on a spectrum of 100% ex-ante to 100% ex-post and not necessarily a binary decision between ex-ante and ex-post).

This degree of 'permissible hindsight' can depend on whether the user is from a civil law or common law background. Civil law systems as a very rough generalisation allow more ex-post use of hindsight. That is not to say that common law systems as a generalisation allow no use of hindsight whatsoever – but perhaps a lower degree as a generalisation – to none at all at one extreme.

To add further complication, in some legal contexts (whether civil law or common law) the term lost profits may itself imply a greater permitted use of ex-post hindsight than a corresponding claim framed as a diminution in business value (notwithstanding our observations on mathematical equivalence in this article).

To add even more complication – the choice(s) of valuation date(s) is another separate, but potentially correlated issue to the degree of permitted hindsight adopted. For example:

- If the valuation date is historical even as at the date of breach, then this might be described by some as being 'ex-ante'. However, it is important to bear in mind that the degree of 'ex-post' applied may be a fundamentally separate issue to the determination of the valuation date. That is, ex-post can theoretically apply notwithstanding a prima facie historical valuation date.
- If the valuation date is a more recent or sufficiently up-to-date valuation date (i.e. proximate to the time when the quantification is being performed by the valuer) then this might be described as being consistent with an ex-post use of hindsight. We would need to bear in mind that it would be unusual in practice to deliberately limit information used (i.e. to that for example at the date of breach) if using a more up-to-date valuation date given, in theory, we have more fulsome information and that information aligns to the knowledge as at the valuation date.

14 See e.g. Bodington, op. cit. (fn. no. 4): 210: "*While much is written on business valuation, none of the existing literature specifically addresses estimating appropriate discount rates for firms' losses in the context of litigation*".

15 Lloyd, op. cit. (fn. no. 2): 9 "T*he interest rate the court uses to discount these profits to present value (the "discount rate") will usually make a large difference in the amount that the court awards as damages for such things as breaches of contract, antitrust violations, infringements of intellectual property rights, and interference with prospective economic advantage. In some instances, the difference will be huge. It may even make the difference between a multi-million dollar recovery and no recovery at all…The problem comes with the choice of the discount rate. Reasonable experts can differ, at least within certain limits, on this issue.*"

16 Lloyd/Chase, Recovery of Damages for Lost Profits: The Historical Development, U. of Pennsylvania Journal of Business Law, vol. 18 no. 2 (2016): 315-364.

17 Demogue, Validity of the Theory of Compensatory Damages, The Yale Law Journal, vol. 27 no. 5 (1918): 585-598.

It is important if possible to keep the degree of hindsight (whether ex-ante / ex-post) applied broadly symmetrical between the but for and actual scenarios when using either of the loss of profits or diminution in valuation paradigm – i.e. abiding by a fundamental principle of consistency among scenarios – consistency also being a judicial tool / principle in resolving expert evidence disputes. Certain key 'hindsight' definitions are summarised in Table 1.

There is an argument that if lost profits are mathematically equivalent to diminution in business value, why should one method imply a different use of hindsight than the other? We see this differential use of hindsight in practice.

For the purpose of this article, the author assumes that lost profits and diminution in business value have the same applicable degree of 'permissible' hindsight for the purposes of demonstrating mathematical and economic equivalence. In a sense, we 'suspend' the untangling of this specific issue for the purposes of the proof. Nevertheless, this is not a sleight of hand. Given the author suggests that lost profits and diminution in business value may potentially just be differences in 'claim framing' (and not substantively different from a valuation perspective), it may follow that the degree of hindsight used can be treated as a fundamental issue separate from the choice of claim framing.

The author further suggests that it may be beneficial to untangle – at least from a valuation perspective – these damages paradigms from hitherto assumed degrees of hindsight. Might it be more useful to assert an overarching fundamental principle that the degree of hindsight used ought to depend on (i) its appropriateness to the specific facts and (ii) any applicable legal principles of the case (including distinctions between civil and common law approaches) that state or imply a certain degree of hindsight might apply to a particular claim?

In this article we do not delve into this question of hindsight further. The issue of the degree of risk that should be incorporated depending on the use of hindsight is also out of scope for the purposes of this article. But it should be highlighted that the use of hindsight is material issue that may merit further theoretical exploration.

VII. Appropriate lost profits discount rate – a literature review

Academic literature surrounding an appropriate discount rate for lost profits is not especially instructive other than to make some observations about the (i) relevance of the underlying business's cost of capital; and (ii) whether or not some kind of future risk adjustment is required (whether applied to the cost of capital or a separate risk assessment exercise).

As recently as 1992, Bodington states "*While much is written on business valuation, none of the existing literature specifically addresses estimating appropriate discount rates for firms' losses in the context of litigation*" [18]. Bodington further opines: "*The rate cited most often in the economics and legal literature, cost of capital, is correct only in a special case.*"[19]

Lloyd suggests that: "*Normally, the proper discount rate to use in calculating the plaintiff's lost profits will be the plaintiff's cost of capital. Although the court decisions are confusing on this point, the academic and professional literature consistently state that this is the proper discount rate.*"[20]

However, *Lloyd* later concedes that: "*Sometimes it will be appropriate to use a discount rate higher or lower than the firm's cost of capital to adjust for the fact that the source of the lost profits claim was a project with risk characteristics different from the risk characteristics of the firm as a whole.*"[21] Lloyd further opines that: "*Unfortunately, the methods for determining project risk are subjective and imprecise. For this reason, a court should not look askance at an expert who uses Burger Duke's corporate cost of capital as a discount rate for the profits of the project. On the other hand, if an expert witness attempts to show that the project would have increased or decreased Burger Duke's overall corporate risk, then a court should be allowed to take this effect into account, so long as the expert's analysis is based on sound economic principles and not simply on unsupported assumptions.*"[22]

From these extracts we can see, for a significant period of time, it was perhaps widely assumed that the cost of capital of the business which suffered the loss was the appropriate metric by which to discount the lost profits suffered by that business.

In fact, it could be worse because also in 1992, in the same journal as *Bodington, Marguis* concludes "*To compute a lump-sum award for damages by discounting uncertain, albeit expected, future losses to present value by a risk-free interest rate may yield an award which excessive and which unjustly enriches the plaintiff. The correct discount rate to apply is one which is risk-adjusted to counterbalance the forecast uncertainty associated with estimating future cash flows.*"[23]

Was the use of a risk- free rate debatable for discounting lost profits, such that it necessitated an article in 1992 concluding on the above proposition?

Surely, we are well beyond that in 2025. It is hopefully relatively clear by now that some type of risk -adjustment element is generally required – and any attempts to argue otherwise are duly considered by the judge or arbitrator when awarding costs.

Bodington acknowledges: "*controversy surrounding the discount rates employed when calculating the present value of lost profits. Estimating discount rates is a murky science, and much remains to be done…However…the injured firm's cost of capital is the correct discount rate in* ***only a special case…the appropriate rate may be substantially higher or lower*** *depending on the specific nature of the injury*".[24]

It is this proposition – that the appropriate discount rate for discounting lost profits is not necessarily the same as the in-

18 See e.g. Bodington, op. cit. (fn. no. 4): 210.
19 Ibid.
20 Lloyd, op. cit. (fn. no. 2):32.
21 Ibid.: 45
22 Ibid.: 45
23 Margulis, Compensatory Damages and the Appropriate Discount Rate, Journal of Forensic Economics, vol. 6 no.1: (1992): 33-41.
24 See e.g. Bodington, op. cit. (fn. no. 4): 209.

Table 1: Key 'hindsight' definitions

Term	Description
But for scenario	What would have occurred had the wrongful act not taken place at the valuation date. *Note: The degree of ex-ante / ex-post hindsight is assumed to be consistent with that used in the actual scenario solely for illustrative purpose and the mathematical proof in this article.*
Actual scenario	What occurred or was reasonably expected to occur at the valuation date, given the harm. Not necessarily what actually occurred depending on degree of ex-ante / ex-post hindsight as defined below.
Ex-ante	Damages assessed as of the Valuation date(s), using only information available at that time.
Ex-post	Damages assessed later, using information that emerged after the breach. Although there can be various degrees of hindsight use.
Valuation date(s)	The valuation date(s) at which the but for and actual scenarios are calculated. Can be correlated with the degree of hindsight used. That is a more recent Valuation date can be associated with an ex-post philosophy. However, can be considered a separate issue to degree of hindsight.

jured firm's cost of capital (whether in the but for or actual scenario – but it can be in a special case) – that we explore further in this article. *Lloyd* appears to agree in principle "*so long as the expert's analysis is based on sound economic principles and not simply on unsupported assumptions*".

The author proposes to do this by virtue of a mathematical proof that leverages the mathematical and economic equivalence of lost profits and diminution in business value methodologies to derive potentially more robust framework for loss of profits quantification.

VIII. Mathematical proof: quantification of lost profits is mathematically equivalent to the diminution in business value – under certain assumptions

For simplicity, assume that a business generates a constant annual profit (or net income), which is capitalised as a perpetuity.

