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We **invite submissions of practical and scientific articles on business valuation topics,** with a particular emphasis on country-specific perspectives. We encourage researchers, practitioners, and industry experts to contribute your expertise to our upcoming issues including but not limited to:

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From the Editors

From Science to Craft: Dealing with Uncertainty in a Changing World (of Business Valuation)

For many years, the methodology for valuing companies has been standardised (without mentioning the normative framework): Perform an economic diagnosis, external (environment, market), then internal (strategy, business model), followed by an operational and financial diagnosis. Use this information to challenge the business plan and determine the valuation aggregates, and finally apply valuation methods according to a multi-criteria approach depending on the context of this valuation (transactional, regulatory, litigation, etc.). As part of the analogue approach, the valuer will constantly identify the most relevant comparables: market/ growth/ etc, based on its economic analysis. As part of an intrinsic approach (DCF, DDM), the appraiser will determine the actuarial parameters taking into account the conclusions of his economic analysis (in particular credit spread, long-term growth rate).

In the 1990s, these business valuation concepts were completed: the concept of value creation highlighted intangible capital. Valuers then became interested in taking this intangible capital into account, as well as the valuation of isolated assets (patents, trademarks, human capital, etc.). However, the valuation techniques used remain the same. Considering a relatively stable economic environment, financial research has thus been able to delve into certain topics: determining the cost of equity for each of its components (risk-free rate, beta, market risk premium, country risk premium, cost of debt), taking into account discounts for size and illiquidity, implementing optional valuation models, the impact of the implementation of accounting standards such as IFRS 16 on leases, etc.

But business valuation is neither a science nor an art, it is a craft, as *Professor Aswath Damodaran* so well reminded us. And the last few years have amply proven this:

- The economy has been marked by soaring inflation. How to deal with it in business plans and therefore future cash flows? Can we still talk about normative results in analogue models? What is the impact on the WACC? French valuation associations have regularly spoken on the subject.
- The cost of credit is experiencing an unprecedented rise in interest: what is the impact on the valuation methods used?
- The valuator, previously being a financial professional, must now be an extra-financial professional. And the whole approach so far conducted must be adapted: how to value the ESG strategy? How to measure OPEX/ CAPEX ESG? Will ESG ratings be harmonised like credit ratings? How to measure the comparability of peers' ESG policies? How to factor ESG in the WACC, in the long-term growth rate, in the cost of debt? In France, valuators as well as financial directors, auditors, and chartered accountants are mobilising around these reflections.
- In France, the European Restructuring and Insolvency Directive 2019/1023 of 20 June 2019 was transposed on 15 September 2021. Valuers are now increasingly solicited by the various classes of affected parties, and must therefore know how to deal with the uncertainty related to the restructuring context. And lawyers and judicial administrators now have to familiarise themselves with valuation issues.

It is easy to see that there is still a lot of research to be done in the field of valuation. Our magazine will echo this.

Maud Bodin Veraldi, CCEF
Groupe Aplitec, France

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Article

Christof Binder, PhD, MBA

Managing Partner of Trademark Comparables AG, Schwyz, Switzerland, and Co-Founder of the MARKABLES database for the valuation of intangible assets.

Christof Binder has extensive experience as a financial advisor for IP-based transactions and IP monetization. Prior to intangible asset advisory, he was principal at one of the leading global strategy and management consultancies.

Binder performed numerous valuation engagements for intangible assets, and he was involved in the initiation and management of over 500 license partnerships. He acted as financial expert in IP infringement and transfer pricing litigation issues to courts and arbitration panels across Europe. He is a regular author and speaker on valuation, royalty rate and licensing issues.

Contact: ebvm@eacva.de

Synergies in Accounting and Valuation

Businesses can create value through organic profitable growth, or through acquisitions. When it comes to M&A, the secret to success is synergies. A successful deal has high synergistic gains and pays little for them. All communications and disclosures about synergies are unregulated, voluntary, and unstructured. Post-deal, synergies are used to qualitatively justify the recognition of goodwill. To improve the understanding of goodwill, the IASB started an initiative to make synergy disclosures in business combinations mandatory. This article analyzes when synergy disclosures are made today, what they contain, their value relevance, and what needs to be done so that they can be integrated into purchase accounting and subsequent amortization and impairment.

I. Introduction

Businesses can create value through organic profitable growth, or through acquisitions. When it comes to M&A, the secret to success is synergies. A successful deal has high synergistic gains and pays little for them.

The IASB has started an initiative to improve the information provided to investors about an acquisition and its subsequent performance. Much of this initiative relates to goodwill, and one of its major elements is how synergies can help to justify and explain goodwill. To achieve this, IASB thinks about making synergy disclosures mandatory for business combinations.

Synergies from M&A have been the focus of dealmakers, transaction advisory, value delivery, investors, and strategic management. What we know about synergies stems from voluntary, unregulated, and unstructured disclosures.

If IASB's current initiative for improving synergy disclosures is accepted and implemented, synergies will get much higher attention. But this involves more than just increasing the frequency of disclosures from voluntary to mandatory. This involves all aspects from how synergies are reliably quantified pre-deal, how they are announced and disclosed, how they relate to assets and values resulting from the underlying acquisition, and how they are measured and reported over time.

This article will take a closer look at the data found in such voluntary synergy disclosures and how they relate to prices, premiums, and values. To better understand the content of this data, we also examine why, and under which circumstances, it is disclosed, and what readers expect from it. We find that synergy data as disclosed in the past is widespread and does not follow a usual pattern. In particular, synergy data provides little information to better understand the unliked category of goodwill. Based on this, we develop requirements how pre-deal synergies can be related to and integrated into post-deal purchase accounting.

II. What are Synergies?
1. Definition of Synergies

The origin of the term synergy is Greek. Synergos means coworker or working together, synergía means working together.

In management and finance, synergy is the concept that the combined value and performance of two companies will be greater than the sum of their separate individual parts.[1] The term synergy is most commonly used in, but not limited to, the context of mergers and acquisitions (M&A).[2] Synergy, or the potential financial benefit achieved through the combination of companies, is often a driving force behind a merger. If there were no benefits from the combination, both entities could continue to operate stand-alone. In practice, there are three different types of synergies:

Revenue synergies are based on the concept of two companies increasing total revenues after their combination compared to the sum of their revenues when operating separately. Cost synergies occur when the combined entities produce the same total revenues or output as if they were stand-alone, but at a lower cost. Financial synergies are improvements in financial activities and conditions for a company as a result of the combination. Cost synergies are commonly classified into how they occur (i.e., economies of scale or increased volume; economies of scope or eliminating duplicate efforts; complementary resources or improving best practice; combined resources or increased buying power), and where they occur (i.e., manufacturing cost synergies; sourcing synergies; R&D synergies; and SG&A synergies).

Synergies are a driving force behind M&A. When a transaction has synergy, it means that the value of the combined entity will be greater than the value of the individual parts. The ultimate motive of any transaction is to generate value; synergies offer a short-cut to achieving that value.

Synergies offer an excellent means through which the benefits of the deal can be communicated to shareholders and investors. When justifying M&A transactions in their public announcements, acquirers typically point to the synergies that the deal will bring. However, such synergy announcements exhibit a wide range regarding the level of detail offered to the public. They start with a vague mention of the term "synergy", and end with a detailed quantification and phasing of synergies and the cost to achieve them, including their impact on EBIT multiples and EPS.

2. Synergies and Goodwill in Accounting

Synergies represent potential, or expectations. As such, they do not exist in accounting or on balance sheets. However, such potential is part of the acquisition and invariably part of the purchase price paid.

In accounting, business combinations are governed by the international standard IFRS 3, or by ASC 805 under US GAAP. Accordingly, the difference between purchase consideration and the net of the identifiable assets acquired and liabilities assumed, is recognized as goodwill.

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1 Investopedia, Synergies: Concepts in Finance and Examples, 31.03.2022, » Link (last access 07.08.2023).

2 Alternatively, synergy is used in the context of joint activities, i.e. joint ventures, joint development projects, etc.

Goodwill is a rather disliked category in accounting. Nobody really knows what it is or what it contains. Its useful life is indefinite. It is not regularly amortized. Some see it as an asset, some as potential for future benefits, and some as future but not yet existing assets. In fact, it is a complex compound of different items.

According to IFRS 3, the acquirer shall disclose information that enables users of its financial statements to evaluate the nature and financial effect of a business combination. In particular, the recognition of goodwill requires a qualitative description of the factors that make up the goodwill recognized, such as **expected synergies** from combining the operations of acquiree and acquirer, intangible assets that do not qualify for separate recognition, or other factors.

As a result, goodwill recognized in business combinations is most often explained qualitatively with something like "Goodwill is primarily attributed to the assembled workforce and anticipated operational synergies." While such a vague statement is in accordance with the guidance provided in IFRS 3, this information does not contribute much to enabling users to evaluate the nature and financial effects of the business combination.

Goodwill is an important but little understood and disliked item on the balance sheet. On average, goodwill accounts for one-half of the value of the acquired business. The qualitative explanations provided with its first-time recognition under IFRS 3 provide little to improve the understanding of goodwill. Like accountants, **analysts** and **investors** don't appreciate the high amounts of largely unexplained goodwill reported from business combinations. This is perceived as an indication of a **high-risk** business model and a potential **overpayment**.

In 2015, IASB started a project titled "Business Combinations—Disclosures, Goodwill and Impairment" with the objective to exploring whether companies can, at a reasonable cost, provide investors with more useful information about the acquisitions those companies make. One of the topics considered in this project is improving the information provided to investors about an acquisition and its subsequent performance.

The current working status of this project[3] is that IASB should

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3 IFRS Accounting, Staff Paper, Business Combinations—Disclosures, Goodwill and Impairment, Topic Expected synergies, January 2023, » Link (last access 10.08.2023).

- require entities to disclose quantitative information about expected synergies disaggregated by nature, for example, total revenue synergies, total cost synergies, and totals for other types of synergies;
- require entities to disclose when the benefits expected from the synergies are expected to start and how long they will last (which would require an entity to identify whether those synergies are expected to be finite or indefinite);
- exempt companies from disclosing some of the information required in specific circumstances.

If implemented, this initiative goes far beyond the current practice of qualitative disclosure of synergies included in goodwill. It would involve many new aspects at the interface between dealmaking and accounting and valuation. And it would involve pre-deal purchase price allocations where synergies and goodwill are reconciled early on.

III. Two different perspectives on synergies
1. Acquirer's view

Usually, the acquirer pays a premium on top of the standalone value of his business, which is described as the takeover premium paid for the potential to realize synergies. Therefore, he must have a clear picture of the synergies that can be expected from the deal before he submits his first bid price. There is both **time pressure** during the pre-deal due diligence phase and **limited access** to information.

Quantifying expected synergies from a merger is a difficult but important exercise. The first step is to systematically **break down** potential synergies into different **categories** and **subcategories**. Basically, there are three major synergy categories:

- **Revenue synergies** result from incremental increases in revenues compared with standalone companies. Subcategories include cross-selling, pricing, additional distribution, innovation, brand recognition, and others. Revenue synergies are generally regarded as difficult to quantify and hard and/or long to achieve. They involve the purchasing behavior of customers, which is difficult to predict and control. Revenue synergies do not include growth that the acquired business would achieve without the merger.

- **Cost synergies** are commonly classified into how they occur (i.e., economies of scale or increased volume; economies of scope or eliminating duplicate efforts; complementary resources or improving best practice; combined resources or increased buying power), and where they occur (i.e., manufacturing costs synergies; sourcing synergies; R&D synergies; and SG&A synergies). Cost synergies can be estimated with a good degree of accuracy, and they are easy to achieve.

- **Balance sheet synergies** are primarily one-off effects from capex and working capital reductions. They include, i.e., inventory reductions, financing terms, better capital allocation, elimination of duplicate capex, and tax optimization. Balance sheet synergies are often minor and take long to achieve.

For each subcategory, the buyer analyzes actual **costs** and **KPIs**. The objective is to achieve improved KPIs through the combination and integration. Based on actual and target KPIs, synergies will be estimated. This estimation is based on **limited information**, typically P&L, cash flow, balance sheet, and headcount information on the target revealed in data room due diligence or from publicly reported information in listed deals. Any serious synergy projection must include a **time schedule** for how they can be achieved over time and an estimation of the **additional cost** to achieve them.

The exercise to quantify synergies might look like a precise calculation, like in a fair value determination. In fact, it is a bandwidth estimation with different scenarios, risks, and aspiration levels. The more **experience** the buyer and his transaction advisors have in dealing with M&A and synergies, the more accurate the synergy estimation. Often, the bandwidth is fully intended. Its different scenarios may be used tactically in the acquisition and post merger integration processes.

- There is a distinction between what is **published** – which corresponds to an amount that can be safely achieved – and a more ambitious **internal target**. The buffer between the two scenarios is between 30% and 50% on average[4]; if the published amount is 100, the internal target would be 150. In M&A practice, these buffers can differ widely.
- Synergies are an important, if not the most important, element of the purchase price negotiation and price arbitration procedures. Although it is the buyer's responsibility to exploit and achieve synergies, it is not his sole profit. The value of synergies is **shared** between the buyer and sellers (through the takeover premium), and therefore the synergy amount is a tactical amount for the buyer.
- Even more, if the purchase price is paid in buyer's stock, the future value of this stock will also depend on expected synergies and how successfully they will be realized. The same applies if the buyer gets less than 100% of the target's shares; synergies will affect the future value of the non-acquired shares. In these cases, synergy projections are like another currency and are used tactically in negotiations or bidding.
- As for the published synergy amount, there is a fine line between **announcing** an amount that looks important and ambitious to the public, and **not missing** this announced amount during the years after the deal. Investors would punish either of the two.

The second most important aspect of synergy quantification is how synergies are **split** between the buyer and sellers. A takeover premium refers to an amount that a buyer is willing to pay more than the fair market value of shares to gain a controlling ownership interest in a publicly traded company. On average, the takeover premium is between 30% and 35% on top of the last unaffected market price.

Synergies must cover the takeover premium that goes to sellers, and, ideally, another extra amount which is the gain of the buyer. In public deals, the split of (disclosed) synergies between the buyer and sellers can be observed through the price premium paid above the last observed market price, against the net present value of expected synergies.

In a paper published in 2013, Boston Consulting Group calculated that this split was **69%** for the buyer and **31%** for the sellers, with sector specific differences. According to BCG, the higher share for the buyer is justified by buyer's sole risk to achieve the announced synergies. Over time, the split has moved towards **50:50** in more recent years, reflecting changes in the general stock market and M&A environment.[5] A MARKABLES analysis of data from 605 public takeovers between 2010 and 2022 basically confirms this. Accordingly, the buyer gets between **56%** and **58%** of synergies, depending on the calculation method.