A similar argument applies if profits grow at a constant rate, in which case the Gordon Growth Model is used.[25]

It is also assumed for simplicity that valuation dates for valuing the lost profits and the business values in the but for and actual scenarios are identical, that the same degree of hindsight is relied upon under both approaches, and that no taxes apply (or alternatively all profits and discount rates are on an after-corporate tax basis and that basis is appropriate).

Mathematical Proof 1: Assuming constant annual profit in perpetuity

Step 1. Valuing the Business Under Normal Conditions

Let

- P be the annual profit of the business, and
- r be the risk-adjusted discount rate.

Using the income approach (specifically, direct capitalisation), the value V of the business is given by:[26]

$$V = \frac{P}{r}$$

Step 2. Impact of a Loss Event on Annual Profits

Now suppose that an event causes a permanent reduction in annual profit by an amount L. After the event, the new annual profit is:

$$P - L$$

Thus, the new value V' of the business (using the same discount rate r since the risk profile is unchanged) is:

$$V' = \frac{P - L}{r}$$

Step 3. Diminution in Value

The diminution in value ΔV due to the loss of profits is the difference between the original value and the new value:

$$\Delta V = V - V' = \frac{P}{r} - \frac{P - L}{r}$$

Simplifying, we have:

$$\Delta V = \frac{P - \left(P - L\right)}{r} = \frac{L}{r}$$

Step 4. Present Value of Lost Profits

Under the same assumptions, the loss of profits is the present value of an infinite stream of lost income L per year. The present value PV of this perpetuity is:[27]

$$PV = \frac{L}{r}$$

25 Gordon/Shapiro, Capital Equipment Analysis: The Required Rate of Profit, Management Science, vol. 3 no. 1 (1956): 102-110.

26 Ibid. Can be derived from the Gordon Growth Model.

27 Ibid.

Mathematical Proof 1: Conclusion
We have shown that the diminution in value of the business is:

$$\Delta V = \frac{L}{r}$$

And the present value of the lost profits is:

$$PV = \frac{L}{r}$$

Thus, we obtain:

$$\Delta V = PV$$

This demonstrates that, under the given assumptions – namely, that the risk of the business remains unchanged, and that the income approach (capitalising earnings) is appropriately used under both the but for and actual scenario[28] – the loss of profits (i.e. the present value of the income loss) is equal to the diminution in the value of the business.

Mathematical Proof 2: Assuming constant growth in annual profit in perpetuity

If the business profits instead grow at a constant rate g (with $r > g$), then the value of the business before the loss is:

$$V = \frac{P}{r-g}$$

And after the loss, the new value is:

$$V' = \frac{P-L}{r-g}$$

The diminution in value becomes:

$$\Delta V = \frac{P}{r-g} - \frac{P-L}{r-g} = \frac{L}{r-g}$$

which is the present value of a perpetuity growing at rate g.

The same reasoning applies – the loss of profits, when appropriately capitalised, equals the diminution in value.

Mathematical Proof 2: Conclusion
Under the assumptions that:

1. the risk profile (and hence the discount rate) of the business does not change;
2. the income approach (i.e., capitalising earnings) is appropriate;
3. valuation dates for valuing the lost profits and the business values in the but for and actual scenarios are identical; and
4. same degree of hindsight is relied upon under both approaches, a permanent annual loss in profit of L reduces the business's value by

$$\Delta V = \frac{L}{r}\left(\text{or } \Delta V = \frac{L}{r-g} \text{ if there is no growth} \right)$$

which is the same as the present value (PV) of the lost profits stream.

Risk and how this is incorporated into the discount rate can be a complex and contentious topic; whether opining on the discount rate to discount lost profits to a present value or opining on the discount rates to quantify the diminution in business value under the but for and actual scenarios.

However, we now suppose a mathematical and economic equivalence[29] between PV of lost profits and diminution in business value. Hence, we can adjust the discount rate – a measure of time value of money and risk – to appropriately discount the lost profits to ensure this equivalence. This assumes that to put the plaintiff / claimant in the same position but for the wrongful conduct, ultimately the plaintiff / claimant needs to be restored from their actual (or constructive actual) scenario to the hypothetical but for scenario by means of an appropriate monetary remedy in the form of a damages judgment / award that takes into account differences in risk between the scenarios.

While civil and common law systems might treat loss of profits and diminution in value as separate legal remedies under certain circumstances, demonstrating how one characterisation can give the same numeric result as the other could assist in a number of practical ways, including:

1. arithmetically in situations where, conceptually, one characterisation is easier to quantify than the other;
2. in 'claim framing';
3. to reconcile expert evidence which has been prepared under different characterisations;
4. to recharacterise expert evidence that has been prepared in one way to the other way to assist in understandility;
5. to add robustness to expert evidence by demonstrating to the judge / tribunal how both characterisations give the same result plus allowing such decision-maker to work with which characterisation they prefer.

28 In extreme cases – where lost profits so severely impact the business that the income approach is no longer viable – the valuation method itself may need to change across scenarios. For instance, if the business performs so poorly post-loss that it faces liquidation, a cost-based approach may be more appropriate than an income-based one. However, there may be instances where a market based approach might be more appropriate e.g. because the business either in the actual or but for scenario has comparable metrics which are appropriate to rely on. Under certain assumptions, the market approach can be shown to be mathematically and economically equivalent to an income approach. In any event the already literature cited recommends a diminution in business value approach in such extreme cases.

29 In addition to our own demonstration of mathematical equivalence but now relaxing the assumption that risk does not change between the but for and actual scenarios, this assumption of equivalence is supported by e.g. Bodington, op. cit. (fn. no. 4): 218; Kolaski/Kuga, op. cit. (fn. no. 4): 23-24; Lloyd, op. cit. (fn. no. 2): 23,28; Cohen/Lobo, op. cit. (fn. no. 4):7.

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Mathematical Proof 3: Determining the discount rate to discount loss of profits (assuming equivalence)

We demonstrate below that even when the but for and actual profit streams are discounted at different rates, it is possible to determine an effective discount rate – call it r^* – so that if we discount the simple annual loss:

$$L = P_B - P_A$$

at this rate, its present value equals the diminution in value of the business.

In other words, we wish to have:

$$\frac{L}{r^*} = \Delta V$$

where ΔV is the difference between the but for value and the actual value.

In our notation:
- P_B is the annual profit in the but for scenario.
- $P_A = P_B - L$ is the annual profit in the actual (post-loss) scenario.
- r_B is the discount rate (reflecting risk) used to value the but for profit stream.
- r_A is the discount rate used to value the actual profit stream.

Under the income approach we have:

- But for value:

$$V_B = \frac{P_B}{r_B}$$

- Actual value:

$$V_A = \frac{P_A}{r_A} = \frac{P_B - L}{r_A}$$

Thus, the diminution in value is:

$$\Delta V = V_B - V_A = \frac{P_B}{r_B} - \frac{P_B - L}{r_A}$$

We now require that the lost profits L, if discounted at an effective discount rate r^*, have a present value equal to ΔV. That is:

$$\frac{L}{r^*} = \frac{P_B}{r_B} - \frac{P_B - L}{r_A}$$

a) Solving for the Effective Discount Rate r^*

Step 1. Start with the equality:

$$\frac{L}{r^*} = \frac{P_B}{r_B} - \frac{P_B - L}{r_A}$$

Step 2. Multiply both sides by r^*:

$$L = r^* \left(\frac{P_B}{r_B} - \frac{P_B - L}{r_A} \right)$$

Step 3. Solve for r^*:

$$r^* = \frac{L}{\frac{P_B}{r_B} - \frac{P_B - L}{r_A}}$$

Step 4. Eliminate the fractions in the denominator by multiplying numerator and denominator by $r_B\, r_A$:

$$r^* = \frac{L r_B r_A}{P_B r_A - (P_B - L) r_B}$$

Step 5. Simplify the denominator:

So we obtain:

$$r^* = \frac{L r_B r_A}{P_B (r_A - r_B) + L r_B}$$

b) Interpretation

The effective discount rate r^* tells us how the lost profits L must be discounted to yield the same result as a diminution in value of the business from which those profits were lost:

$$\frac{L}{r^*} = \frac{P_B}{r_B} - \frac{P_B - L}{r_A}$$

If the risks are the same: That is, if $r_B = r_A = r$, then

$$r^* = \frac{L r_B r_A}{P_B (r_A - r_B) + L r_B} = \frac{L r^2}{L r} = r$$

In this case, discounting L at r directly gives the diminution in value, as expected.

If the risks differ: The formula adjusts r^* to reflect that the 'lost profit' stream L is "inherited" from a scenario valued at r_B (but for) even though the actual profits are discounted at r_A. The effective rate r^* depends on the magnitude of L relative to P_B and the difference $r_A - r_B$.

Mathematical Proof 3: Conclusion

When the but for and actual scenarios have different risks, the effective discount rate r^* at which the annual 'lost profit' L must be discounted to yield the diminution in value is

$$r^* = \frac{L r_B r_A}{P_B (r_A - r_B) + L r_B}$$

This rate r^* ensures that

$$\frac{L}{r^*} = \frac{P_B}{r_B} - \frac{P_B - L}{r_A}$$

so that the present value of the lost profits (discounted at r^*) equals the diminution in the business value.

Mathematical Proof 3: Illustrative Example

The purpose of this illustrative example is to demonstrate that failure to account for differences in risk (at least those appropriately taken into account in the discount rate) between the but for and actual scenarios in a loss of profits quantification can potentially lead to an underestimation of the appropriate discount rate for discounting lost profits and therefore overvalue the damages (although it could, conversely, also overestimate the appropriate discount rate and undervalue the damages e.g. in the scenario where the lost profits were less risky than the risk profile of the business as a whole).

When the but for and actual scenarios have different risks, the effective discount rate r^*, at which the annual 'lost profit' L must be discounted to yield the same result as diminution in value is given by[30]:

$$r^* = \frac{Lr_B r_A}{P_B\left(r_A - r_B\right) + Lr_B}$$

Let's consider an example with the following assumptions:

- Loss: $L = 0.5P_B$ (i.e., the loss is 50% of the but for annual profit)
- But for discount rate: $r_B = 10\%$ (or 0.10)
- Actual discount rate: $r_A = 15\%$ (or 0.15)

a) Substitute the Values into the Formula

Substitute $L = 0.5P_B$ but for discount rate: $r_B = 10\%$ (or 0.10) $r_A = 15\%$ (or 0.15) into the formula:

$$r^* = \frac{0.5P_B \cdot 0.10 \cdot 0.15}{P_B\left(0.15 - 0.10\right) + 0.5P_B \cdot 0.10} = \frac{0.0075P_B}{0.10P_B} = 0.075$$

Thus $r^* = 7.5\%$.

Therefore, where a loss of profits leads to increased risk (e.g. due to higher operating leverage, lower economies of scale – i.e., being less competitive, or due to the loss of less volatile revenues – resulting in a higher beta, and perhaps higher insolvency / bankruptcy risks as the risk of financial covenants breaches increase) in the actual scenario relative to the but for scenario, the discount rate for discounting those lost profits can be significantly less than the discount rate in both the but for and actual scenarios.

The above result is consistent with the intuition that when, working backwards, less risky lost profits (with a discount rate of 7.5%) are added to actual scenario profits that are riskier (with a discount rate of 15%), the result is the but for scenario profits (with a discount rate of 10%) having a risk and appropriate discount rate somewhere in between the risk of those first two – but equally the inverse could be true.

30 It can also be shown assuming constant growth (g) that $r^* = g^* + [L(r_B - g_B)(r_A - g_A)] / [P_B((r_A - r_B) - (g_A - g_B)) + L(r_B - g_B)]$.

b) Potential error if cost of capital of uninjured business used

If the lost profits L are say €10 million per annum. Say Valuer A adopts $r = r_B = 10\%$ to capitalise L then

$$PV = \frac{L}{r} = \frac{€10\,\text{million}}{0.10} = €100\,\text{million}$$

And say Valuer B adopts $r = r^* = 7.5\%$ to capitalise L then

$$PV = \frac{L}{r} = \frac{€10\,\text{million}}{0.075} = \sim €133.3\,\text{million}$$

The above example illustrates a material € 33.3 million difference (representing a 33.3% increase in the present value of the lost profits) by considering the lost profits as having a distinct risk profile to that of the but for scenario business.

Such risk nuances might be lost when lost profits are quantified without full risk considerations, risk considerations which are perhaps best understood by business valuation professionals (i.e. opining on the appropriate discount rates in the actual and but for scenarios).

IX. Discussion

Why might lost profits have a different risk profile to the uninjured or injured business?

To use a very simple example, imagine there is a business with two divisions. Division A and Division B. Division A is involved in selling widgets which is a very safe business. Division B is involved in selling wonder machines which is volatile. Both widgets and wonder machines have the same profits and growth prospects and are in all respects identical (including the supply of X) save for wonder machines being riskier than widgets (i.e., the demand for wonder machines fluctuates more with economic cycles than widgets, which have steady demand).

If Division A is lost – that is – the safe business, then the loss of profits is the loss of Division A. Because that Division is safer, it should have a lower discount rate and be more valuable. When that Division A is lost, we are left with Division B which is the riskier division – with a higher discount rate – hence less valuable. So here the lost profits being those of Division A are clearly conceptually more valuable than those of Division B and also the business as a whole (which has the blended risk profile of Division A and Division B). Of course, even if the business sells just widgets, there could be operating leverage such that the rump business (Division B) left behind is riskier than both Division A and the business as a whole.

While the formula in this article represents a simple example, the underlying mechanisms can be scaled up to real use cases where the r^* could be backsolved using the diminution in value method and applied to the loss of profits. That is, one could use business valuation principles to determine r_B and r_A and use those to calculate r^*.

Such methods may also consider a temporary loss of profits[31] (say a business interruption that goes back to normal after a few years), in which case ,there may be a difference between $\mathbf{r}_B$ and $\mathbf{r}_A$ during the business interruption period (although the materiality of that difference would be significantly less as it would only apply over a few years instead of perpetuity as our example suggests.)

Conventional wisdom suggests that where the loss is temporary, and say, limited to a few years then the lost profits approach should be used.

But why is this so? The author suggests that this is not because the diminution in business value approach is somehow mathematically or economically unsound and not capable of appropriately quantifying the damages to put the plaintiff / claimant in the same position but for the breach or legal wrong. Rather, perhaps it is for pragmatic reasons – because valuing the business in the but for scenario and actual scenario might be significantly more costly and time-consuming than valuing the lost profits. Nevertheless, the point is that a diminution in business value approach can yield a mathematically equivalent result and the choice between one or another is one of convenience or legal necessity. But to underscore, they are economically equivalent.

X. Conclusion

One wonders whether such equivalency could be used by valuation professionals to 'shoe horn' or 'reverse engineer' results to fit the legal requirements (whether the claim needs to be framed as a lost profits or diminution in business value), or perhaps whether legal requirements will evolve once there is a greater understanding of the mathematical and economic equivalency between what has historically been seen, especially in legal contexts, as different ways to quantify damages or compensation.

Irrespective of the trajectory of future applications, there is likely utility in being able to reconcile a lost profits to a diminution in business valuation approach. For instance, while more data may be available to quantify $\mathbf{r}_A$ and $\mathbf{r}_B$ rather than $\mathbf{r}^*$ directly, legal precedent in a jurisdiction insists on a lost profits claim framing. Indeed, perhaps both methods are used as a reasonableness check for robustness. There is also far more literature available on determining discount rates for business valuation than for lost profits and therefore fertile potential for more robust discount rates by taking an indirect approach to discounting lost profits. ◆

31 A mathematical proof for showing that our results apply for a temporary loss of profits can be shown – but a detailed examination is beyond the scope of this article.

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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 30 April 2025

The typified, uniform risk-free rate based on AAA-rated government bonds currently lies at 2.75% 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 8.25%, leading to a market risk premium of 5.5%. Estimations of the market return rely on historical returns, as well as on forward-looking return estimates and risk premiums based on Eurozone companies with current market share prices and earnings forecasts from financial analysts.

Betas

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

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

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

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

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

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

30 April 2025	Median Levered Betas								
	1-Year, weekly returns							5-Year, monthly returns	
Industries	Comps incl. (Average*)	5/2020 to 4/2021	5/2021 to 4/2022	5/2022 to 4/2023	5/2023 to 4/2024	5/2024 to 4/2025	Average*	Comps incl.	5/2021 to 4/2025
Industrials	*271*	0.93	0.77	0.83	0.86	0.85	0.85	*248*	1.00
Consumer Discretionary	*181*	0.89	1.05	0.93	0.90	0.87	0.93	*163*	1.10
Health Care	*130*	0.54	0.67	0.77	0.77	0.77	0.70	*123*	0.74
Financials	*144*	1.04	0.97	0.89	0.69	0.90	0.90	*139*	1.02
Utilities	*49*	0.71	0.46	0.59	0.71	0.40	0.57	*47*	0.70
Materials	*86*	0.85	0.82	0.92	0.91	0.89	0.88	*85*	1.00
Real Estate	*87*	0.68	0.54	0.83	0.87	0.42	0.67	*80*	0.84
Communication Services	*86*	0.75	0.56	0.73	0.57	0.58	0.64	*85*	0.82
Information Technology	*153*	0.68	0.89	0.90	0.89	0.82	0.83	*140*	1.07
Consumer Staples	*75*	0.43	0.66	0.54	0.41	0.42	0.49	*70*	0.57
Energy	*34*	1.03	0.37	0.62	0.40	0.84	0.65	*33*	0.87