Available data on synergy split suggests that the buyer's share has been decreasing over time. As takeover premiums, although fluctuating, show no clear long-term trend, the reason must be that buyers became more prudent (or realistic) with their synergy announcements. Increased prudence about synergy expectations might be the result of widespread skepticism among investors and the financial press towards the value creation and success rate of M&A deals.[6]
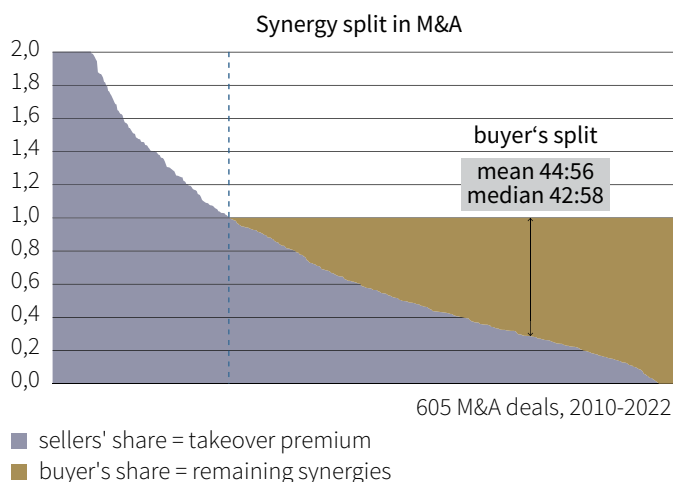
4 McKinsey & Co., A Winning Formula for Deal Synergies, 2020, » Link (last access 12.08.2023); Boston Consulting Group, The Real Deal and M&A, Synergies, and Value, 2016, » Link (last access 13.08.2023).

5 Boston Consulting Group, Divide and Conquer – How Successful M&A Deals Split the Synergies, 2013. 365 transactions > $300 million from 2000-2011, » Link (last access 12.08.2023); Boston Consulting Group, The 2018 M&A Report – Synergies Take Center stage, 2018. Transactions from 2008-2017, » Link (last access 12.08.2023).

6 Despite challenges how to measure merger success, the reported failure rates range from 61% to 90%. Aoris Investment Management, Beware the acquirer's curse, 2021, » Link (last access 13.08.2021); Christensen/Alton/Rising/Waldeck, The Big Idea: The New M&A Playbook, Harvard Business Review, March 2011: 3-11.

The empirical distribution of synergy splits reveals some important findings (see figure 1).

Figure 1: Synergy split in M&A

Synergy split in M&A

buyer's split

mean 44:56
median 42:58

605 M&A deals, 2010-2022

■ sellers' share = takeover premium
■ buyer's share = remaining synergies

Source: MARKABLES 2023

- A typical synergy split or split range, i.e., between 60/40 and 40/60, is not verifiable.
- Many deals involve synergy splits in extreme favor of one party that are difficult to explain in theory.
- In 29% of the cases, the takeover premium is even higher than total synergies, meaning that expected synergies go 100% to sellers, and additional parts of the takeover premium must be paid from somewhere else.[7]

The buyer's share of the synergy split is an important indicator for merger success. However, it is important to realize that the split as measured above is only a tactical pre-deal split based on announced synergy expectations. As this split does not include additional synergies the buyer has in mind that he does not make public (the "buffer", see above), nor what percentage of expected synergies are effectively realized,[8] there is substantial upside and downside potential to arrive at an effective synergy split.

It bears repeating that quantifying and disclosing synergies pre-deal involves uncertainty, risk, and tactics.

2. Investors' view
Pre-deal synergies express a target, which is communicated to investors, shareholders, and analysts. They cannot reliably know if this target is realistic and achievable.

They can only believe it or not. Therefore, readers expect comprehensive, high-quality information on synergies.

Today, voluntary synergy disclosures are made primarily to assure readers that an announced deal is going to be a good investment that creates value. It is about creating trust and credibility. If perceived positively, the disclosure will increase trust in the outcome of the transaction, and eventually result in a positive stock market reaction for acquirer's stock. The key question here is whether there are clear benefits from such disclosure and how different forms and content of synergy disclosure contribute to such benefits.

There is ample academic and business research covering the stock market reaction of synergy announcements.[9] Success is usually measured as the cumulative abnormal return (CAR) of acquirer's stock in a short period before and after the announcement of an M&A transaction, for both announcements with and without synergy disclosures. The theory suggests that synergy disclosures result in superior returns, compared to non-disclosures. The empiric results are, however, ambivalent. Among seven studies, five (two) report higher (lower) CARs for deals including synergy announcements. There seems to be a small benefit to synergy disclosure compared to non-disclosure, but this benefit is not significant. On average, it does **not make a difference** to investors if synergy projections are disclosed or not. Although most investors appreciate synergy disclosures, such disclosures can also have negative impacts.

In contrast, it makes a considerable difference how synergies are disclosed. Investors react positively if the disclosed synergies are high, explained in detail, and in a positive, confident tone. Some of the research findings include:

- A high emphasis on synergies (i.e., how often the term synergy is used) in the announcements makes readers more confident in the credibility of synergy expectations and deal quality, resulting in a higher CAR.
- More information is better. Acquirers should disaggregate the cost, capital, and revenue synergies, and provide a clear rationale and vision for each. They

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7   Obviously, such deals were not made for synergies. They require different arguments in their internal justification and in their communication to the public.

8   A McKinsey survey found that 36% of acquirers overachieved their cost synergy goals, but 40% largely missed them. For revenue synergy, the success rate was substantially lower. Kristoffersen/McNish/Sias, Where mergers go wrong, The McKinsey Quarterly No. 2 (2004): 93-99.

9   Dutordoir/Roosenboom/Vasconcelos, Synergy disclosures in mergers and acquisitions, International Review of Financial Analysis 31 (2014): 88–100; Boston Consulting Group, Synergies Take Center Stage, 2018, » Link (last access 13.08.2023); Ismail/Khalil/Safieddine/Titman, Smart Investments by Smart Money: Evidence from Acquirers' Projected Synergies, Journal of Corporate Finance, vol. 56, June 2019: 343-363; Kristoffersen/Saellmann, The Role of Projected Synergies in M&A, 2019, » Link (last access 13.08.2023); McKinsey & Co., Making M&A deal synergies count, 2017, » Link (last access 13.08.2022); Pely/Schoch, Merger Rhetoric and the Credibility of Managerial Synergy Forecasts, 2020, » Link (last access 13.08.2020); Andresen/Gulbrandsen, Market Reaction to Synergy Disclosure in M&A, 2022, » Link (last access 13.08.2023).

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should communicate a timeline for when they expect the synergies to be fully recognized and what one-time investments and costs are required to capture the synergies.

- A comprehensive explanation of synergy amounts reduces analysts' questions and positively impacts CAR.
- A positive tone in the synergy announcements (i.e., the use of positive and optimistic wording, as opposed to negative or cautious wording) has a significant impact on readers' confidence and CAR.
- The initial market reaction is stronger when the net present value of synergies is higher than the takeover premium paid. A positive difference is expected to create value for acquirers.[10]
- The higher the relative size of synergies (i.e., relative to acquirer's value), the more positive their announcement effects on acquirer's stock. Unsubstantial synergies are hardly worth mentioning.
- Providing regular update reports on synergy targets, progress toward their realization, and actions taken to foster progress definitively helps to keep the early wins of disclosures (provided that synergy targets are achieved).

These findings suggest two different things: 1) Investors have more confidence in synergy disclosures that are well-explained and ambitious. Both aspects together create credibility. In contrast, investors seem to mistrust low synergy projections with brief explanations. 2) Given that the effect stays positive in the long-run, management with ambition and clear communication seems to be perceived as superior in delivering deal value from making good deals, from achieving synergy goals, or both. Poor communication, on the other hand, may be perceived as insecurity, hesitancy, and lack of focus.

IV. The valuation of synergies

Like any other valuation, the valuation of synergies uses a DCF approach to arrive at the net present value of the gains and costs of the synergy-related cash-flow projections. It requires a set of information and assumptions.

Synergies are usually quantified in the form of an **annual amount** of cost savings or additional EBIT resulting from additional sales. Such annual benefits are pre-tax and go into annual EBIT. The annual amount of synergy EBIT has a startup curve, meaning that it will be achieved with some delay after the acquisition date, and a growth path to get there. Moreover, there might be additional costs to realize the synergies, which also have an amount and a timing.

One major unknown in the valuation of synergies is their **longevity**. This phenomenon has not yet been addressed, let alone researched. It compares to the question if the gains from an internal cost-cutting program are perpetual, or if synergies will be caught up by competition. If competitors of the combining entities achieve similar efficiency effects from future growth, or if the combining entities would have achieved efficiency gains without the combination on a stand-alone basis, synergies must be considered finite-lived with a decreasing effect in the outer years.

Finally, the valuation requires a discount rate, which will be derived from the acquirer's WACC. Whether there is an additional risk premium to the WACC depends on the risk associated with the realization of projected synergies. Eventually, there will be different risk premiums for different synergy and realization scenarios. The applicable tax rate is the statutory corporate tax rate of the acquirer, target, or both, depending on the entity where the synergies will take effect.

Based on this information, the after-tax cash flows from synergies are discounted to their net present value.

Generally speaking, there are a few **valuation methods** available. We distinguish between **outside-in** methods available for the reader of financial information (i.e., equity analysts and investors) and **inside-in** methods for the acquirer (i.e., transaction advisors, accountants, independent valuers). **Outside-in** methods include the following:

1. Differential enterprise value

The value of synergies is the value of the two entities combined minus the sum of the values of both entities stand-alone. Prof. Damodaran initially propagated this approach. It is helpful if no synergies are disclosed by the acquirer. If the target is a private company, however, it is difficult to perform an outside-in valuation prior to the merger. If both entities are public, the resulting difference represents the outside view of the capital markets immediately before and after the announcements, which is reflected in share price developments. The result is most sensitive to the dates chosen to measure the market capitalization of the two entities.

2. EBITDA multiple

For this approach, three major datapoints are required as inputs: enterprise value and EBITDA of the target firm, and projected annual synergies. Based on the pre-deal EV/EBITDA multiple, an adjusted enterprise value, including synergies, can be calculated. Below is a sample case for the acquisition of Chemtura by Lanxess in 2017. All input data was disclosed in the deal announcements. In this particular case, annual

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10 All cases to the left of the vertical dotted line in figure 1 above didn't generate enough synergies to cover the takeover premium. Announcing synergies in these cases was eventually not a very good idea.

synergies of € 100 million would result in a total value of € 980 million.

Synergies in acquisition of Chemtura by Lanxess, 2017		
Pre-deal	Synergies	Pre-deal including synergies
Enterprise value: € 2.400 mn EBITDA: € 245 mn	€ 100 mn p.a.	
EV/EBITDA: 9.8x		EBITDA: € 345 mn EV/EBITDA: 7.0x Adj EV based on 9.8x: € 3.380 mn Synergy value: € 3.380 - € 2.400 = € 980 mn Synergy multiple: € 980 mn / € 100 mn = 9.8x

This simple approach is based on major assumptions:

- Synergies have the same risk profile and cost of capital as the underlying businesses.
- The pre-deal EV/EBITDA is fully applicable to synergies, even if parts of them are realized at the buyer's firm.
- The delay and additional costs of synergy realization are negligible.
- Synergies persist into perpetuity; there is no effect of obsolescence.

3. DCF method

This approach involves an accurate projection of the cash flows resulting from synergies over time and their discounting to a net present value. In particular, it requires:

- Amount and timing of **expenses** required to fully realize the run-rate synergies.
- This amount is sometimes reported with the synergy disclosure. If not, a typical amount is from 0.5x to 1x annual run rate synergies, expensed in year one after the acquisition.
- Timing of synergies realized over time.
- The **phasing** of synergy realization over time is sometimes reported with the synergy disclosure. If not, a typical pattern would be 1/3 in year one, 2/3 in year two, and 100% of full run-rate synergies in year three after the acquisition.
- Assumption regarding the long-term **growth** of annual synergies (i.e., following inflation), and assumption regarding the longevity and useful life of synergies (indefinite vs. finite).
- There is no consensus on whether synergies have an indefinite life with a perpetual growth rate equal to inflation, or a perpetual life with no growth, or if their effects are declining over time as a result of competitive reactions.
- Assumption regarding the **cost of capital** to discount synergies in future years

- Usually, synergies are discounted at the weighted average cost of capital of the acquirer, plus an additional risk premium due to the uncertainty of synergistic cash flows. Ideally, the discount rate applied to synergies is reconciled with the discount rates of the other assets of the business and the overall WACC under the WARA to WACC concept.

Inside-in valuation methods are applied by the acquirer or his advisors. Although much more accurate information is available, expected synergies are not just an exact annual amount. The valuer has to consider **buffers** above the amount that is given to the public, the synergy **split** between the buyer and sellers, average **realization levels,** hard-to-achieve synergies not disclosed (like revenue synergies), negotiation tactics, and more. As a result, the acquirer deals with different synergy **scenarios** or even a **complex** synergy playing field. The disclosed synergy amount is just one concrete result of this **playing field,** which serves practical or tactical motives. Applicable valuation approaches include:

- Scenario-based valuation
- Option pricing valuation or
- Monte-Carlo simulation

For further details on these methods, reference is made to the paper "Valuation of Contingent Consideration" of The Appraisal Foundation[11].

V. Synergy disclosures in M&A announcements
1. Disclosure frequency

Investors want information about synergies. Moreover, synergy disclosures are value relevant provided that their informational content is of high quality. IASB is investigating whether synergy disclosures should be made mandatory. As a result, we would expect that synergies are disclosed frequently in the context of M&A announcements.

The frequency of synergy disclosures – the percentage of M&A announcements that include a quantified synergy projection – has been measured in numerous publications. The findings, however, vary widely, with disclosure rates ranging from 50% to 8%. Findings depend on the research objective and on the sampling.

Irrespective of the inconsistencies, several findings on synergy disclosure frequency can be generalized:

- Synergy disclosures are very size-sensitive. This holds true for absolute target size, relative target size (materiality), and acquirer size.

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11 The Appraisal Foundation, Valuation of Contingent Consideration, 2019, » Link (last access 14.08.2023).