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

30 April 2025	Median Equity-Ratios								
	1-Year							5-Year	
Industries	Comps incl. (Average*)	5/2020 to 4/2021	5/2021 to 4/2022	5/2022 to 4/2023	5/2023 to 4/2024	5/2024 to 4/2025	Average*	Comps incl.	5/2021 to 4/2025
Industrials	*272*	83.2%	82.3%	80.3%	79.8%	80.9%	81.3%	*241*	79.1%
Consumer Discretionary	*180*	81.8%	83.4%	75.4%	74.4%	71.7%	77.3%	*156*	79.6%
Health Care	*134*	99.8%	96.8%	91.2%	94.2%	94.0%	95.2%	*125*	98.2%
Utilities	*46*	63.1%	68.1%	63.2%	59.3%	60.3%	62.8%	*46*	63.1%
Materials	*84*	79.7%	80.8%	81.2%	81.1%	77.6%	80.1%	*86*	76.1%
Real Estate	*85*	55.4%	53.3%	46.3%	47.1%	48.8%	50.2%	*76*	48.9%
Communication Services	*89*	81.3%	84.1%	79.1%	70.3%	74.9%	77.9%	*81*	76.3%
Information Technology	*157*	99.7%	98.2%	97.0%	95.4%	93.0%	96.6%	*139*	97.5%
Consumer Staples	*79*	78.1%	75.8%	70.3%	69.4%	71.9%	73.1%	*72*	72.0%
Energy	*37*	65.1%	70.7%	85.5%	85.2%	80.3%	77.4%	*34*	75.0%

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

30 April 2025	Median Unlevered Betas								
	1-Year, weekly returns							5-Year, monthly returns	
Industries	Comps incl. (Average*)	5/2020 to 4/2021	5/2021 to 4/2022	5/2022 to 4/2023	5/2023 to 4/2024	5/2024 to 4/2025	Average*	Comps incl.	5/2021 to 4/2025
Industrials	*255*	0.80	0.69	0.72	0.70	0.74	0.73	*229*	0.82
Consumer Discretionary	*163*	0.82	0.86	0.81	0.74	0.71	0.79	*144*	0.88
Health Care	*113*	0.55	0.66	0.75	0.69	0.62	0.65	*110*	0.61
Utilities	*49*	0.60	0.39	0.48	0.53	0.36	0.47	*44*	0.48
Materials	*84*	0.80	0.70	0.81	0.71	0.74	0.75	*80*	0.80
Real Estate	*81*	0.62	0.45	0.60	0.61	0.37	0.53	*71*	0.62
Communication Services	*81*	0.60	0.57	0.60	0.51	0.57	0.57	*76*	0.64
Information Technology	*143*	0.69	0.87	0.86	0.83	0.77	0.80	*125*	0.95
Consumer Staples	*73*	0.48	0.54	0.52	0.39	0.42	0.47	*68*	0.50
Energy	*32*	0.94	0.45	0.60	0.43	0.67	0.62	*30*	0.70

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

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

30 April 2025	Median Levered Betas								
	1-Year, weekly returns							5-Year, monthly returns	
Subindustry: Consumer Discretionary	Comps incl. (Average*)	5/2020 to 4/2021	5/2021 to 4/2022	5/2022 to 4/2023	5/2023 to 4/2024	5/2024 to 4/2025	Average*	Comps incl.	5/2021 to 4/2025
Automobile Components	*29*	1.10	1.46	1.12	0.73	0.85	1.05	*28*	1.17
Automobiles	*12*	1.19	1.31	1.09	0.98	1.26	1.17	*11*	1.24
Household Durables	*22*	0.57	0.78	0.70	0.91	0.63	0.72	*20*	0.86
Leisure Products	*8*	0.64	1.01	0.76	0.98	0.86	0.85	*7*	0.74
Textiles, Apparel & Luxury Goods	*26*	1.05	1.27	1.17	1.06	1.15	1.14	*24*	1.28
Hotels, Restaurants & Leisure	*30*	1.28	1.14	0.85	0.96	0.69	0.98	*28*	1.29
Distributors	*4*	0.61	0.30	0.78	0.41	0.69	0.56	*3*	1.20
Broadline Retail	*19*	0.59	1.29	0.65	0.85	1.00	0.87	*18*	0.96
Specialty Retail	*30*	0.78	0.92	1.05	0.88	0.82	0.89	*24*	0.94

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

30 April 2025	Median Equity-Ratios								
	1-Year							5-Year	
Subindustry: Consumer Discretionary	Comps incl. (Average*)	5/2020 to 4/2021	5/2021 to 4/2022	5/2022 to 4/2023	5/2023 to 4/2024	5/2024 to 4/2025	Average*	Comps incl.	5/2021 to 4/2025
Automobile Components	*29*	63.4%	62.4%	58.1%	57.0%	49.8%	0.58	*25*	56.1%
Automobiles	*13*	95.9%	96.6%	92.0%	94.8%	85.8%	0.93	*11*	92.0%
Household Durables	*22*	79.9%	73.7%	67.2%	71.9%	70.1%	0.73	*20*	79.8%
Leisure Products	*8*	96.7%	95.9%	99.9%	100.6%	103.0%	0.99	*6*	97.7%
Textiles, Apparel & Luxury Goods	*26*	82.6%	87.0%	84.2%	83.5%	79.4%	0.83	*23*	87.1%
Hotels, Restaurants & Leisure	*29*	72.6%	74.5%	71.7%	70.3%	71.8%	0.72	*28*	74.7%
Distributors	*4*	84.4%	95.4%	71.6%	95.8%	70.4%	0.84	*4*	79.7%
Broadline Retail	*19*	96.2%	85.1%	82.2%	83.6%	86.8%	0.87	*0*	82.5%
Specialty Retail	*30*	93.7%	97.2%	80.1%	76.0%	75.3%	0.84	*0*	84.0%

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

30 April 2025	Median Unlevered Betas								
	1-Year, weekly returns							5-Year, monthly returns	
Subindustry: Consumer Discretionary	Comps incl. (Average*)	5/2020 to 4/2021	5/2021 to 4/2022	5/2022 to 4/2023	5/2023 to 4/2024	5/2024 to 4/2025	Average*	Comps incl.	5/2021 to 4/2025
Automobile Components	*27*	0.87	0.85	0.82	0.57	0.67	0.76	*25*	0.92
Automobiles	*10*	0.89	0.81	0.90	0.82	0.85	0.85	*9*	0.98
Household Durables	*22*	0.64	0.64	0.69	0.78	0.62	0.67	*19*	0.78
Leisure Products	*8*	0.65	1.01	0.71	0.93	0.96	0.85	*6*	1.11
Textiles, Apparel & Luxury Goods	*25*	0.98	1.05	0.94	0.96	0.85	0.96	*23*	1.01
Hotels, Restaurants & Leisure	*27*	1.06	0.86	0.85	0.73	0.62	0.82	*24*	1.03
Distributors	*4*	1.03	0.26	0.85	0.40	0.62	0.63	*3*	0.88
Broadline Retail	*14*	0.43	0.88	0.67	0.72	0.73	0.69	*14*	0.79
Specialty Retail	*26*	0.77	0.86	0.84	0.61	0.67	0.75	*21*	0.83

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

30 April 2025	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	*221*	6.7	6.0	*216*	10.9	9.5	*210*	13.1	11.2	*203*	1.6	1.4	*196*
Consumer Discretionary	0.9	0.8	*149*	6.4	5.8	*145*	12.0	10.2	*141*	12.0	9.8	*127*	1.5	1.5	*133*
Health Care	2.3	2.1	*100*	8.8	8.3	*77*	12.9	12.3	*76*	14.9	12.7	*66*	1.8	1.7	*81*
Financials	n/m	n/m	*n/a*	n/m	n/m	*n/a*	n/m	n/m	*n/a*	10.3	9.5	*103*	1.2	1.1	*96*
Utilities	2.6	2.6	*37*	7.9	7.4	*38*	13.3	13.3	*38*	14.4	14.6	*38*	1.6	1.5	*38*
Materials	1.0	0.9	*77*	6.4	5.6	*76*	11.3	9.6	*72*	13.0	10.7	*65*	1.2	1.1	*66*
Real Estate	12.4	12.3	*55*	18.0	16.6	*55*	17.7	17.1	*56*	12.8	12.4	*49*	0.7	0.7	*51*
Communication Services	1.4	1.4	*71*	5.6	5.4	*70*	11.4	10.6	*64*	13.0	11.6	*58*	1.6	1.6	*59*
Information Technology	1.2	1.1	*124*	7.7	6.5	*119*	13.2	11.0	*112*	17.2	13.7	*100*	2.0	1.8	*104*
Consumer Staples	0.9	0.7	*61*	7.0	6.3	*60*	11.8	10.8	*58*	13.6	12.4	*54*	1.4	1.4	*53*
Energy	1.2	1.2	*29*	4.8	4.4	*29*	7.3	7.0	*29*	9.6	8.3	*22*	1.2	1.0	*23*

Table 8: Median Subindustry (Consumer Discretionary) Multiples

30 April 2025	Sales			EBITDA			EBIT			Earnings			Market to Book		
Subindustry: Consumer Discretionary	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.
Automobile Components	0.4	0.4	*24*	4.4	4.0	*23*	7.7	6.7	*23*	9.1	7.2	*23*	0.8	0.8	*23*
Automobiles	0.5	0.5	*11*	4.2	3.9	*12*	6.5	6.0	*12*	7.0	6.4	*11*	0.5	0.5	*11*
Household Durables	0.8	0.8	*18*	6.2	5.5	*18*	9.7	8.4	*18*	11.0	9.3	*17*	1.1	1.0	*16*
Leisure Products	0.8	0.8	*8*	7.2	6.0	*8*	11.1	7.9	*8*	12.0	9.1	*7*	2.0	1.7	*5*
Textiles, Apparel & Luxury Goods	1.6	1.4	*21*	10.4	8.8	*20*	16.2	14.0	*19*	20.4	17.1	*15*	2.4	2.2	*17*
Hotels, Restaurants & Leisure	2.0	1.9	*27*	8.1	7.5	*26*	13.6	11.7	*26*	13.6	11.8	*23*	2.3	2.0	*23*
Distributors	1.2	1.1	*3*	6.1	5.7	*3*	9.9	9.4	*3*	11.3	9.8	*2*	2.9	2.4	*2*
Broadline Retail	1.0	1.0	*16*	8.6	8.8	*14*	15.5	13.3	*14*	18.5	14.9	*14*	3.0	2.6	*14*
Specialty Retail	0.7	0.6	*21*	7.4	5.0	*21*	13.0	10.7	*18*	16.4	16.6	*15*	1.2	1.5	*22*

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

In the previous issue we provided multiples for Scandinavia and Britain. The multiples in this issue provide a 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

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

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

Eastern Europe - Trailing & 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
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

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
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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/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
408	0.56	0.12	0.46	0.20	0.34	0.68	[0,49 ; 0,64] (37,3)	1.58	0.99	$\hat{y}$ = 0,359 x Sales + 2.282	0.52	16,955
172	0.80	0.06	0.75	0.37	0.66	1.26	[0,66 ; 0,94] (17,7)	0.80	0.79	$\hat{y}$ = 1,624 x Sales - 26.866	0.97	179,016
343	1.02	0.17	0.94	0.35	0.84	1.60	[0,85 ; 1,19] (40,6)	0.78	0.82	$\hat{y}$ = 0,612 x Sales + 2.693	0.88	24,681
902	0.76	0.09	0.68	0.23	0.51	1.18	[0,69 ; 0,82] (79,3)	0.99	0.86	$\hat{y}$ = 0,741 x Sales - 70.100	0.77	2,566,241
612	0.61	0.04	0.50	0.17	0.42	0.76	[0,54 ; 0,68] (56,4)	1.72	1.04	$\hat{y}$ = 0,906 x Sales - 30.185	0.89	370,288
338	0.72	0.14	0.64	0.23	0.50	1.18	[0,62 ; 0,82] (23,6)	1.14	0.87	$\hat{y}$ = 0,204 x Sales + 4.751	0.19	18,044
547	0.65	0.15	0.52	0.25	0.44	0.79	[0,56 ; 0,73] (51,1)	1.72	1.02	$\hat{y}$ = 0,441 x Sales - 642	0.85	132,733
504	0.55	0.13	0.42	0.13	0.26	0.73	[0,46 ; 0,63] (48,0)	1.72	1.18	$\hat{y}$ = 0,888 x Sales - 341.172	0.65	4,725,577
86	0.72	0.20	0.63	0.16	0.29	0.71	[0,32 ; 1,12] (8,6)	1.31	1.25	$\hat{y}$ = 0,284 x Sales + 18.255	0.74	41,932
896	0.77	0.02	0.66	0.25	0.44	1.08	[0,69 ; 0,86] (82,3)	1.26	0.98	$\hat{y}$ = 0,179 x Sales + 10.092	0.34	37,356
1,530	0.62	0.02	0.50	0.13	0.37	0.81	[0,57 ; 0,67] (131,0)	1.52	1.06	$\hat{y}$ = 1,007 x Sales - 118.437	0.96	791,583
574	0.85	0.04	0.76	0.12	0.57	1.21	[0,73 ; 0,98] (66,5)	0.86	0.96	$\hat{y}$ = 0,618 x Sales - 7.267	0.62	121,675
1,132	1.09	0.20	1.02	0.41	0.92	1.66	[1,01 ; 1,18] (133,6)	0.67	0.73	$\hat{y}$ = 0,470 x Sales + 9.903	0.74	51,258
1,540	1.00	0.12	0.91	0.38	0.75	1.54	[0,93 ; 1,07] (170,1)	0.83	0.79	$\hat{y}$ = 1,727 x Sales - 35.928	0.84	402,389
429	1.18	0.18	1.12	0.42	1.06	1.93	[1,01 ; 1,36] (58,3)	0.45	0.75	$\hat{y}$ = 1,872 x Sales - 4.196	0.82	86,852
209	1.19	0.24	1.15	0.31	1.06	2.08	[0,90 ; 1,49] (31,5)	0.39	0.81	$\hat{y}$ = 0,889 x Sales + 2.284	0.74	9,233
698	1.08	0.22	1.01	0.32	0.75	2.01	[0,94 ; 1,21] (100,7)	0.55	0.82	$\hat{y}$ = 0,418 x Sales + 40.836	0.75	154,598
403	0.93	0.15	0.86	0.26	0.62	1.56	[0,79 ; 1,07] (50,0)	0.60	0.84	$\hat{y}$ = 1,376 x Sales - 19.227	0.80	322,406

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
-	-	-	-	-	-	-	-	-	-	-	-	-
48	0.38	0.30	0.38	0.23	0.40	0.49	[0,36 ; 0,39] (6,8)	-0.44	0.39	$\hat{y}$ = 0,503 x Sales - 231.086	0.86	467,108
-	-	-	-	-	-	-	-	-	-	-	-	-
140	0.25	0.13	0.22	0.15	0.19	0.32	[0,24 ; 0,27] (10,2)	1.54	0.77	$\hat{y}$ = 0,098 x Sales + 494.900	0.66	1,330,734
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
81	0.32	0.07	0.27	0.06	0.15	0.41	[0,26 ; 0,39] (6,4)	1.58	1.11	$\hat{y}$ = 0,062 x Sales + 53.520	0.18	58,555
48	0.29	0.17	0.29	0.15	0.20	0.27	[0,23 ; 0,35] (14,2)	2.17	1.02	$\hat{y}$ = 0,034 x Sales + 4.267.777	-0.10	4,608,552
-	-	-	-	-	-	-	-	-	-	-	-	-
43	0.56	0.09	0.56	0.05	0.08	0.43	[-0,02 ; 1,14] (3,5)	1.60	1.63	$\hat{y}$ = -0,119 x Sales + 154.888	0.04	98,133
156	0.27	0.18	0.26	0.18	0.24	0.35	[0,26 ; 0,28] (10,4)	0.97	0.59	$\hat{y}$ = 0,466 x Sales - 159.214	0.89	336,237
81	0.72	0.60	0.68	0.50	0.53	0.53	[0,64 ; 0,81] (8,4)	1.50	0.56	$\hat{y}$ = -90,507 x Sales + 16.334.005	1.00	3,069
123	0.73	0.35	0.66	0.28	0.42	1.16	[0,58 ; 0,87] (12,7)	0.92	0.81	$\hat{y}$ = 0,359 x Sales + 35.852	0.86	75,799
81	0.58	0.34	0.49	0.25	0.31	0.46	[0,42 ; 0,75] (7,5)	1.73	0.99	$\hat{y}$ = 0,357 x Sales + 37.297	0.84	93,405
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
54	0.74	0.46	0.63	0.52	0.55	0.62	[0,54 ; 0,94] (4,7)	1.64	0.77	$\hat{y}$ = 0,826 x Sales + 6.574	0.67	191,006
70	0.72	0.17	0.59	0.12	0.48	0.55	[0,31 ; 1,12] (6,0)	1.64	1.20	$\hat{y}$ = 0,485 x Sales - 11.777	0.89	422,175

Eastern Europe - Trailing & 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
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