Table 1: Synergy disclosure rates in different data samples

Authors*	Sampling	Sample Size	Period	Data Source	Synergy Disclosure Rate
Boston Consulting Group	Largest 100 US public-to-public deals each year	1,000	2008-2017		50%
Pely/Schoch	US public-to-public	1,917	2002-2018	SDC	42%
Andresen/Gulbrandsen	US public-to-public	501	2012-2021	SDC	38%
Kristoffersen/ Saellmann	US target companies	775	2009-2018	SDC, Eventus	27%
McKinsey		1,640 2,500	2010-2016 2017-2019		20% 18%
Ismail/Khalil/Safieddine/ Titman	US public-to-public	3,108	1990-2013	SDC, Thomson	19.3%
Dutordoir/Roosenboom/ Vasconcelos	US public-to-public	1,990	1995-2008	SDC	17.3%
Fiorentino/Garzella	Italian public-to-public	58	2002-2010	CONSOB	15.5%
Andriolo	US target companies >5mn	290	2013	Bloomberg	13.8%
MARKABLES	Global target companies	16,642	2002-2022	MARKABLES	7.8%

*   Boston Consulting Group, op. cit. (footnote 9). Pely/Schoch, op. cit. (footnote 9). Andresen/Gulbrandsen, op. cit. (footnote 9). Kristoffersen/Gulbrandsen, op. cit. (footnote 9). McKinsey & Co. 2017, op. cit. (footnote 9), McKinsey & Co., op. cit. (footnote 4). Ismail/Khalil/Safieddine/Titman, op. cit. (footnote 9). Dutordoir/ Roosenboom/ Vasconcelos, op. cit. (footnote 9). Fiorentino/Garzella, The disclosure of synergy value in mergers and acquisitions, 2012, » Link (last access 13.08.2023). Andriolo, Synergies disclosure in M&A deals, 2014, » Link (last access 13.08.2023).

- Deals with listed targets have a much higher disclosure rate of 50%, vs. 5% for deals with non-listed targets.
- Synergy disclosures are positively correlated with payments involving acquirer's stock (in contrast to cash-only payments).
- Synergy disclosures are more frequent in national deals as opposed to cross-border deals.
- Synergy disclosures are more frequent with lower takeover premiums.

Synergy disclosures typically relate to cost synergies but rarely to other types of synergies. As revenue synergies are difficult to quantify and take time to realize, buyers often prefer to keep them private. Only between 5% and 8% of all synergy disclosures include an amount for revenue synergies. If disclosed, they contribute 39% to total synergies, with the remainder being cost synergies. Financial synergies are reported in only 1% of the synergy disclosures. Both revenue and financial synergies are not disclosed as stand-alone synergies.[12]

Disclosures of information on the timing and cost of synergy realization are not provided consistently. Some disclosures provide the year after the acquisition when the full run-rate synergies are expected to be realized. Less disclosures provide information about the cost to achieve the synergies, and even fewer disclosures provide information about the schedule of synergy realization over time from its beginning to full realization. Dis-

closure frequency of timing and cost information is not known; we estimate that 50% of synergy disclosures include the year of full realization, 25% cost, and 15% the schedule over time.

Regarding the wide differences in disclosure rates, there is a good case to assume that the **8% disclosure rate** found in MARKABLES is the most unbiased and most realistic finding. All other studies are sampled from transaction databases, which source their information from deal announcements in the public domain. A very substantial part of these (smaller) deal announcements states something like „*financial terms of the transaction were not disclosed*". For lack of financial terms, there is nothing to file on these deals in transaction databases.

However, some of these deals make it onto the **balance sheet** of the acquirer a few months later, under the **IAS purchase accounting rules** and including a wide set of financial data. This is the data source for **MARKABLES**. In other words, MARKABLES has more deals on file where the acquirer does not want to make voluntary disclosures around the acquisition date but makes mandatory disclosures later. This helps to explain the difference between 14%-27% synergy disclosures for unlisted targets found in transaction databases and 8% found in MARKABLES.

Nothing is known about why the remaining 92% of acquisitions don't include a synergy announcement. Three factors likely come into play:

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12 Dutordoir/Roosenboom/Vasconcelos, op. cit. (footnote 9); Pely/Schoch, op. cit. (footnote 9); Boston Consulting Group, 2013, op. cit. (footnote 5).

- Deals can be non-synergistic. Sometimes a target may simply be perceived as undervalued and therefore a good deal.
- Identifying, quantifying, and implementing synergies before and after an M&A deal is a **complex**, non-recurring management task that requires not only project-based resources, but also **experience** on all three levels. Inexperienced acquirers might not disclose synergy information to avoid mistakes.
- Potential disclosure benefits are not obvious.

Given the low disclosure rates today, IASB's initiative to make synergy disclosures mandatory might encounter some resistance and require well-scaled exemptions.

2. The Size of the synergy effect

When analyzing quantitative synergy disclosures, it is important not to compare apples and oranges. Therefore, the content of the disclosures must be consistent. Basically, two types of synergies can be identified in disclosures: **cost synergies** (or cost savings) and **revenue synergies.**

- The use of the term „**cost synergies**" is consistent in quantitative synergy disclosures. It relates to „annual run-rate cost savings before tax", and this annual amount adds to annual EBITDA. Additional information regarding the time lapsed until the cost savings are achieved in full, and the amount of one-time expenses needed to achieve the cost savings, is not disclosed consistently. Sometimes, such information is fully disclosed together with the cost savings, sometimes in parts, and in most cases not.
- In contrast, the use of the term „**revenue synergies**" is not consistent in disclosures. A quantified amount of revenue synergies may relate to either „additional EBITDA resulting from additional revenues", or simply „additional revenues" with an unknown EBITDA margin. In any case, disclosures of revenue synergies are much less frequent than cost savings. Likely, there is more **uncertainty** related to the quantification of revenue synergies.

For disclosure consistency, we will analyze **annual run-rate cost savings** related to particular M&A deals, as disclosed in documents surrounding the public announcement of a deal. To understand more about the size of such cost savings, we relate them to other parameters of the same deal as disclosed in purchase price allocations. In total, the MARKABLES synergy data subset has synergy data for 1,300 global deals from 2002 to 2022 on file.

First, we relate annual cost synergies to revenues and EBITDA of the acquired[13] business. We provide the results
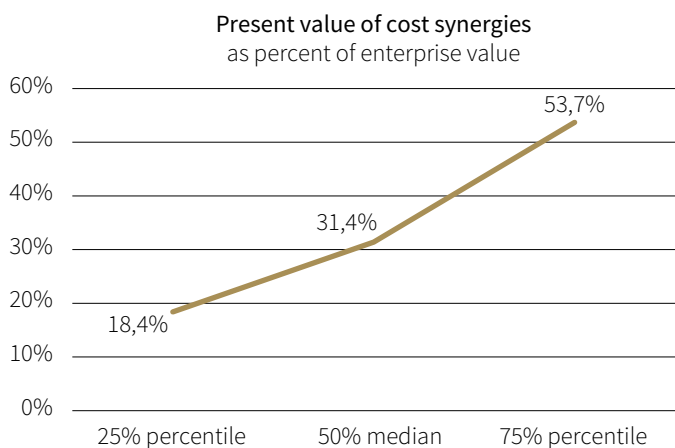
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13 EBITDA data is available in 739 cases.

Figure 2: Annual run-rate cost synergies
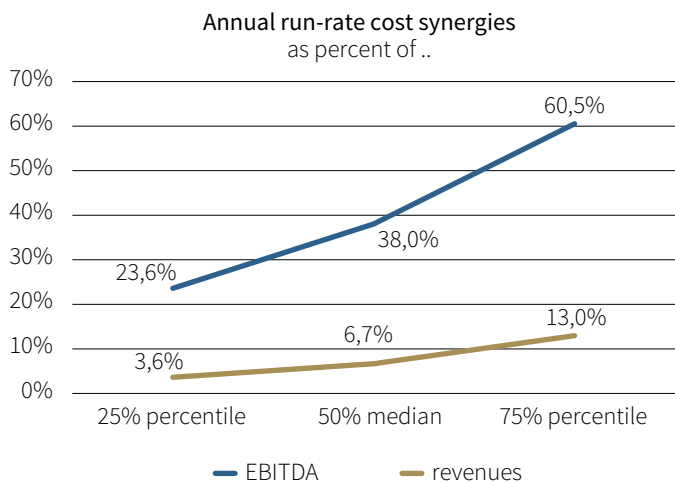
Source: MARKABLES 2023, 1.300 M&A deals

Figure 3: Present value of cost synergies

Source: MARKABLES 2023, 1,300 business combinations

of an interquartile range analysis, that is, the results for the 25th, 50th (median) and 75th percentiles of the data (see figure 3).

- As a median result, cost synergies represent **6.7% of annual revenues**, ranging from 3.6% to 13.0%. These percentages represent an additional EBITDA margin resulting from the synergies.
- As a median result, EBITDA of the acquired business increases by **38%** (ranging from 23.6% to 60.5%) if the cost savings from synergies are added.

In other words, a median 38% of purchase consideration can be justified with expected cost synergies. Therefore, cost synergies must be considered a **major driver of M&A success**. Looking closer at the numbers, the size of such contributions shows a very wide range. Apparently, some deals provide only little synergy po-

Figure 4: Present value of cost synergies by sectors

Present value of cost synergies
as % of enterprise value
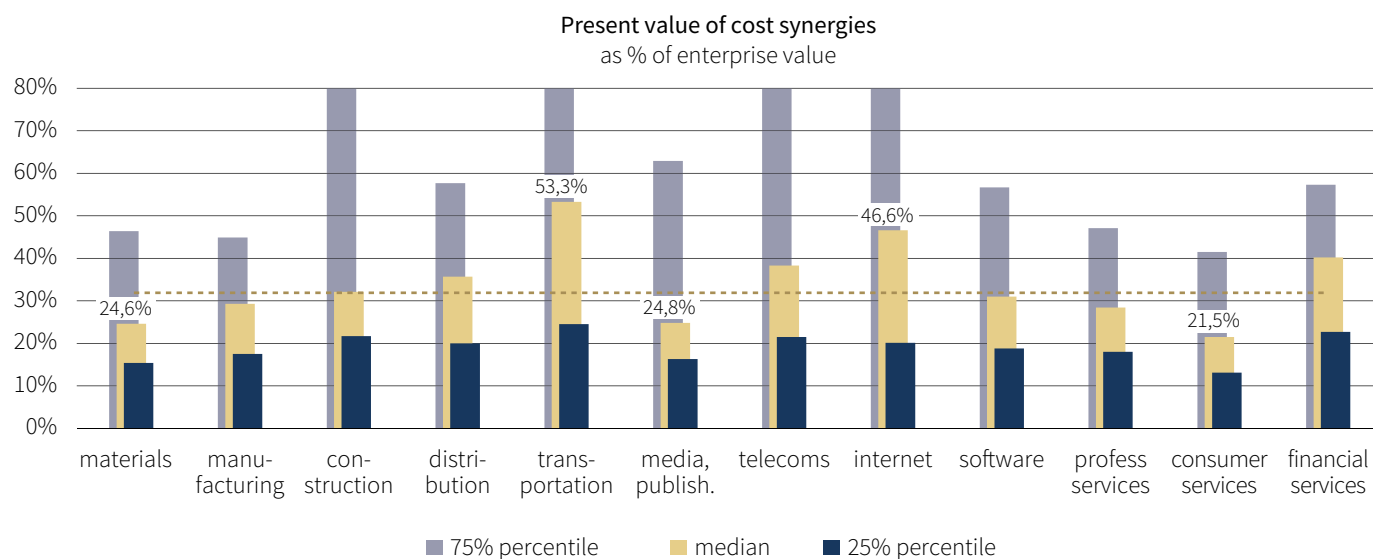
Source: MARKABLES 2023, 1.300 business combinations

tential (they are rather justified with expected **growth**), while other deals show very substantial potential for synergies exceeding pre-deal profit (i.e., **restructuring** cases with low pre-deal profitability).

Second, we approximate the **lifetime value** of annual cost savings (their **net present value,** NPV) as of the date of the acquisition and relate it to other net present value figures. Based on disclosed information, we estimate that the average **time lapsed** until the cost savings are achieved in full is 24 months from the acquisition date and that **one-time expenses** required to achieve full cost savings are between 0.5x and 1x full annual savings. We find that a multiple of 9x full run-rate cost synergies best approximates the total net present value of future cost synergies minus expenses at the acquisition date.[14]

With this multiple, we calculate the **approximate value of cost synergies** for each acquisition and relate it to enterprise value. **Enterprise value** is the purchase consideration paid for 100% of the shares of the acquired business, minus cash acquired, plus interest-bearing debt acquired, plus future (contingent) payments.[15]

We provide the results of an interquartile range analysis, that is, the results for the 25th, 50th (median) and 75th percentiles of the data (see figure 4).

As a median result, cost synergies represent **31.4% of the enterprise** value of the acquired business, ranging from 18.4% to 53.7%. This percentage can be considered an additional future cash contribution or a future price discount towards the refinancing of the purchase consideration for the acquisition. The results correspond largely to the annual cost synergies / annual EBITDA ratio found above.

To analyze sector-specific synergies, we classified the 1,300 acquired businesses in twelve different sectors: **materials, manufacturing, construction, distribution** (wholesale and retail), **transportation, media and publishing, telecoms, internet and online businesses, software, professional services, consumer services, and financial services.** For these twelve sectors, we show the results of an interquartile range analysis of synergies as a percentage of enterprise value (see figure 4).

The average median for all sectors is 31.4%. Transportation and internet are the two sectors with the highest share of synergies. Consumer services, materials, and media/publishing are at the low end of the ranking. Sector-specific synergy differences are substantial. There is a factor of 2.5x between the sectors with the highest and lowest synergies. This does not mean that one sector is more attractive for making deals than another. The overall attractiveness is a matter of the specific combination, and a combination of **price, risk, growth**, and – of course – **synergies**.

VI. Synergies in purchase price allocation and goodwill justification

In the sections above, we have seen how acquirers use synergies during the deal process, and how investors use

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14 Based on the following assumptions: full cost synergies achieved after 24 months; one-time expenses 1x annual synergies fully spent in year 1; 10% discount rate; mid-year discounting.

15 For banks, EV is defined as purchase consideration for 100% of the shares.

synergy disclosures in their ad-hoc assessment of acquisitions and subsequent investment decisions. Finally, we will take a look at how synergies can be used in accounting for goodwill.

Until today, quantifying synergies was fully **detached** from accounting and its standards and regulations. Quantifying and announcing synergies was part of investor communications and ad-hoc announcements. Similarly, subsequent reporting on synergy realization was part of investor communications, too. Eventually, the financial reporting of the acquirer included some remarks on synergies in the MD&A sections.

However, there is a section in the financial statements that regularly refers to synergies: the section **business combinations** or **acquisitions**, which contains the post-deal accounting or the purchase price allocation. IFRS 3 gives expected synergies as one example of the factors that make up goodwill and that might be mentioned by companies. As a result, synergies are frequently mentioned qualitatively as one of the factors that justify the accounting of goodwill from an acquisition. Other factors listed in IFRS 3 include the **assembled workforce, going concern value**, and **overpayment**.

Investors request more relevant informational content from financial statements. In order to improve the understanding of goodwill from an acquisition, **IASB** has started an **initiative** to develop proposals to make targeted improvements to the disclosure requirements of IFRS 3, in particular to disclose:

1. a description of the synergies expected from combining the operations of the acquired business with the company's business,
2. when the synergies are expected to be realized,
3. the estimated amount or range of amounts of the synergies; and
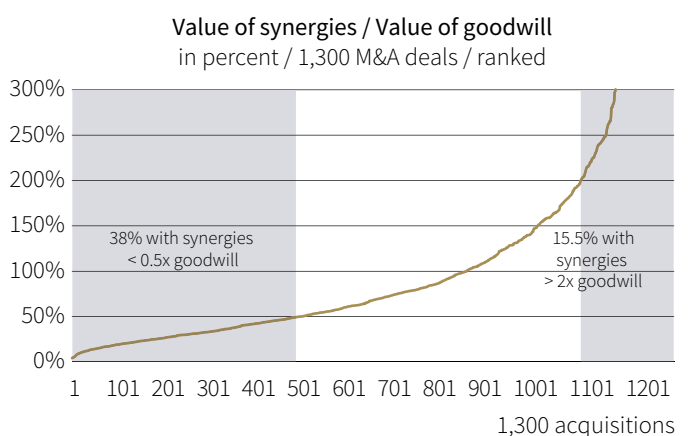4. the estimated cost or range of costs to achieve those synergies.

This initiative is certainly helpful to investors, but it needs further discussions, specifications, and due diligence, before being defined and implemented.

If we look at acquisitions where the acquirer **voluntarily** disclosed quantified synergies in the past, the range of observed findings is quite wide. Based on the MARKABLES synergy dataset, we relate expected synergies to goodwill. Our analysis is the first attempt ever to relate the value of expected synergies to the value of goodwill. As a median result, synergies constitute **68% of goodwill**, ranging from 36% to over 137% in the interquartile range analysis (and even further in the outer quartiles). The findings show that expected

synergies do little to improve the understanding of goodwill.

In 38% of all deals, synergies explain less than 50% of goodwill. In other words, one half of goodwill or more remain unexplained. This must be assembled workforce, going concern value, or overpayment. Alternatively, it could be a cautious (under)estimation of synergies. In 15.5% of all deals, synergies are more than twice the value of goodwill. This would mean a substantial underpayment (the acquirer's gain), or an unrealistic overestimation of synergies. In the middle of the range, there is no „typical" or frequent value of synergies in relation to goodwill. There is even no clustering around a mean value (see figure 5).

Figure 5: Value of synergies / Value of goodwill

Value of synergies / Value of goodwill
in percent / 1,300 M&A deals / ranked

38% with synergies < 0.5x goodwill

15.5% with synergies > 2x goodwill

1,300 acquisitions

Source: MARKABLES 2023

The ratio synergies / goodwill is impacted not only by synergies but also by the size of goodwill which itself is a hard-to-value figure. If we look at the share of goodwill in enterprise value, we find a similar spread between close to 0% to over 100%. We would expect a positive correlation between goodwill and synergies, meaning that high goodwill can be best explained by high synergies. However, data compiled from pre-deal synergy disclosures and subsequent purchase accounting comes nowhere close to this logic. In other words, synergies provide no significant information to justify or explain goodwill.

IASB's intention with its synergy disclosure initiative is to provide investors with more useful information about acquisitions, in particular about the goodwill recognized.[16] In its current form, the usefulness of quantified and disclosed synergies is questionable. Investors need to understand if an observable value is relatively high or low compared to peers or means. Observable data suggests

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16 See above, chapter II.2.

Figure 6: Value of synergies / Value of goodwill

Value of synergies / Value of goodwill
1,300 M&A deals

Source: MARKABLES 2023

GW/EV in %
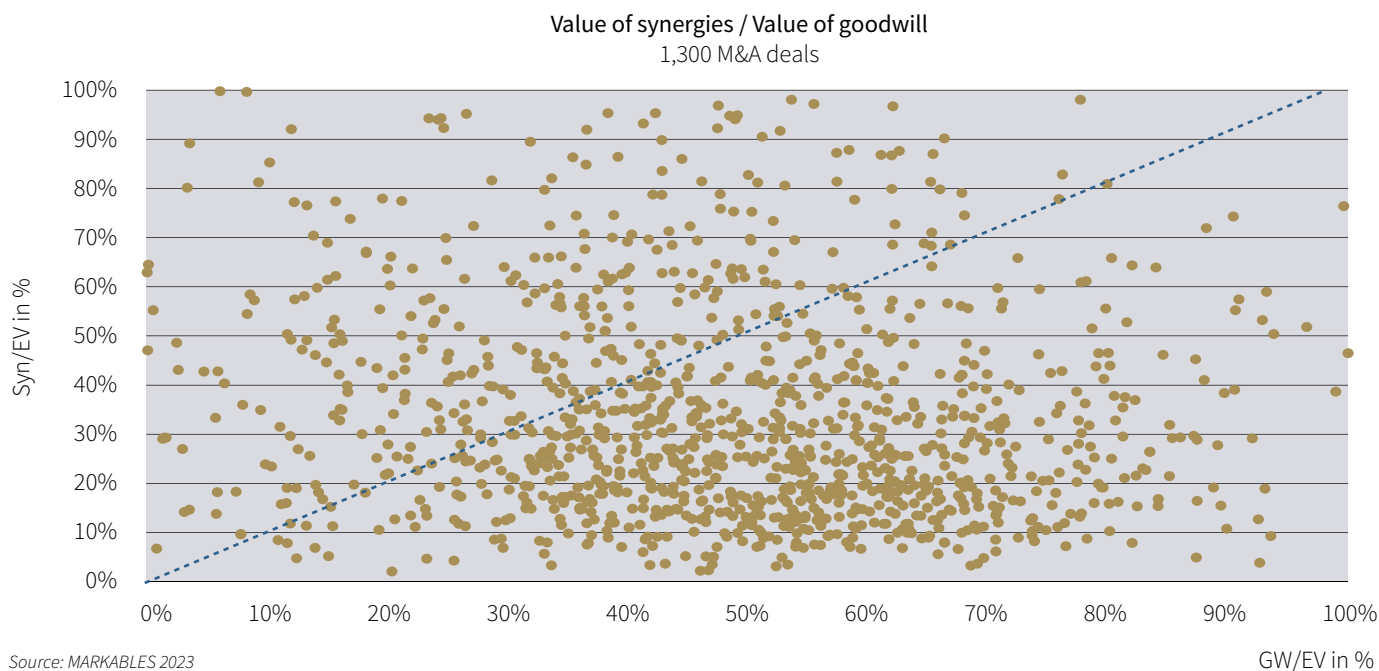
that no such peers or means exist, and that synergy data cannot be reasonably related to goodwill. It seems that both figures are detached from each other, and the detachment is apparent in several areas:

Table 2: Synergy – goodwill mismatch

	Synergies	Goodwill
Persons involved	Deal team Transaction advisors	Independent valuer Accountants
Timing	Pre-deal At deal	Post-deal Measurement period
Basic methods	Operations manage-ment Cash-flow projection	Risk adjusting Discounting Fair value
Intent	Deal justification	Assets, balance sheet Accounting, amortization Earnings management Tax
Compo-nents	*Takeover premium* Acquirer's gain	*Takeover premium* Assembled workforce Going concern value Overpayment

In my view, IASB must address six major challenges in their current discussion and an eventual formulation of a synergy disclosure requirement.

1. Timing

For investors, synergy disclosures are most value-relevant at the date of the acquisition. One year after the deal is closed, such information is almost useless, un-

less it involves performance tracking regarding the realization of previously announced synergies.

The purchase price allocation and the goodwill resulting from it are disclosed sometime after the deal. Usually in the annual financial statements. Moreover, IFRS defines a measurement period of 12 months after the deal is closed; during this period, the acquirer can complete missing information to finalize the initial purchase price allocation. Numerous acquirers make use of this measurement period. Then there is the period between the end of measurement, and the release date of the subsequent annual statement. Moreover, some deals require a long period between signing (announcing) and closing, for various reasons. If worst comes to worst, the final PPA is reported only three years after the deal announcement.

For the relevance of synergy disclosures, it is most important that they happen with or shortly after the deal announcement. In relation to goodwill recognized, disclosure should not be later than 6 months thereafter.

2. Synergy split

It is a misconception that all synergy value must necessarily be incorporated into the PPA. The PPA is a breakdown of the purchase price paid into different assets and liabilities. However, it is very common that the acquirer gets additional synergies he did not pay for. Hence, these additional synergies are not included in the purchase price.

From another perspective, the acquirer paid for the identifiable assets of the target (minus its debt) on a stand-alone basis, plus a takeover premium on top. The price paid for the takeover premium is not reflected in identifiable assets; it would end up in goodwill.

To justify and refinance the control premium, the acquirer must realize synergies. But synergies are not the same as the price of the control premium. Conceptually, synergies should be higher than the control premium because the acquirer tries to make a good deal.

In practice, synergies can be less or more. If they are less, either the control premium was overpaid, or the synergies were understated (which is more likely). If they are more, the acquirer will get a gain from the acquisition.[17]

It would be helpful for both the quality of the PPA and for the usefulness of the synergy disclosure to quantify the synergy split between buyer and seller. This is possible for listed targets; it can be approximated for private targets based on market comparables and transaction-specific adjustments. The synergy part for the sellers goes into goodwill, and the part for the buyer will be a gain from the acquisition.

IASB should integrate the aspects of control premium, synergy split, acquirer's gain and overpayment into its synergy disclosure initiative. It should also provide guidance on how to treat acquisition gains and overpayments in the PPA and in goodwill impairment.

3. Integration
As discussed above, quantifying synergies long before the PPA is done can lead to a mismatch. Synergies and goodwill must be reconciled via the overlapping element "takeover premium". This is impossible without determining and reconciling the values of the other elements of goodwill (assembled workforce, going concern value, overpayment) and synergies (acquirer's gain) separately. If not, the information can be misleading and even wrong.

Performing a pre-deal PPA is not new. Considering the lack of information during due diligence, it is demanding. Ideally, the independent valuer of the acquirer is involved early in this process as an advisor of the deal team.

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17 See above chapter III.3.

4. Useful life
The issue how long synergies are expected to last is most important. Some synergies are short-lived (i.e., one-time tax benefits or capex synergies), some synergies may last very long. Usually, annual run-rate synergies are understood to have an indefinite life.

This seems to be a simplification. In the short run, synergies represent additional earnings. Long-term, synergies are a relative cost advantage, depending on competitors' actions. If competitors follow suit, the higher profit margins could result in price competition and synergies fading away over time.

In its staff papers, IASB has recognized this issue of how long synergies are expected to last, and to identify if synergies are finite or indefinite. As there is no best practice available to determine the remaining finite life of expected synergies, acquirers will likely opt for an indefinite life. IASB must then address how to deal with indefinite lived synergies. Will they just stay there, or is there a procedure for synergy impairment or synergy reporting in case of goodwill impairment?

5. Subsequent reporting
Acquirers do not fully achieve synergies as expected. IASB must determine if the disclosure requirement is only one-time, or if there is an additional requirement to report achievement levels. If it was only one-time, the commitment associated with the disclosure would be lower, as would its accuracy.

Any underachievement of synergies would first affect the gain from the acquisition (as described above). Goodwill impairment is only required if the underachievement goes beyond acquirer's gain. But the key issue here is that synergy realization **can** have an impact on goodwill impairment.

6. Exemptions
Disclosure requirements are always a trade-off between information quality on the one hand and cost to disclose / commercial sensitivity on the other. Given all the challenges related to synergy quantification and accounting-relevant disclosure, its implementation would be a huge step. There could be resistance from acquirers/preparers.

If IASB proceeds with the initiative, the parties involved will certainly ask for exemptions. Getting such exemptions right will be the decisive factor in the success of the disclosures. Exemptions applied too frequently could reduce the benefits of the then few disclosures beyond recognition.

Article

VII. Conclusion and outlook

Synergies are a cornerstone of M&A transactions. Without them, deals don't make much sense. However, quantifying synergies, paying the right price, and drawing the right conclusions can be a challenge. It is about investment, return, and risk. Good decisions require good information. This article provides insights and empirical data on how synergies are viewed, quantified, and used today across different groups of stakeholders.

Pre-deal, the acquirer must develop realistic synergy targets as a basis for enterprise valuation and purchase price negotiations. Similarly, the sellers must develop a view of acquirer's synergy expectations to determine their own asking price and limit price. At the time of the deal, investors expect meaningful synergy disclosures to be able to assess the quality of the deal and make their investment decisions accordingly. Post-deal, valuers and accountants must provide accurate purchase accounting, which until now obscured synergies in the compound item goodwill. Finally, investors want to better understand from the purchase accounting if the acquisition was potentially over- or underpaid.

As of today, the estimation, determination, and announcement of synergies pre-deal follow no rules or standards. Further, there is no systematic review or accounting process for synergies. Therefore, the consequences of circulating inaccurate synergy information are limited. The informational content of synergy disclosure in one particular case might be valuable information. Overall, within a regulated financial market where all participants compete for equity and finance and where issues related to investments and returns are usually "compared", synergy disclosures look rather individual. What we have observed is a largely inconsistent set of approaches and information with widespread results that can be misleading and, in the end, useless.

IASB's initiative to make synergy disclosures in M&A deals mandatory can be a first and most important step towards an integrated approach to synergies. Hopefully, IASB will stand strong against resistance from acquirers and accountants.

In essence, IASB's initiative is much more about goodwill than synergies. Looking closer at the nexuses, the initiative will lead to synergies themselves, which can be the missing link for goodwill valuation and accounting.

Simply increasing the frequency of basically inconsistent synergy disclosures does not help much.