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
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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
231	6.13	1.02	5.54	2.08	4.97	8.57	[-1,36 ; 13,62] (23,0)	0.88	0.82	$\hat{y}$ = 7,689 x EBITDA - 5.614	0.96	65,396
70	3.78	1.87	3.62	2.02	3.23	4.82	[0,04 ; 7,52] (7,7)	0.71	0.69	$\hat{y}$ = 3,246 x EBITDA + 871	0.86	2,912
199	8.88	2.10	8.89	4.18	7.33	15.76	[-2,36 ; 20,11] (31,9)	0.11	0.67	$\hat{y}$ = 1,343 x EBITDA + 14.430	0.89	23,194
821	8.19	0.99	8.04	3.33	7.17	13.88	[3,47 ; 12,91] (115,9)	0.30	0.67	$\hat{y}$ = 6,422 x EBITDA + 90.564	0.78	3,097,976
386	6.08	0.95	5.48	1.70	4.10	8.55	[-0,59 ; 12,75] (45,3)	0.90	0.88	$\hat{y}$ = 5,356 x EBITDA - 5.736	0.95	1,326,759
252	5.93	1.18	5.32	2.93	5.31	7.24	[0,57 ; 11,29] (17,1)	1.42	0.73	$\hat{y}$ = 2,919 x EBITDA + 2.604	0.29	18,233
236	6.19	2.29	5.60	2.06	4.53	8.75	[-2,34 ; 14,72] (26,8)	0.97	0.87	$\hat{y}$ = 8,319 x EBITDA - 2.108	0.88	173,728
343	4.20	0.96	3.43	1.49	2.96	5.23	[-0,18 ; 8,59] (44,2)	1.94	1.01	$\hat{y}$ = 2,209 x EBITDA + 298.240	0.45	1,882,508
81	6.01	2.80	5.73	1.96	3.43	9.30	[-4,88 ; 16,90] (11,6)	0.55	0.77	$\hat{y}$ = 9,931 x EBITDA - 7.646	0.92	19,254
810	7.88	0.06	7.66	2.94	6.89	12.28	[3,59 ; 12,18] (100,1)	0.31	0.66	$\hat{y}$ = 9,145 x EBITDA + 28.114	0.91	307,528
880	6.16	1.19	5.56	2.48	5.37	8.55	[2,68 ; 9,64] (72,4)	1.02	0.77	$\hat{y}$ = 7,748 x EBITDA - 315.528	0.95	1,624,748
386	8.37	2.92	8.17	2.86	8.11	13.92	[0,64 ; 16,11] (58,5)	0.17	0.69	$\hat{y}$ = 5,114 x EBITDA + 48.229	0.47	266,759
660	7.21	1.49	6.79	2.51	5.76	10.78	[2,06 ; 12,36] (84,2)	0.59	0.75	$\hat{y}$ = 1,101 x EBITDA + 37.277	0.41	136,796
886	5.86	1.41	5.36	2.37	4.89	8.63	[2,86 ; 8,85] (66,2)	0.98	0.76	$\hat{y}$ = 4,510 x EBITDA - 23.503	0.91	397,209
279	6.49	1.18	5.77	2.14	4.35	10.98	[-2,47 ; 15,44] (31,3)	0.92	0.88	$\hat{y}$ = 2,248 x EBITDA + 7.102	0.62	25,177
236	8.09	1.12	7.79	2.27	7.80	12.56	[-2,91 ; 19,08] (32,2)	0.41	0.75	$\hat{y}$ = 9,862 x EBITDA - 7.790	0.99	129,954
381	7.45	1.45	6.99	2.25	6.53	11.51	[0,35 ; 14,54] (49,5)	0.50	0.74	$\hat{y}$ = 1,979 x EBITDA + 34.825	0.84	154,944
284	6.19	0.57	5.51	2.30	4.91	9.34	[-1,41 ; 13,79] (26,6)	1.02	0.86	$\hat{y}$ = 8,902 x EBITDA - 24.514	0.94	71,585

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
-	-	-	-	-	-	-	-	-	-	-	-	-
48	2.71	2.54	2.71	2.35	2.92	3.11	[2,49 ; 2,93] (2,9)	-1.13	0.21	$\hat{y}$ = 2,891 x EBITDA - 93.939	0.92	349,967
-	-	-	-	-	-	-	-	-	-	-	-	-
140	2.00	1.01	1.97	1.15	2.26	2.61	[1,54 ; 2,46] (12,6)	0.30	0.55	$\hat{y}$ = 0,842 x EBITDA + 379.238	0.73	1,189,960
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
81	2.26	0.55	2.08	0.67	2.41	2.67	[0,55 ; 3,97] (5,1)	0.83	0.81	$\hat{y}$ = 1,661 x EBITDA + 14.211	0.23	56,671
48	1.70	1.31	1.70	1.07	1.46	2.37	[1,31 ; 2,10] (7,8)	0.12	0.46	$\hat{y}$ = 0,816 x EBITDA + 2.054.882	0.20	3,938,411
-	-	-	-	-	-	-	-	-	-	-	-	-
70	3.94	2.54	3.99	2.12	5.44	5.78	[1,56 ; 6,32] (13,8)	-0.19	0.53	$\hat{y}$ = 6,312 x EBITDA - 76.465	0.97	52,380
156	3.40	2.51	3.32	2.02	2.98	4.09	[2,32 ; 4,47] (16,2)	0.51	0.51	$\hat{y}$ = 2,628 x EBITDA + 11.998	0.91	295,868
81	3.51	2.90	3.28	2.44	2.59	2.59	[1,52 ; 5,49] (8,4)	1.50	0.56	$\hat{y}$ = -438,827 x EBITDA + 16.334.005	1.00	3,069
150	4.20	1.67	3.63	1.62	2.60	5.56	[-1,41 ; 9,81] (20,0)	1.84	0.93	$\hat{y}$ = 0,740 x EBITDA + 121.772	0.37	197,160
91	3.40	1.81	3.06	1.52	2.06	4.80	[-0,73 ; 7,54] (6,7)	1.36	0.87	$\hat{y}$ = 0,674 x EBITDA + 154.042	0.33	232,772
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
54	4.46	2.75	4.48	2.57	5.26	6.30	[1,22 ; 7,71] (8,1)	-0.22	0.51	$\hat{y}$ = 3,877 x EBITDA + 2.751	0.66	193,152
81	3.60	2.48	3.33	2.17	2.85	4.34	[0,80 ; 6,40] (5,2)	1.33	0.65	$\hat{y}$ = 2,643 x EBITDA + 39.921	0.94	297,081

Eastern Europe - Trailing & Forward DEPV/EBIT, 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

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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
236	6.18	1.42	5.48	2.50	5.56	8.55	[-2,26 ; 14,62] (43,0)	1.87	0.86	$\hat{y}$ = 9,141 x EBIT - 14.221	0.94	77,162
86	8.44	3.09	7.53	2.29	3.79	11.97	[-28,61 ; 45,49] (8,3)	1.15	1.03	$\hat{y}$ = 22,258 x EBIT - 17.007	0.72	42,320
182	7.20	1.69	6.65	1.85	4.65	11.92	[-5,68 ; 20,08] (22,8)	0.72	0.86	$\hat{y}$ = 1,810 x EBIT + 20.931	0.81	40,948
869	8.79	0.98	8.37	3.40	6.99	14.31	[2,62 ; 14,97] (84,2)	0.60	0.72	$\hat{y}$ = 6,799 x EBIT + 137.442	0.72	3,413,771
445	7.68	1.01	6.56	2.04	4.29	12.64	[-4,29 ; 19,65] (37,3)	1.19	0.97	$\hat{y}$ = 5,688 x EBIT + 15.188	0.95	1,232,604
236	10.15	1.52	9.78	3.78	8.78	17.23	[-5,28 ; 25,58] (29,1)	0.43	0.71	$\hat{y}$ = 2,453 x EBIT + 6.755	0.22	17,088
301	9.46	2.67	8.43	2.77	5.45	13.19	[-10,12 ; 29,05] (32,0)	1.01	0.91	$\hat{y}$ = 10,475 x EBIT - 12.184	0.85	173,292
440	7.45	2.12	6.28	1.68	3.83	10.83	[-5,09 ; 19,99] (46,5)	1.16	1.02	$\hat{y}$ = 7,035 x EBIT - 45.335	0.40	6,650,048
118	9.54	5.09	9.44	3.93	9.46	15.22	[-4,78 ; 23,86] (17,0)	0.25	0.61	$\hat{y}$ = 9,939 x EBIT - 781	0.78	41,289
891	9.57	0.07	8.68	4.05	8.39	13.22	[1,84 ; 17,29] (70,5)	0.97	0.75	$\hat{y}$ = 9,146 x EBIT + 22.040	0.90	310,198
1,106	7.78	0.27	6.78	3.45	5.81	10.49	[1,70 ; 13,86] (82,6)	1.42	0.86	$\hat{y}$ = 9,186 x EBIT - 175.747	0.86	2,784,663
365	10.12	0.03	9.83	3.16	11.40	16.01	[-1,63 ; 21,88] (36,6)	0.25	0.69	$\hat{y}$ = 4,097 x EBIT + 83.192	0.43	296,821
853	11.51	2.04	10.91	3.64	9.58	18.36	[0,28 ; 22,73] (112,6)	0.50	0.74	$\hat{y}$ = 11,952 x EBIT + 101.083	0.49	817,190
1,036	8.43	1.64	7.25	3.09	6.77	10.62	[1,05 ; 15,81] (79,6)	1.39	0.86	$\hat{y}$ = 9,184 x EBIT - 23.015	0.85	483,285
397	9.38	1.46	8.30	2.27	5.59	17.13	[-8,27 ; 27,02] (45,5)	0.95	0.94	$\hat{y}$ = 8,364 x EBIT + 704	0.85	90,062
301	8.95	1.11	8.06	2.26	8.01	13.58	[-7,66 ; 25,56] (30,1)	0.81	0.89	$\hat{y}$ = 10,001 x EBIT - 224	0.99	115,426
478	10.81	1.53	10.11	3.83	8.51	17.46	[-3,11 ; 24,73] (52,5)	0.63	0.76	$\hat{y}$ = 2,834 x EBIT + 55.696	0.77	175,776
327	8.03	0.73	6.95	2.92	5.16	11.06	[-5,35 ; 21,41] (25,4)	1.23	0.91	$\hat{y}$ = 7,252 x EBIT - 21.195	0.78	128,936

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
-	-	-	-	-	-	-	-	-	-	-	-	-
48	4.87	4.44	4.87	3.56	4.41	4.90	[3,21 ; 6,53] (4,8)	0.86	0.33	$\hat{y}$ = 4,276 x EBIT - 28.373	0.93	335,942
-	-	-	-	-	-	-	-	-	-	-	-	-
140	4.86	2.48	3.76	1.97	3.22	4.69	[-6,77 ; 16,50] (70,0)	2.70	1.13	$\hat{y}$ = 1,344 x EBIT + 408.713	0.70	1,244,340
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
81	9.23	2.50	8.56	1.88	4.70	14.68	[-28,74 ; 47,21] (8,3)	0.82	0.94	$\hat{y}$ = 1,871 x EBIT + 54.865	0.17	58,857
48	2.58	2.09	2.58	1.87	2.54	3.60	[1,88 ; 3,28] (6,6)	-0.05	0.40	$\hat{y}$ = 1,426 x EBIT + 1.765.784	0.30	3,690,767
-	-	-	-	-	-	-	-	-	-	-	-	-
70	4.59	3.46	4.64	2.77	5.65	5.92	[2,69 ; 6,49] (9,3)	-0.32	0.41	$\hat{y}$ = 6,068 x EBIT - 27.890	0.99	33,246
156	4.78	3.69	4.77	3.19	4.87	5.63	[3,13 ; 6,44] (20,5)	0.16	0.45	$\hat{y}$ = 3,977 x EBIT + 10.466	0.91	293,233
81	6.70	5.54	6.27	4.67	4.95	4.95	[-0,54 ; 13,93] (8,4)	1.50	0.56	$\hat{y}$ = -838,095 x EBIT + 16.334.005	1.00	3,069
134	4.77	2.16	4.59	2.13	3.40	7.42	[1,01 ; 8,54] (14,2)	0.55	0.65	$\hat{y}$ = 1,640 x EBIT + 113.202	0.44	192,012
91	4.27	2.77	3.91	2.00	2.41	6.17	[-0,46 ; 8,99] (7,3)	1.16	0.74	$\hat{y}$ = 1,541 x EBIT + 128.078	0.41	219,182
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
54	3.17	0.67	2.59	0.57	0.77	4.32	[-5,13 ; 11,47] (4,8)	1.07	1.16	$\hat{y}$ = 8,523 x EBIT - 196.521	0.64	200,310
81	4.99	3.51	4.61	3.03	4.32	5.57	[0,09 ; 9,90] (6,2)	1.55	0.62	$\hat{y}$ = 3,667 x EBIT + 86.899	0.89	416,706

Eastern Europe - 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
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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/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
499	0.53	0.14	0.51	0.24	0.52	0.80	[0,51 ; 0,55] (63,0)	0.32	0.61	$\hat{y}$ = 1,061 x IC - 13.034	0.92	30,841
166	0.50	0.10	0.48	0.19	0.48	0.68	[0,46 ; 0,54] (18,3)	0.42	0.68	$\hat{y}$ = 1,138 x IC - 21.492	0.98	69,885
338	0.50	0.16	0.48	0.28	0.42	0.72	[0,47 ; 0,52] (37,1)	0.58	0.63	$\hat{y}$ = 0,907 x IC - 16.823	0.89	89,349
1,433	0.54	0.12	0.52	0.30	0.56	0.70	[0,53 ; 0,55] (132,3)	0.26	0.54	$\hat{y}$ = 0,468 x IC + 351.515	0.93	1,265,461
821	0.50	0.13	0.48	0.24	0.42	0.77	[0,48 ; 0,51] (100,2)	0.50	0.67	$\hat{y}$ = 0,963 x IC - 105.800	0.92	1,051,504
354	0.50	0.11	0.48	0.23	0.41	0.78	[0,47 ; 0,53] (43,9)	0.58	0.72	$\hat{y}$ = 0,610 x IC - 4.055	0.75	27,712
660	0.41	0.16	0.38	0.20	0.37	0.49	[0,40 ; 0,43] (44,5)	1.02	0.68	$\hat{y}$ = 0,415 x IC - 4.578	0.91	94,846
708	0.44	0.13	0.41	0.20	0.37	0.66	[0,42 ; 0,45] (76,1)	0.69	0.68	$\hat{y}$ = 0,386 x IC - 83.423	0.98	952,293
118	0.43	0.11	0.43	0.25	0.44	0.63	[0,40 ; 0,46] (10,7)	0.11	0.61	$\hat{y}$ = 0,534 x IC + 1.286	0.93	10,734
1,556	0.46	0.04	0.43	0.21	0.45	0.65	[0,45 ; 0,47] (138,2)	0.57	0.63	$\hat{y}$ = 0,675 x IC - 13.878	0.96	94,018
1,857	0.51	0.08	0.50	0.24	0.47	0.77	[0,50 ; 0,52] (226,6)	0.36	0.64	$\hat{y}$ = 0,490 x IC + 130.949	0.92	1,202,692
521	0.47	0.00	0.44	0.22	0.43	0.61	[0,45 ; 0,49] (49,9)	0.64	0.68	$\hat{y}$ = 0,527 x IC - 1.009	0.81	95,677
869	0.61	0.16	0.61	0.33	0.60	0.92	[0,60 ; 0,63] (113,1)	0.08	0.56	$\hat{y}$ = 0,236 x IC + 11.807	0.78	54,027
1,149	0.64	0.09	0.65	0.41	0.62	0.99	[0,63 ; 0,66] (152,7)	-0.02	0.54	$\hat{y}$ = 0,748 x IC - 30.452	0.90	364,181
1,138	0.49	0.05	0.48	0.24	0.47	0.74	[0,47 ; 0,50] (128,1)	0.23	0.62	$\hat{y}$ = 0,680 x IC - 3.319	0.86	118,493
773	0.54	0.06	0.54	0.35	0.55	0.72	[0,53 ; 0,55] (66,3)	0.08	0.55	$\hat{y}$ = 0,638 x IC - 2.150	0.96	36,959
939	0.54	0.20	0.54	0.29	0.50	0.78	[0,53 ; 0,55] (115,5)	0.12	0.54	$\hat{y}$ = 0,345 x IC + 25.402	0.87	103,957
526	0.47	0.16	0.44	0.22	0.35	0.66	[0,45 ; 0,50] (58,1)	0.81	0.73	$\hat{y}$ = 0,790 x IC - 23.716	0.76	176,738

News from EACVA

Celebrating 20 Years of EACVA – A Milestone in Business Valuation

In 2025, the European Association of Certified Valuators and Analysts (EACVA) proudly celebrates its 20th anniversary. Since its founding in 2005, EACVA has become the leading professional organisation for business valuation professionals in Germany, Austria, and Switzerland, and has significantly expanded its reach across Europe since 2017.

As the European chapter of NACVA – one of the most prominent organizations for valuation professionals in the US – EACVA provides the globally recognized Certified Valuation Analyst® (CVA®) training and certification exam. It also serves as a vibrant platform for professional networking, continuing education and certification in Europe, offering all the services and benefits of a professional association. We support our members in technical matters, promote national and international contacts with other experts, and encourage mutual support. With a network of over 1,200 members and strong international ties through the global GACVA network and IVSC membership, EACVA continues to shape and support the future of business and intangible asset valuation across Europe.

Join the growing EACVA community of valuation professionals and become a member »

Upcoming EACVA Trainings and Events – Mark Your Calendar

EACVA's professional education program for the second half of 2025 offers a wide range of high-quality opportunities for valuation professionals across Europe. Highlights include the *18th Annual Business Valuation Conference* – Europe's largest gathering of valuation experts – alongside four *Certified Valuation Analyst (CVA) training programs*. Additionally, the *Around the Valuation World International* – monthly webcast series and various seminars will provide con-tinuous professional development and global insights.