A substantial improvement in the understanding of synergies and deal attractiveness for all stakeholders requires much more. To get there, the personal and methodological boundaries between pre-deal and post-deal must be torn down. For the dealmakers, it must be clear how pre-deal calculations will end up in post-deal accounting, reporting, amortization, and eventually impairment. If so, pre-deal synergy estimations will be quantified and disclosed to fit into an integrated post-deal accounting system. ◆

Cost of capital in real time

Researching and preparing the data for the derivation of cost of capital or multiples does not have to be an elaborate process. The KPMG Valuation Data Source calculates the WACC and multiples at the push of a button. The tool groups together all important cost of capital parameters, including country risk premiums, credit spreads, sector- and peer-group-specific beta factors as well as multiples – updated monthly in an interactive dashboard.

More information and access to the free trial version:

www.kpmg.de/en/valuation-data-source
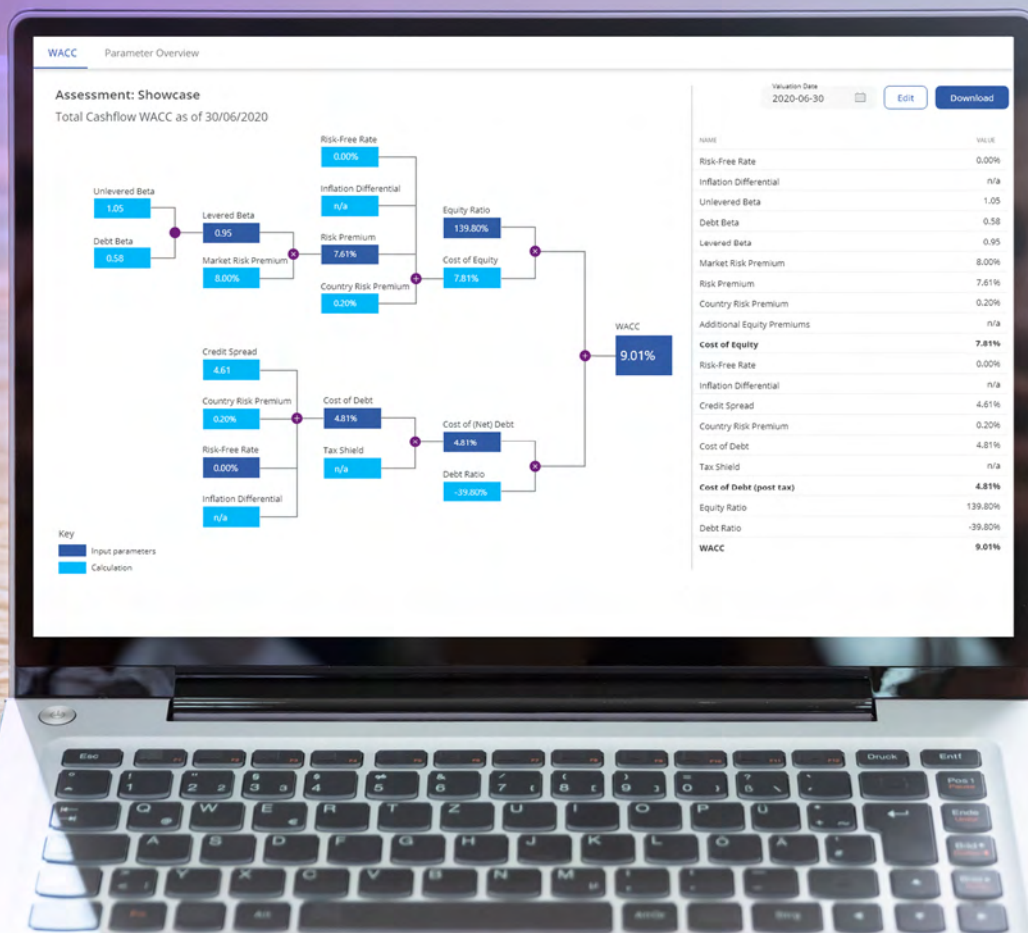
Dealing With Historical Capital Structure Volatility in Valuation

– How to Directly Estimate Unlevered Betas –

Deriving unlevered betas is a standard exercise for valuation professionals when using the Capital Asset Pricing Model (CAPM). In this article we show that the traditional indirect approach (first deriving levered betas, then recalculating them using beta unlevering formulas) can lead to severely wrong results if capital structures are non-stable over time. A better approach is the direct estimation of unlevered betas (first translating each equity return data point into an asset return data point, then running the regression with these „unlevered" returns). This approach allows to take financial risk properly into account when debt-to-equity ratios are volatile.

Professor Dr. Matthias Meitner, CFA

lecturer at the International School of Management (ISM), founder and managing partner of VALUESQUE. Prof. Meitner is a CFA charterholder, member of the Capital Market Advisory Committee of the IFRS Foundation, of the EU-related EFRAG User Panel and of the Supervisory Board of the CFA Society Germany.

Professor Dr. Kenneth Lee, CFA

professor in the Accounting and Finance research group of Loughborough Business school and the Director of Postgraduate Taught programmes. He is a member of the Capital Markets Advisory Committee (CMAC), a body supported by the IFRS Foundation, which interprets proposed accounting changes from the perspective of capital market participants.
Contact: ebvm@eacva.de

I. Introduction

The discount rates in a Discounted Cash Flow (DCF) model are often derived using the Capital Asset Pricing Model (CAPM). In the CAPM, beta is the core risk parameter. Depending on the circumstances analysts often require a so-called unlevered beta, i.e. a beta of the unlevered firm or of the assets of the firm. This is the case when non-public companies are valued (and the beta is derived via public market peers) or when certain sub-variants of the DCF-Model such as the Adjusted-Present-Value (APV) approach are applied.

If one does not want to rely on unlevered betas directly from professional databases but rather determine the unlevered beta herself, the traditional way of deriving unlevered betas is to first derive levered betas (based on observable stock market returns) and then translating this levered beta into an unlevered beta using certain reaction-formulas. In this article we analyse the performance of this approach against the background of historical capital structure volatility, i.e. fluctuating debt-to-equity ratios. As a benchmark to this we also analyse more modern approaches of deriving unlevered betas, in particular the direct estimation approach.

We start by setting the framework for asset rates of return and equity rates of return. Then we dive deeper into the relationship of betas and rates of return. This is followed by a practical example showing different approaches to the derivation of unlevered beta (which can be replicated by the readers) and analysing the performance of the different approaches in a capital-structure-volatile world. The article closes by an outlook on modern applications of direct estimation approaches in valuation practice in a „stretch yourself"-chapter.

Except for the „stretch-yourself" chapter IV we assume for reasons of simplicity that debt is risk-free. In the whole article we abstract from the existence of taxes.[1]

The article focusses on a specific problem in the context of beta determination. As a matter of course the way to deriving proper betas is paved with lots of other challenges, such as parameter setting (observation period, periodicity), taxation issues, etc., which we do not touch here in detail.

II. Asset Rates of Return vs. Equity Rates of Return
Basic capital structure theory deals with the relationship of different kinds of capital (e.g. equity or debt capital) amongst each other and with their relationship to the value of the assets of a company. A well-known effect

in this context is the so-called leverage-effect. It states that in a company partly financed with debt the expected equity rates of return are higher than the expected rates of return of the unlevered company (expected asset rates of return) as long as the rates of return on debt are lower than the expected asset rates of return of the company:

$$E\left(R_E\right) > E\left(R_U\right) \text{ if } E\left(R_U\right) > R_D$$

With R_E: Equity Rate of Return, R_U: Asset Rate of Return (Return of the Unlevered Company), R_D: Rate of Return on Debt (here equal to the Risk-free Rate R_f) and $E(RU)$ being the expectation value operator.

The following Figure 1 emphasises the leverage effect. The figure shows a value-based balance sheet where the numbers indicate the value of each component. Assuming debt showing a zero-return we can see that an equity rate of return of (66/60) – 1 = 10% compares to an asset rate of return of (106/100) – 1 = 6%.

Figure 1: Asset and Equity Rates of Return (constant Debt)
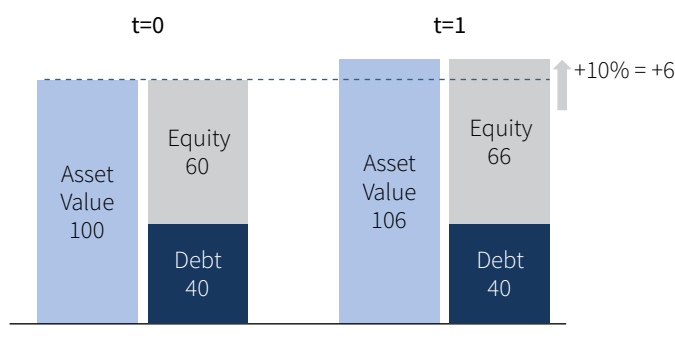
If (in a variant to the above) debt shows a risk-free return of 2.5% the picture would change a bit in quantitative terms (for a given 10% equity rate of return the asset rate of return is now (107/100) – 1 = 7%) but not in qualitative terms. The leverage effect still works as the rate of return on debt is still lower than the expected asset rate of return.

Figure 2: Asset and Equity Rates of Return (Debt with risk-free rate of return)

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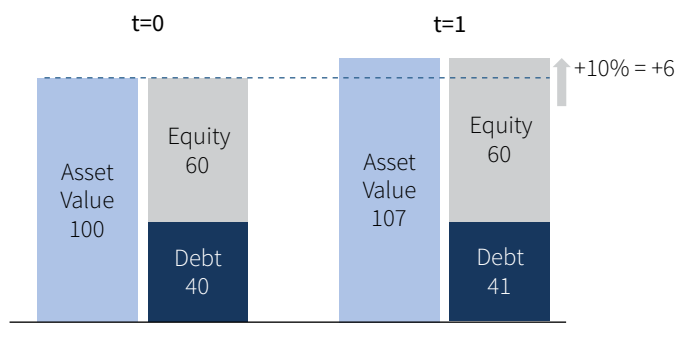
1 The results here are similar to those in a world with taxes but with tax shields having the same risk profile as the operating business of the company, i.e. if management follows an instantaneous value oriented financing strategy.

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The calculations of the leverage effect are straightforward. For the first case (constant debt, i.e. zero return on debt) we get for **D**: Value of Debt at the beginning of the period and **E**: Value of Equity at the beginning of the period:

$$E(R_U) = \frac{E(R_E)}{1+\dfrac{D}{E}} = \frac{10\%}{1+\dfrac{40}{60}} = 6.0\%$$

In the second case (debt with risk-free rate of return) we get:

$$E(R_U) = \frac{E(R_E)\cdot E + R_f \cdot D}{D+E} = \frac{10\%\cdot 60 + 2.5\%\cdot 40}{100} = 7.0\%$$

These formulas are well-known in the finance literature.[2] They are expressions of different cost of capital in a Discounted Cash Flow (DCF) Framework.

III. Indirect vs. Direct Way of Deriving Unlevered Betas
1. Betas and Rates of Return
In the standard Capital Asset Pricing Model (CAPM[3]) framework the expected rate of return of a security is a function of the risk-free rate, the market risk premium (MRP) and a security-specific systematic risk parameter called beta:

$$E(R) = R_f + \beta \cdot MRP$$

If the expected asset rate of return $E(R_U)$ is to be derived, the CAPM-equation requires the unlevered (or asset) beta ß_U as an input. If one wants to determine the expected equity rate of return, the formula requires the levered (or equity) beta ß_L as an input.

While betas are a determinant of expected rates of return they are – at least in valuation practice – also a function of historical, realized rates of return. Usually betas are derived by a statistical procedure called linear regression in which actual rates of return of a security serve as the dependent variable and actual rates of return of the market (proxied by a broad equity index) are the independent variable. This setting allows to statistically determine the market-related (i.e. the systematic) impact on security returns, i.e. the systematic risk of a

security. The typical regression equation (the so called „market model") looks as follows:

$$R_t = \alpha + \beta \cdot R_t^M + \in_t$$

With R_t: rate of return of the security at time **t**, R_t^M: market rate of return at time **t**, α: intercept, $\in_t$: error term at time **t**.

So obviously, in valuation practice beta is sandwiched between different rates of return of a security. It is a function of historical rates of return and it is a determinant of future rates of return.

Figure 3: Input-Output-Relationship of Beta and Rates of Return

| Input | CAPM | Output |
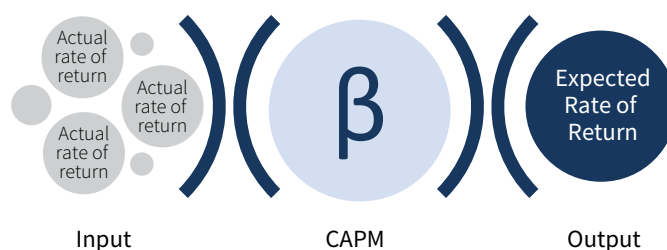
2. Stable capital structure environment
The application of regression techniques is not difficult in practice. Below is a set of rate of return for a security (stock A) and a broad equity index. To keep things manageable and for didactical reasons we rely on 12 monthly return data for each instrument here. This allows readers to replicate our calculations by entering the numbers e.g. in MS Excel.

Table 1: Monthly rates of return for a security and an index

	Stock A equity return	Index Return
01.10.2022	0.029	-0.033
01.11.2022	0.123	0.092
01.12.2022	0.082	0.086
01.01.2023	-0.022	-0.031
01.02.2023	-0.029	0.079
01.03.2023	-0.043	0.006
01.04.2023	0.016	0.018
01.05.2023	0.069	0.023
01.06.2023	-0.076	-0.004
01.07.2023	0.030	0.014
01.08.2023	-0.038	0.013
01.09.2023	-0.019	-0.016

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2   See e.g. Faber et al., A General Formula for the WACC, International Journal of Business, vol. 11, no. 2 (2006): 211-218.
3   See Sharpe, Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk, The Journal of Finance, vol. 19, no. 3. (1964): 425-442; Lintner, The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets, Review of Economics and Statistics, vol. 47, no. 1 (1965): 13-37; Mossin, Equilibrium in a capital asset market, Econometrica Econometrica, vol. 34 (1966): 768-783.

Using these data we can now derive a beta for stock A by linear regression analysis. This can be done e.g. here by using the SLOPE function in MS Excel[4]. The SLOPE function determines the slope of the regression line of a set of independent and dependent data. The slope of the regression line equals the beta in the CAPM framework. When applying the slope function it is important to first enter the cell range of dependent data points and then the cell range of independent data points. In our example we enter:

=SLOPE(B2:B13;C2:C13)

Base on the data set above we get a value of 0.750. This is the levered beta of stock A as it is based on actual (i.e. levered) rates of return of stock A. Hence from our regression we get $ß_L = 0.750$.