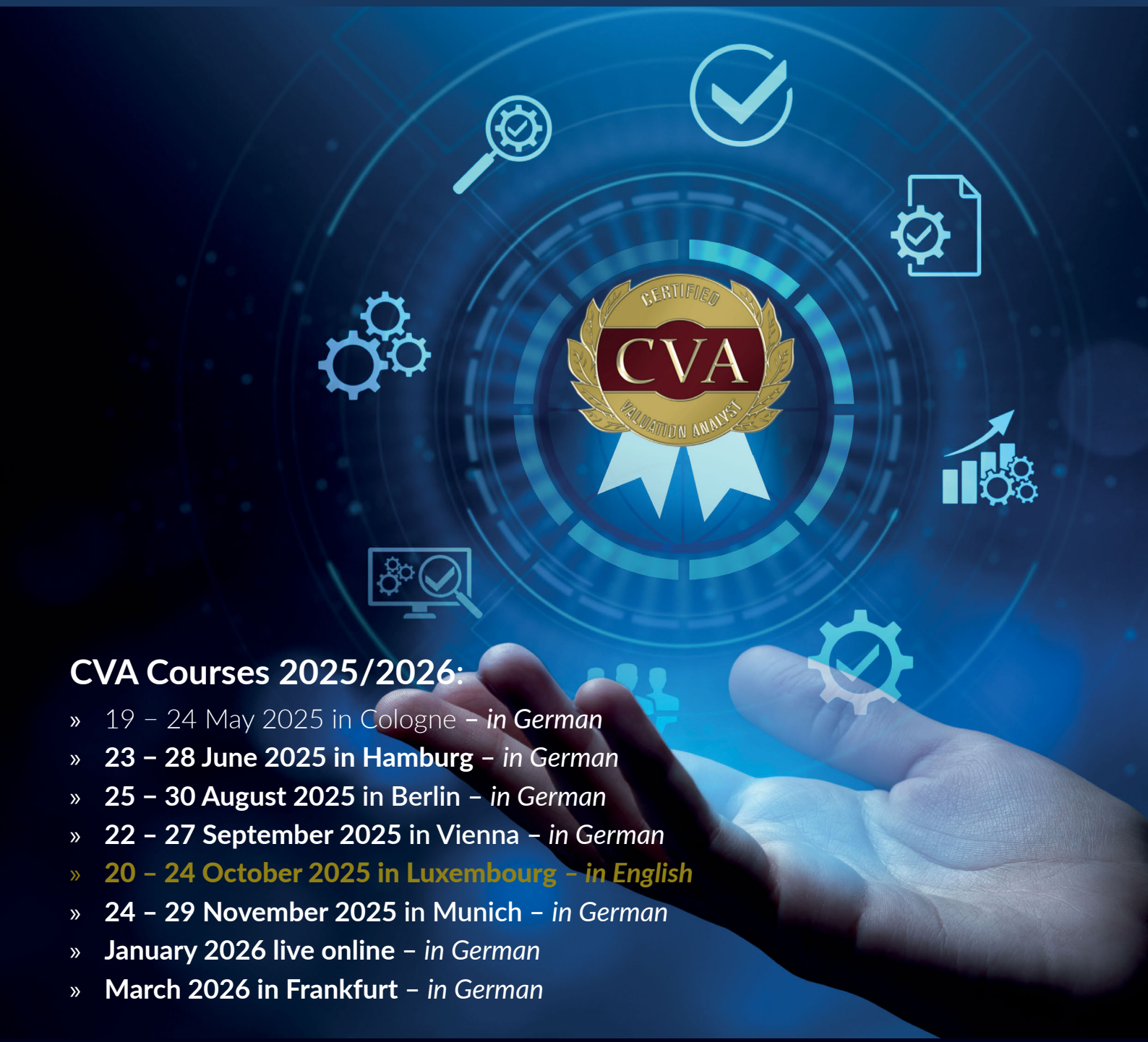
Featured events 2025:

- 25–29 August: In-person five-day CVA Training and Exam in Berlin (German)
- 22–27 September: In-person five-day CVA Training and Exam in Vienna (German)
- 20–24 October: In-person five-day CVA Training and Exam in Luxembourg (English)
- **13–14 November**: EACVA's 18th Annual International Business Valuation Conference in Munich (English and German)
- **20 November**: EACVA's Live Web Seminar: Valuation of Highly Asset-Light Start-Up Companies (English)
- **24–29 Novembe**r: In-person five-day CVA Training and Exam in Munich (German)

Whether you're pursuing certification, recertification, or looking to expand your network, EACVA's 2025 events offer exceptional value and engagement for all valuation professionals. Learn more and register »

Certified Valuation Analyst (CVA)

– the most widely recognised business valuation credential worldwide –



CVA Courses 2025/2026:

- 19 – 24 May 2025 in Cologne – *in German*
- **23 – 28 June 2025 in Hamburg** – *in German*
- **25 – 30 August 2025 in Berlin** – *in German*
- **22 – 27 September 2025 in Vienna** – *in German*
- **20 – 24 October 2025 in Luxembourg – *in English***
- **24 – 29 November 2025 in Munich** – *in German*
- **January 2026 live online** – *in German*
- **March 2026 in Frankfurt** – *in German*

Learn more and register:

- courses in English language: www.EACVA.com/certified-valuation-analyst-cva
- courses in German language: www.EACVA.de/certified-valuation-analyst

For further information, please contact the EACVA team
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EUROPEAN ASSOCIATION OF CERTIFIED EACVA SINCE 2005 VALUATORS AND ANALYSTS

News from IVSC

Supporting Valuers Amid Regulatory Uncertainty: IVSC Issues Statement on Prudential Value for Real Estate

The IVSC Europe Committee, in collaboration with the Tangible Assets Board, has published a statement addressing growing uncertainty around the interpretation and implementation of Prudential Value in real estate valuation across Europe. Following the introduction of "Property Value" requirements under the EU Capital Requirements Regulation (CRR), valuers have faced increased demand for prudent valuations—often in the absence of clear regulatory guidance.

The statement outlines three approaches currently emerging in practice and offers practical advice for valuers, including the importance of seeking clear instructions, documenting adjustments transparently, and applying professional judgement in line with IVS 100. As national guidance continues to evolve, the IVSC is committed to supporting valuation professionals with clarity and consistency. Read the full statement here.

New Appointments Strengthen IVSC Standards Boards

The IVSC has announced several new appointments to its Standards Boards, further strengthening the depth and diver-sity of expertise guiding the development of the International Valuation Standards (IVS). The Business Valuation Board, Fi-nancial Instruments Board, Tangible Assets Board, and Stand-ards Review Board are made up of leading professionals from more than 40 countries, all contributing to the global advance-ment of valuation best practice.

New members include representatives from Australia, China, Poland, Romania, the UK, France, Germany, Italy, Canada, Kenya, and the UAE. Each board member is appointed for a re-newable three-year term, supporting the ongoing renewal and progression of the IVSC's technical agenda.

Meet the new board members here.

Strengthening Trust in Private Market Valuations

The IVSC's Financial Instruments Board has published a new article examining how International Valuation Standards (IVS) can help build confidence in private market valuations. As private assets form an increasingly large component of institutional portfolios, consistent and transparent valuation practices are essential for investor trust and regulatory oversight.

The article identifies current challenges in valuing private market instruments and outlines how IVS can support greater rigour and comparability across jurisdictions. It also highlights the importance of professional judgement and the role of principles-based standards in a fast-evolving market environment.

Read the full article here.

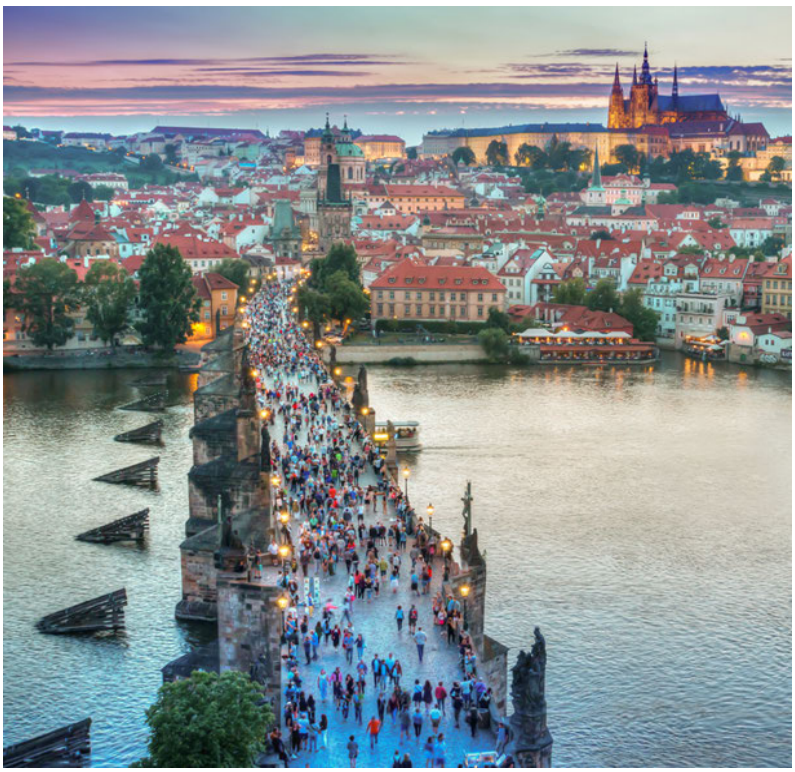
Free-to-Join IVSC Webinars Support Global Valuation Community

IVSC continues to host a series of free thought leadership we-binars open to all valuation professionals and stakeholders. These sessions bring together international experts to discuss key developments in valuation, share insights, and explore the application of International Valuation Standards in practice. Topics in 2024 have included valuation risk, macroeconomic uncertainty, digital assets, restructuring, and ESG. Recordings of recent sessions and information on upcoming events are available on the IVSC website.

Explore IVSC webinars.

IVSC Standards Boards Convene in Prague to Advance Technical Agenda

From 9–12 June 2025, IVSC's Standards Boards will gather in Prague for a series of meetings aligned with Czech Valuation Day. Hosted by the Prague University of Economics and Business, the meetings will bring together board members from around the world to advance their technical work programmes. Discussions will include analysis of feedback to the recent Agenda Consultation and early planning for a public consultation on the next edition of IVS, expect-ed in 2026. Board members will also meet with local stakeholders including the Ministry of Finance, Czech National Bank, and representatives from the Czech valuation community.



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