Assuming the debt-to-equity ratio of stock A is equal to our example above, i.e. (D/E) = (40/60) = 0.667 we can now determine the unlevered beta of stock A which is (as debt is risk-free here)[5]:

$$\beta_U = \frac{\beta_L}{1+\dfrac{D}{E}} = \frac{0.750}{1+\dfrac{40}{60}} = 0.450$$

However, as beta is not only a function of rates of return but also the input for rates of return, we can approach the task of deriving unlevered betas also from a different angle. So far we have estimated the levered beta in a first step and then unlevered this beta using the debt-to-equity ratio in a second step. Now we will unlever rates of return in a first step (i.e. calculating the asset rates of return from the given set of equity rates of return) in a first step and then estimating the unlevered beta directly in a second step.

More concretely, we calculate for each stock A data point the asset rate of return based on the given equity rate of return and the assumption of a debt-to-equity ratio of 40/60. Hence, for the stock A data point at 01.10.2022 we get:

$$R_U = \frac{R_E}{1+\dfrac{D}{E}} = \frac{2.9\%}{1+\dfrac{40}{60}} = 1.7\%$$

and so on.

After recalculating all data points for stock A the following table results:

Table 2: Monthly rates of return for a security (un-levered) and an index

	Stock A equity return	Index Return
01.10.2022	0.017	-0.033
01.11.2022	0.074	0.092
01.12.2022	0.049	0.086
01.01.2023	-0.013	-0.031
01.02.2023	-0.017	0.079
01.03.2023	-0.026	0.006
01.04.2023	0.010	0.018
01.05.2023	0.041	0.023
01.06.2023	-0.046	-0.004
01.07.2023	0.018	0.014
01.08.2023	-0.023	0.013
01.09.2023	-0.011	-0.016

Now we can apply the regression model to the adjusted set of data. Calculating the slope of the regression line yields the value 0.450. This is exactly the value we got for the unlevered beta in our first approach.

We can see here that deriving unlevered betas is a commutative process as long as we operate in a stable capital structure environment where the debt-to-equity stays constant over the data observation period. It does not matter whether we first estimate the levered beta and then unlever it (indirect derivation), or whether we first unlever the underlying rate of return data and then estimate it (direct derivation).

### 3. Volatile Capital Structure Environment
Things change, however, if the capital structure is volatile over the time of observation of data points. Assuming the debt-to-equity ratio is not constant at 0.667 over the period 01.10.2022 until 01.09.2023 the two approaches (indirect and direct derivation) would not match.

The following Monte-Carlo-Simulation using the Oracle Crytal Ball software shows how unlevered betas would be distributed if there is capital structure volatility (i.e. debt-to-equity ratio volatility) over time if we follow the direct derivation approach. In this analysis the equity rates of return are unchanged as compared to the analysis in chapter III.2. Only the derived asset rates of return are subject to change as we have calculated each unlevered rate of return with the appropriate debt-to-equity ratio that prevails at each measurement date. We ran 100,000 trials in our Monte Carlo simulation analysis.

---

4   MS Excel also knows more complex regression analytics, but for the presentation here the SLOPE function is sufficient.
5   These results confirm our calculations in chapter II, for $R_f = 2.5\%$ and MRP = 10% and using the CAPM we get an equity rate of return of 2.5% + 0.750 x 10% = 10% and an asset rate of return of 2.5% + 0.450 x 10% = 7%.

Figure 4: Unlevered Beta Distribution in the case of Capital Structure Volatility
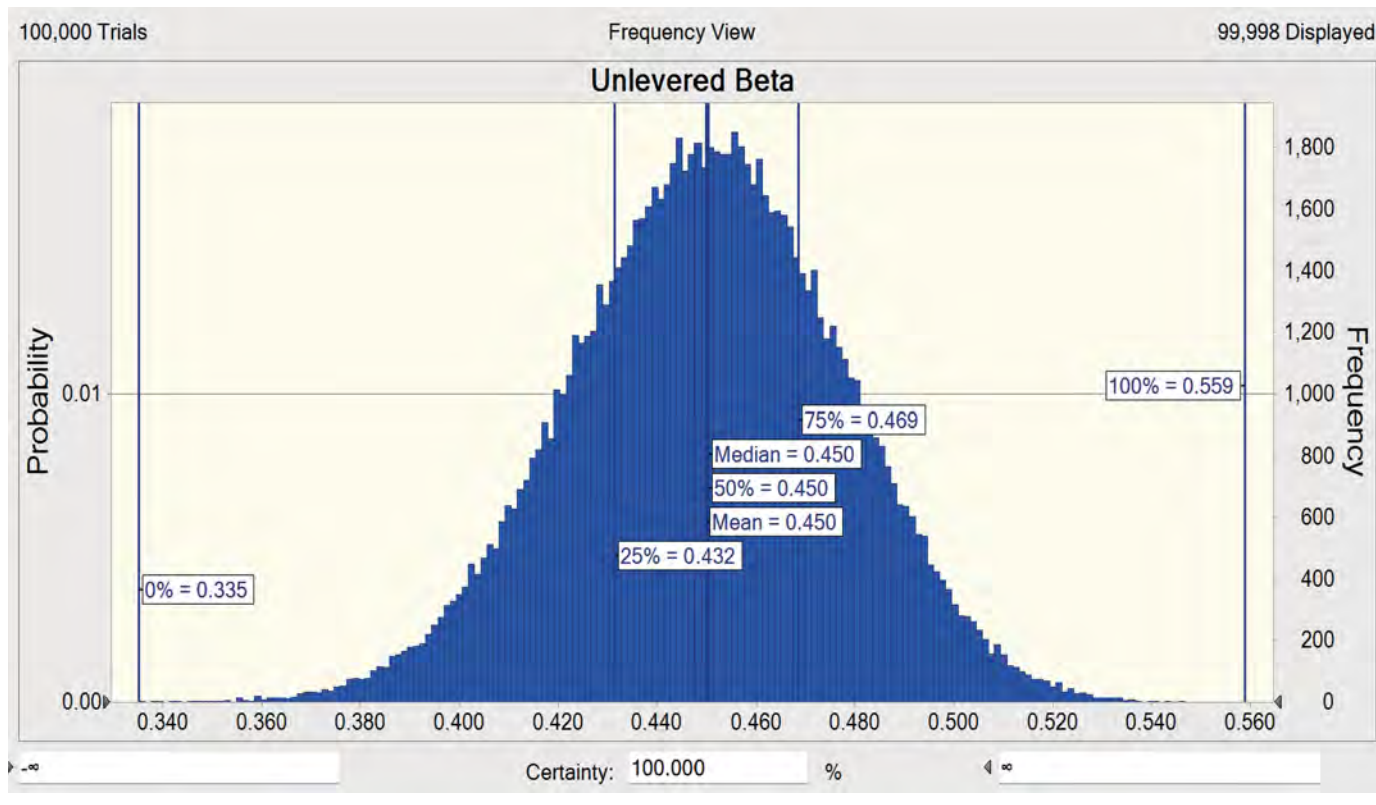
It can be seen that while on average analysts get an unlevered beta of 0.450 the outcomes in single cases can differ materially from this mean and median value. They can go as low as 0.335 and as high as 0.559 in this example.

The assumed capital structure volatility is not very aggressive. It is in line with normal stock market volatilities. The following figure shows some representative paths of debt-to-equity ratios over the course of one year. These paths are the input for the Monte Carlo simulation analysis above.

Figure 5: Debt-to-Equity Ratio Volatility (Monte Carlo Simulation)
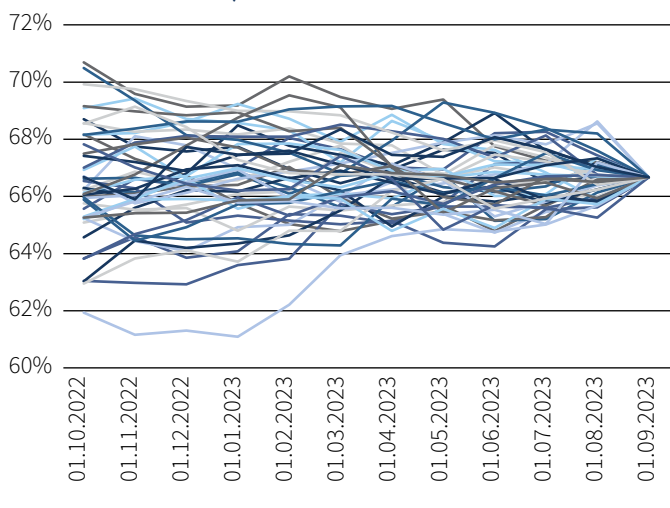
It is important to note that – by definition here – in all cases the debt-to-equity ratio is equal to 0.667 at 01.09.2023. I.e. an analyst that derives the unlevered beta the traditional indirect way (first deriving the levered equity beta, then unlevering it) and uses the debt-to-equity ratio at 01.09.2023 would in all cases get an unlevered beta of 0.450. Hence obviously the two approaches – indirect and direct approach – lead to different results if capital structures are volatile. And the differences can be material as we can see from the distribution in Figure 4.

The question is now: Which of the two approaches is the appropriate way of deriving unlevered betas. The answer here is straightforward:

- From an economic point of view each and every single data point is subject to specific capital structure risk. I.e. the measured equity rates of return are a function of the specific financing risk of the company at the measurement date. Hence, proper input data for the derivation of unlevered betas have to be first date-specifically adjusted and then used in the analysis. This means only the direct derivation approach (first calculating asset rates of return and then directly determining unlevered betas via regression) yields sound results.
- The use of a sweeping debt-to-equity ratio for all data points – as it is done in the traditional indirect approach – is just a simplification which (as we can

Figure 6: Capital Structure volatility at BMW AG

Issuance of Bonds
(Panda + 144A)

Post Covid Financial Optimisation
Measures

Covid-19
induced
stock price
weakness

Net Debt (RHS) — Debt / Equity Ratio (LHS)
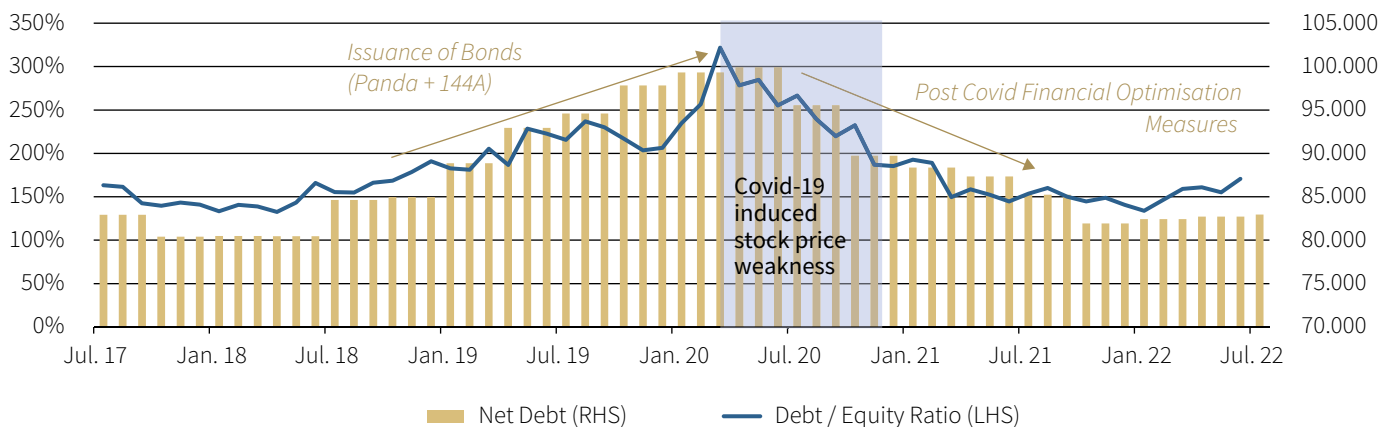
see here) might lead to heavily misleading results. While an analyst might be right on average by using the indirect approach, she can be massively wrong in single cases.

- Using an average debt-to-equity ratio over time (instead of the last-day debt-to-equity-ratio as in the example above) can mitigate derivation mistakes a bit but will still not lead to proper results in all cases.

In the case of capital structure volatility – and all capital structures are volatile by a certain degree over the time of data observation – only the direct approach to deriving unlevered betas (i.e. first calculating asset rates of return and then directly determining unlevered betas via regression) is appropriate.

Direct estimation of unlevered betas has a further positive: If the unlevered beta is the direct result of a statistical exercise (and not a recalculated number) we can apply further statistical analyses to it such as determining confidence intervals, etc. This might be of added-value in certain circumstances.

Finally, in terms of effort required this approach is not meaningfully more time consuming than the common standard approaches of unlevering betas.

4. Case Study BMW Group

The following figure shows the development of Net Debt (in bn Euros) and the debt-to-equity ratio of German car manufacturer BMW Group between 2017 and 2022. In the years before the COVID-19 crisis BMW planned to massively invest in its core business. BMW issued 144A bonds (bonds that specifically address US institutional investors) and Chinese renminbi-denominated bonds (so called Panda bonds) in order to strengthen its international foothold. With the outbreak of COVID-19 things changed. The demand weakness forced BMW to apply meaningful financial optimisation measures and

decrease the financial leverage just built up a couple of months before.

As a consequence, BMW Group showed a quite elevated capital structure volatility over the course of the years. An analyst that wanted to derive an unlevered beta based on a 5-year observation period using monthly rates of return and using the German DAX index as a benchmark would have been faced with totally different results – pending on which approach she followed:

The levered beta (regression with equity returns as the dependent variable) ß_L is 1.220. Using the June-2022 debt to equity ratio for unlevering leads to an unlevered beta $\text{ß}_U = 0.451$. Using an average debt-to-equity ratio (calculated over the whole 5 years) leads to an unlevered beta $\text{ß}_U = 0.464$. But applying the proper direct way of deriving the unlevered beta (regression with asset returns as the dependent variable) leads to $\text{ß}_U = 0.389$. It goes without saying that the differences between the direct and the indirect approach are quite pronounced.

IV. Stretch Yourself: Direct Unlevering of Betas when Debt is Risky

So far, we assumed that debt is risk-free. In modern valuation practice, however, we know that debt is subject to (systematic) risk. This systematic risk is mirrored in the expected rates of return on debt (cost of debt) being higher than the risk-free rate R_f in reality.

In this context, we can find beta unlevering formulas in finance textbooks that particularly take this systematic risk-component of debt – the so-called debt beta ß_D – into account as part of the traditional indirect approach. A famous unlevering formula is e.g. the so-called Harris/Pringle[6] formula:

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6   See Harris/Pringle, Risk-Adjusted Discount Rates – Extension form the Average-Risk Case, The Journal of Financial Research, vol. 8, issue 3, (1985): 237-244.

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$$\beta_U = \frac{\beta_E \cdot E + \beta_D \cdot D}{D + E}$$

A huge practical problem is the proper measurement of β_D. A big advantage of the direct estimation of unlevered betas is that β_D can be estimated along with β_U. For example, assuming that the Merton[7] model provides a good description of the realities at capital markets we can substitute the rate of return volatilies by the Omega[8] of the Merton model. As a consequence the asset rates of return R_U (that are used as an input to the regression equation, direct approach) can be derived from the observable equity rates of return by the following formula:

$$R_U = \frac{R_E}{\left(1 + \frac{D}{E}\right) \cdot N\left(d_{1,Assets}\right)}$$

---

7   See Merton, On the Pricing of Corporate Debt: The Risk Structure of Interest Rates, The Journal of Finance, vol. 29, no. 2 (1974): 449-470. The Merton Model is a structural model to explain the behavior of different components of the capital structure – mainly equity and debt – in a risky environment.
8   Omega is an elasticity measure also known from the Black/Scholes-Option pricing model.

Here, $N(d1, Assets)$ is the value of the cumulative normal distribution at d1 under the volatility measure of the assets. d1 is a core parameter in the Merton respectively the Black/Scholes-option pricing model.

It is important that the R_U-formula above already takes the effect of debt beta into account. While admittedly the application of this formula is not easy in practice the idea of the short presentation of this approach here is just to senitize readers for what is possible in an advanced setting of direct estimation of unlevered betas.

V. Summary

Deriving unlevered betas is a standard exercise for valuation professionals. In this article we showed that the traditional indirect approach (first deriving levered betas, then recalculating them using beta unlevering formulas) can lead to massively wrong results if capital structures are non-stable over time. A better approach is the direct estimation of unlevered betas (first translating each equity return data point into an asset return data point, then running the regression with these „unlevered" returns). This approach allows to take financial risk properly into account when debt-to-equity ratios are volatile. ◆

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Industry Betas and Multiples

Dr. Martin H. Schmidt
Manager Deal Advisory KPMG AG
WPG Germany
Contact: ebvm@eacva.de

Dr. Andreas Tschöpel, CVA, CEFA, CIIA
Partner Deal Advisory KPMG AG WPG
Germany, Member of the Technical
Committee for Business Valuation and
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General

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

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

Data source

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

Eurozone Cost of Capital Parameters as at 31 August 2023

The typified, uniform risk-free rate based on AAA-rated government bonds currently lies at 2.5% for the Eurozone. It is derived from yield curves based on Svensson parameters and results published by the European Central Bank. The overall long-term market return for the Eurozone is estimated at around 8.5%, leading to a market risk premium of 6.0%. Estimations of the market return rely on historical returns, as well as on forward-looking return estimates and risk premiums based on Eurozone companies with current market share prices and earnings forecasts from financial analysts.

Betas

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

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

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

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

where β_U = unlevered beta, β_D = debt beta, **D** = net debt, **E** = market value of equity. Debt betas rely on a company's individual rating on a given date. Annual 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: Average Levered Industry Betas for five single 1y-periods and one 5y-period

31 August 2023	Average* Levered Betas								
	1-Year, weekly returns							5-Year, monthly returns	
Industries	Comps incl. (Average*)	9/2018 to 8/2019	9/2019 to 8/2020	9/2020 to 8/2021	9/2021 to 8/2022	9/2022 to 8/2023	Average*	Comps incl.	9/2018 to 8/2023
Industrials	257	1.12	1.02	1.02	0.86	0.87	0.98	234	1.18
Consumer Discretionary	168	1.06	1.03	1.02	1.04	0.98	1.03	150	1.24
Health Care	131	1.04	0.73	0.84	0.75	0.83	0.84	122	0.84
Financials	146	0.97	1.01	1.10	0.98	0.85	0.98	135	1.11
Utilities	49	0.53	0.81	0.76	0.62	0.74	0.69	44	0.68
Materials	81	1.21	1.04	0.98	0.86	0.96	1.01	77	1.22
Real Estate	93	0.45	0.78	0.74	0.61	0.80	0.68	81	0.87
Communication Services	91	0.84	0.80	0.78	0.66	0.71	0.76	85	0.87
Information Technology	149	1.15	0.86	0.82	0.93	0.93	0.94	138	1.12
Consumer Staples	64	0.66	0.62	0.64	0.75	0.68	0.67	62	0.71
Energy	33	1.05	1.02	1.24	0.47	0.78	0.91	33	1.07

Table 2: Average Industry Leverage for five single 1y-periods and one 5y-period

31 August 2023	Average* Debt-Equity-Ratios								
	1-Year							5-Year	
Industries	Comps incl. (Average*)	9/2018 to 8/2019	9/2019 to 8/2020	9/2020 to 8/2021	9/2021 to 8/2022	9/2022 to 8/2023	Average*	Comps incl.	9/2018 to 8/2023
Industrials	163	96.2%	117.0%	54.2%	65.0%	61.1%	78.7%	186	63.4%
Consumer Discretionary	94	202.8%	150.7%	85.0%	160.6%	235.9%	167.0%	113	90.8%
Health Care	63	52.7%	45.1%	26.0%	239.3%	114.6%	95.5%	75	27.7%
Utilities	36	95.2%	86.8%	67.7%	84.6%	76.4%	82.2%	30	75.8%
Materials	56	72.9%	87.5%	42.9%	59.7%	51.0%	62.8%	59	53.4%
Real Estate	52	139.5%	165.2%	126.2%	161.2%	329.2%	184.3%	58	141.2%
Communication Services	53	74.3%	282.2%	49.2%	75.3%	96.7%	115.5%	61	58.8%
Information Technology	86	25.8%	43.9%	11.3%	24.8%	28.8%	26.9%	106	13.9%
Consumer Staples	43	230.3%	253.9%	159.1%	295.9%	130.3%	213.9%	47	215.7%
Energy	22	150.5%	205.1%	117.1%	66.2%	46.3%	117.1%	24	69.7%

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

31 August 2023	Average* Unlevered Betas								
	1-Year, weekly returns							5-Year, monthly returns	
Industries	Comps incl. (Average*)	9/2018 to 8/2019	9/2019 to 8/2020	9/2020 to 8/2021	9/2021 to 8/2022	9/2022 to 8/2023	Average*	Comps incl.	9/2018 to 8/2023
Industrials	163	0.93	0.87	0.84	0.75	0.74	0.82	186	0.93
Consumer Discretionary	94	0.87	0.86	0.83	0.87	0.76	0.84	113	0.96
Health Care	63	0.84	0.67	0.72	0.71	0.79	0.75	75	0.75
Utilities	36	0.48	0.68	0.62	0.45	0.47	0.54	30	0.50
Materials	56	0.93	0.80	0.81	0.71	0.78	0.80	59	0.92
Real Estate	52	0.43	0.67	0.55	0.48	0.50	0.53	58	0.62
Communication Services	53	0.76	0.63	0.64	0.61	0.59	0.65	61	0.78
Information Technology	86	1.14	0.96	0.83	0.93	0.88	0.95	106	1.06
Consumer Staples	43	0.59	0.58	0.54	0.60	0.52	0.57	47	0.56
Energy	22	0.90	1.02	1.05	0.46	0.72	0.83	24	0.92

Source: KPMG Valuation Data Source, see www.kpmg.de/en/valuation-data-source

*Average = Arithmetic Mean

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

31 August 2023	Average* Levered Betas								
	1-Year, weekly returns							5-Year, monthly returns	
Subindustry: Materials	Comps incl. (Average*)	9/2018 to 8/2019	9/2019 to 8/2020	9/2020 to 8/2021	9/2021 to 8/2022	9/2022 to 8/2023	Average*	Comps incl.	9/2018 to 8/2023
Chemicals	32	1.22	0.96	0.89	0.78	0.95	0.96	31	1.17
Construction Materials	12	1.00	1.14	1.12	0.98	1.03	1.05	11	1.30
Containers & Packaging	11	1.03	0.75	0.50	0.82	0.84	0.79	9	0.72
Metals & Mining	19	1.46	1.32	1.36	1.01	1.17	1.26	18	1.57
Paper & Forest Products	8	1.11	0.98	0.98	0.68	0.56	0.86	8	1.03

Table 5: Average Subindustry (Materials) Leverage for five single 1y-periods and one 5y-period

31 August 2023	Average* Debt-Equity-Ratios								
	1-Year							5-Year	
Subindustry: Materials	Comps incl. (Average*)	9/2018 to 8/2019	9/2019 to 8/2020	9/2020 to 8/2021	9/2021 to 8/2022	9/2022 to 8/2023	Average*	Comps incl.	9/2018 to 8/2023
Chemicals	22	51.9%	61.8%	31.6%	44.8%	51.9%	0.48	22	40.6%
Construction Materials	9	59.4%	57.7%	37.3%	65.1%	44.6%	0.53	9	50.9%
Containers & Packaging	8	48.1%	35.4%	22.5%	33.0%	39.9%	0.36	7	21.6%
Metals & Mining	13	135.4%	184.8%	77.8%	108.4%	68.3%	1.15	16	97.8%
Paper & Forest Products	5	57.4%	72.0%	43.8%	30.9%	32.9%	0.47	5	41.9%

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

31 August 2023	Average* Unlevered Betas								
	1-Year, weekly returns							5-Year, monthly returns	
Subindustry: Materials	Comps incl. (Average*)	9/2018 to 8/2019	9/2019 to 8/2020	9/2020 to 8/2021	9/2021 to 8/2022	9/2022 to 8/2023	Average*	Comps incl.	9/2018 to 8/2023
Chemicals	22	0.91	0.76	0.74	0.67	0.75	0.76	22	0.85
Construction Materials	9	0.79	0.89	0.94	0.83	0.84	0.86	9	0.96
Containers & Packaging	8	0.97	0.65	0.55	0.70	0.69	0.71	7	0.65
Metals & Mining	13	1.06	0.90	1.03	0.75	0.90	0.93	16	1.12
Paper & Forest Products	5	0.92	0.81	0.81	0.61	0.53	0.73	5	0.85

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 capital-ization plus net debt) by its sales, EBITDA or EBIT. Earnings multiples are derived by dividing a companies' market capitalization by earnings (net in-coe). 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: Average Industry Multiples

31 August 2023 Industries	Sales			EBITDA			EBIT			Earnings			Market to Book-Ratio		
	Trai-ling	Fwd. +1	Comps incl.	Trai-ling	Fwd. +1	Comps incl.	Trai-ling	Fwd. +1	Comps incl.	Trai-ling	Fwd. +1	Comps incl.	Trai-ling	Fwd. +1	Comps incl.
Industrials	1.5	1.4	238	10.0	8.3	217	15.1	14.2	232	16.3	15.4	221	2.4	2.2	224
Consumer Discretionary	1.6	1.4	152	11.3	8.4	131	14.9	18.6	146	18.4	13.3	136	2.6	2.7	141
Health Care	8.7	5.9	111	14.8	11.5	76	24.7	17.4	83	23.9	18.7	73	3.8	5.2	89
Financials	n/m	n/m	n/a	n/m	n/m	n/a	n/m	n/m	n/a	11.3	11.3	113	1.4	1.2	110
Utilities	4.2	3.8	46	9.3	8.8	45	15.8	15.7	45	17.1	16.8	46	2.1	1.9	44
Materials	3.0	1.4	75	7.3	6.5	67	15.6	10.9	74	13.9	13.9	72	1.6	1.4	69
Real Estate	13.0	12.1	69	30.2	18.9	64	27.4	22.0	68	13.8	16.5	63	0.6	0.7	57
Communication Services	2.3	2.1	79	8.2	7.9	70	17.7	19.1	76	16.2	19.4	70	2.8	2.2	64
Information Technology	2.4	1.9	140	15.1	9.8	112	25.0	21.6	126	23.3	23.9	120	4.0	3.4	118
Consumer Staples	1.9	1.5	54	18.4	10.3	39	15.4	16.3	55	18.5	15.9	51	2.2	2.1	49
Energy	1.8	1.6	33	5.3	5.0	29	9.2	7.8	32	13.8	9.2	32	1.8	1.5	30

Table 8: Average Subindustry (Materials) Multiples

31 August 2023 Subindustry: Materials	Sales			EBITDA			EBIT			Earnings			Market to Book		
	Trai-ling	Fwd. +1	Comps incl.	Trai-ling	Fwd. +1	Comps incl.	Trai-ling	Fwd. +1	Comps incl.	Trai-ling	Fwd. +1	Comps incl.	Trai-ling	Fwd. +1	Comps incl.
Chemicals	5.8	1.9	31	8.8	7.6	28	24.0	13.0	29	17.9	14.9	29	1.7	1.7	26
Construction Materials	1.2	1.1	10	5.1	5.0	9	8.7	8.3	11	9.5	9.1	10	1.4	1.2	10
Containers & Packaging	1.5	1.5	11	8.1	7.2	10	14.0	11.8	11	15.1	12.6	11	2.9	2.1	11
Metals & Mining	0.6	0.6	16	4.1	4.0	13	7.0	6.8	16	7.0	6.2	15	0.8	0.7	16
Paper & Forest Products	1.3	1.3	7	9.4	7.3	7	14.7	13.8	7	19.7	34.8	7	1.4	1.4	6

Source: KPMG Valuation Data Source, see www.kpmg.de/en/valuation-data-source

*Average = Arithmetic Mean

Data

Transaction Multiples

Professor Dr. Stefan O. Grbenic, StB, CVA

Professor of Management Control, Accounting and Finance at Webster University St. Louis/Vienna and Graz University of Technology and Visiting Professor at University of Maribor, Istanbul Medeniyet University and University of Twente.
Contact: ebvm@eacva.de

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 January 2020 until 31 December 2022*) for the following multiples:

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

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

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

In the following issue we will continue the regional breakdown into Eastern Europe.

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

- Sectors and resulting sector multiples are formed according to the *NACE Rev. 2 industry classification system.*
- The multiples indicate the Deal Enterprise Value *(DEPV = Market value of total capital corrected)* for a private firm. They are scaled to the levels of value Control Value, Pure Play Value and Domestic Value. Additionally, the multiples *do not include any identifiable Synergistic Values*. When applying the multiples to other levels of value without adjusting the value driver (reference value), respective *Valuation Adjustments* (Minority Discount for Minority Values, Conglomerate

Discount for Conglomerates, Regional Premiums for Cross-Border transactions by international acquirors and Strategic Premium for Synergistic acquisitions) must be applied.

- The multiples are computed using transaction data collected from the previous three years. Therefore, the available multiples include transactions of the period *1 January 2020 until 31 December 2022*, 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)

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

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

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

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

Scandinavia - Trailing & Forward DEPV/Sales (operating), 1 January 2020 until 31 December 2022

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
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C24 - C25	Manufacture of basic metals, fabricated metal products
C26 - C27	Manufacture of computers, electronic/optical products, electrical equipment
C28 - C30, C33	Manufacture of machinery, motor vehicles, other transport equipment; repair/installation
D35	Electricity, gas, steam and air conditioning supply
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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
107	0.77	0.40	0.69	0.30	0.41	1.13	[0,60 ; 0,94] (12,4)	0.87	0.81	$\hat{y}$ = 0,999 x Sales - 6.495	0.79	30,784
343	2.11	1.75	2.14	1.89	2.06	2.47	[2,05 ; 2,17] (25,4)	-1.39	0.23	$\hat{y}$ = 2,157 x Sales + 25.019	0.53	735,880
628	1.97	0.99	2.07	1.93	2.06	2.21	[1,90 ; 2,04] (56,4)	-1.69	0.31	$\hat{y}$ = 2,178 x Sales - 24.820	0.90	365,890
268	1.29	0.41	1.26	0.46	1.51	1.77	[1,11 ; 1,46] (29,6)	-0.04	0.62	$\hat{y}$ = 1,456 x Sales + 131.601	0.96	403,903
1,079	1.83	0.71	1.90	1.48	1.90	2.30	[1,77 ; 1,90] (64,2)	-0.83	0.37	$\hat{y}$ = 2,230 x Sales - 160.033	0.90	406,798
1,036	1.03	0.82	1.04	0.83	1.09	1.25	[1,01 ; 1,05] (6,7)	0.46	0.36	$\hat{y}$ = 1,004 x Sales + 156.293	0.83	717,603
945	1.32	0.54	1.27	1.02	1.21	1.38	[1,28 ; 1,36] (42,9)	0.67	0.41	$\hat{y}$ = 0,927 x Sales + 1.113.343	0.89	993,745
263	1.23	1.13	1.23	1.07	1.23	1.32	[1,20 ; 1,26] (4,8)	0.48	0.24	$\hat{y}$ = 1,223 x Sales + 760.108	0.84	7,720,863
5	-	-	-	-	-	-	-	-	-	-	-	-
805	0.65	0.14	0.61	0.17	0.62	1.12	[0,61 ; 0,69] (82,5)	0.59	0.80	$\hat{y}$ = 1,072 x Sales - 15.781	0.85	215,724
1,084	1.37	0.47	1.36	0.50	1.85	2.10	[1,26 ; 1,48] (176,3)	-0.06	0.66	$\hat{y}$ = 1,330 x Sales + 482.052	0.61	979,656
102	0.46	0.10	0.42	0.12	0.30	0.59	[0,36 ; 0,56] (7,5)	1.42	1.01	$\hat{y}$ = 0,332 x Sales + 10.164	0.88	97,150
644	1.39	0.67	1.37	0.73	1.32	1.95	[1,28 ; 1,50] (76,2)	0.19	0.57	$\hat{y}$ = 1,330 x Sales + 15.713	0.98	160,173
757	1.20	0.55	1.14	0.51	0.99	1.87	[1,09 ; 1,31] (93,2)	0.54	0.68	$\hat{y}$ = 0,599 x Sales + 20.836	0.44	92,996
161	1.49	0.35	1.49	0.64	1.51	2.28	[1,21 ; 1,77] (22,5)	0.04	0.59	$\hat{y}$ = 0,027 x Sales + 91.347	-0.01	303,690
140	1.07	0.99	1.06	0.79	1.12	1.29	[1,04 ; 1,11] (18,2)	0.19	0.28	$\hat{y}$ = 1,067 x Sales - 6.774	0.54	303,161
467	0.60	0.09	0.48	0.17	0.33	0.76	[0,51 ; 0,69] (51,7)	1.87	1.11	$\hat{y}$ = 0,243 x Sales + 11.838	0.26	57,421
150	0.69	0.12	0.57	0.10	0.22	0.61	[0,38 ; 0,99] (16,2)	1.37	1.32	$\hat{y}$ = 1,986 x Sales - 112.148	0.72	542,399

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
54	1.44	0.63	1.42	0.43	1.30	2.27	[0,83 ; 2,04] (9,4)	0.15	0.69	$\hat{y}$ = 2,904 x Sales - 727.284	0.94	671,131
467	0.92	0.79	0.86	0.75	0.84	0.98	[0,89 ; 0,95] (87,6)	2.05	0.41	$\hat{y}$ = 0,716 x Sales + 636.084	0.73	738,151
1,465	1.12	0.86	1.01	0.78	0.88	1.29	[1,08 ; 1,16] (129,2)	1.61	0.52	$\hat{y}$ = 0,786 x Sales + 995.968	0.68	1,561,407
1,030	1.65	1.28	1.63	0.91	1.78	2.18	[1,58 ; 1,72] (140,4)	-0.00	0.44	$\hat{y}$ = 0,938 x Sales + 1.035.559	0.80	1,986,717
2,710	1.03	0.39	1.02	0.24	0.94	1.90	[0,98 ; 1,09] (465,3)	0.14	0.75	$\hat{y}$ = 2,112 x Sales - 8.216.817	0.53	6,803,453
2,324	0.91	0.73	0.82	0.60	0.67	1.05	[0,89 ; 0,93] (195,9)	1.60	0.54	$\hat{y}$ = 0,907 x Sales - 281.162	0.55	2,522,556
3,451	0.95	0.72	0.88	0.58	0.77	1.11	[0,93 ; 0,98] (347,2)	1.13	0.57	$\hat{y}$ = 1,777 x Sales - 4.205.175	0.78	3,742,498
301	0.71	0.41	0.54	0.32	0.37	0.58	[0,56 ; 0,86] (35,6)	1.94	1.07	$\hat{y}$ = 0,368 x Sales + 396.068	0.79	10,284,553
11	-	-	-	-	-	-	-	-	-	-	-	-
1,476	0.72	0.42	0.61	0.28	0.56	0.90	[0,68 ; 0,75] (149,7)	1.80	0.80	$\hat{y}$ = 0,493 x Sales + 297.118	0.30	3,556,632
2,286	0.83	0.58	0.79	0.55	0.82	1.01	[0,81 ; 0,85] (106,9)	1.22	0.54	$\hat{y}$ = 0,866 x Sales - 395.661	0.78	4,164,305
483	0.72	0.36	0.62	0.28	0.50	1.09	[0,64 ; 0,80] (38,2)	1.56	0.85	$\hat{y}$ = 0,703 x Sales - 591.475	0.82	3,983,811
1,444	1.19	0.72	1.10	0.54	0.68	2.07	[1,10 ; 1,27] (196,7)	0.79	0.71	$\hat{y}$ = 0,972 x Sales + 217.708	0.30	2,310,709
1,921	1.45	0.74	1.43	0.66	1.29	2.19	[1,38 ; 1,52] (271,0)	0.11	0.58	$\hat{y}$ = 0,795 x Sales + 1.147.070	0.65	2,374,113
150	1.42	0.48	1.43	0.43	1.51	2.36	[1,07 ; 1,77] (26,7)	-0.10	0.68	$\hat{y}$ = 1,362 x Sales + 74.666	0.61	1,282,377
188	1.21	0.79	1.15	0.65	0.97	1.81	[1,05 ; 1,38] (22,8)	0.77	0.58	$\hat{y}$ = 0,663 x Sales + 248.515	0.35	427,555
1,997	0.44	0.24	0.29	0.18	0.22	0.35	[0,41 ; 0,47] (650,6)	2.67	1.24	$\hat{y}$ = 0,137 x Sales + 981.479	0.35	803,793
1,975	1.33	0.66	1.29	0.62	1.35	1.84	[1,26 ; 1,39] (232,9)	0.22	0.59	$\hat{y}$ = 0,151 x Sales + 1.855.934	0.14	1,365,726

Scandinavia - Trailing & Forward DEPV/EBITDA, 1 January 2020 until 31 December 2022

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
F41 - F43	Construction - Buildings, civil engineering, specialized construction activities
G45 - G47	Wholesale/Retail trade, repair of motor vehicles and motorcycles
H49 - H53	Transportation and storage - Land/pipelines, water, air; warehousing, postal/courier activities
J58 - J60, C18	Publishing activities, programme production, music publishing, broadcasting, printing
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M71, M72, M74, M75	Architectural/engineering/other professional activities, technical testing, scientific R&D, veterinary activities

n	Trailing DEPV/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
81	5.68	3.30	5.40	2.34	4.68	9.25	[-2,82 ; 14,17] (10,9)	0.68	0.72	$\hat{y}$ = 9,289 x EBITDA - 5.030	0.87	28,138
349	13.41	12.25	13.47	12.28	13.16	14.61	[11,45 ; 15,37] (6,6)	-0.78	0.21	$\hat{y}$ = 13,124 x EBITDA + 174.756	0.70	641,652
767	10.75	7.52	10.62	8.32	8.76	14.67	[7,55 ; 13,94] (65,8)	0.31	0.41	$\hat{y}$ = 13,863 x EBITDA - 791.994	0.71	1,496,229
263	10.03	4.89	10.12	4.54	11.66	14.45	[1,18 ; 18,87] (39,9)	-0.22	0.56	$\hat{y}$ = 1,553 x EBITDA + 1.615.215	0.48	1,780,258
279	10.53	1.76	10.77	4.17	12.65	14.34	[1,42 ; 19,64] (38,4)	-0.54	0.55	$\hat{y}$ = 13,637 x EBITDA + 11.964	0.94	512,253
145	8.02	4.35	7.74	4.15	6.93	12.30	[-1,17 ; 17,22] (17,1)	0.36	0.62	$\hat{y}$ = 11,772 x EBITDA - 21.856	0.96	66,332
741	8.58	2.53	8.23	5.71	7.40	11.47	[5,16 ; 12,00] (62,8)	0.78	0.53	$\hat{y}$ = 5,682 x EBITDA + 1.629.359	0.64	2,229,550
172	11.78	8.38	11.95	8.76	11.10	16.29	[3,86 ; 19,69] (16,5)	-0.06	0.41	$\hat{y}$ = 7,841 x EBITDA + 12.746.399	0.80	10,706,500
5	-	-	-	-	-	-	-	-	-	-	-	-
794	4.69	1.00	4.33	1.34	4.54	7.87	[2,42 ; 6,96] (41,9)	0.96	0.80	$\hat{y}$ = 6,890 x EBITDA + 541	0.82	241,166
1,106	9.02	3.73	8.81	4.84	8.54	12.08	[5,74 ; 12,30] (112,0)	0.33	0.54	$\hat{y}$ = 10,764 x EBITDA - 84.742	0.87	847,851
91	4.13	0.77	3.36	0.97	2.57	5.04	[-6,93 ; 15,18] (16,7)	2.02	1.17	$\hat{y}$ = 2,737 x EBITDA + 53.319	0.50	232,060
429	9.23	4.61	9.18	4.72	11.10	12.37	[3,91 ; 14,55] (54,1)	-0.10	0.53	$\hat{y}$ = 11,495 x EBITDA - 3.099	0.98	352,816
735	9.32	4.83	9.21	4.05	11.00	13.21	[4,43 ; 14,20] (104,2)	0.03	0.58	$\hat{y}$ = 11,512 x EBITDA + 27.174	0.98	289,803
134	7.03	3.65	6.57	2.92	4.25	9.25	[-5,02 ; 19,09] (15,8)	0.89	0.79	$\hat{y}$ = 3,954 x EBITDA + 446	0.99	35,934
177	8.56	7.12	8.03	5.27	8.28	9.06	[3,23 ; 13,89] (13,3)	1.08	0.46	$\hat{y}$ = 6,072 x EBITDA + 130.053	0.57	309,878
349	5.11	0.89	4.42	1.47	3.62	6.45	[-0,60 ; 10,81] (27,8)	1.25	0.95	$\hat{y}$ = 5,549 x EBITDA + 3.934	0.72	27,703
290	11.30	2.92	11.77	5.50	13.48	15.05	[2,74 ; 19,87] (38,3)	-0.71	0.50	$\hat{y}$ = 14,355 x EBITDA - 991	0.95	390,740

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
140	7.95	5.38	8.02	6.15	8.32	9.33	[3,93 ; 11,97] (11,8)	-0.29	0.41	$\hat{y}$ = 9,109 x EBITDA - 50.482	0.84	1,769,929
488	6.63	5.85	6.00	5.25	5.86	6.59	[4,74 ; 8,51] (216,7)	2.69	0.46	$\hat{y}$ = 4,644 x EBITDA + 871.772	0.67	789,740
1,717	5.99	4.04	4.91	2.82	4.23	6.52	[3,53 ; 8,44] (183,1)	1.81	0.79	$\hat{y}$ = 3,447 x EBITDA + 996.401	0.55	1,998,265
1,573	9.00	5.55	8.74	5.01	8.61	11.88	[6,40 ; 11,60] (165,1)	0.44	0.53	$\hat{y}$ = 0,981 x EBITDA + 4.284.555	0.10	4,517,670
2,743	5.24	3.27	5.14	2.15	5.98	8.14	[4,41 ; 6,07] (247,0)	0.37	0.59	$\hat{y}$ = 8,889 x EBITDA - 4.260.518	0.88	3,526,196
2,388	7.23	6.29	6.73	5.51	6.19	8.27	[6,35 ; 8,11] (281,1)	1.88	0.43	$\hat{y}$ = 8,734 x EBITDA - 718.394	0.72	2,632,163
3,494	6.66	5.66	6.20	4.97	6.08	7.58	[5,97 ; 7,35] (450,2)	1.88	0.45	$\hat{y}$ = 8,491 x EBITDA - 1.190.267	0.85	3,235,051
349	2.32	0.98	1.81	0.68	0.81	2.89	[0,54 ; 4,10] (33,0)	1.74	1.17	$\hat{y}$ = 0,732 x EBITDA + 1.265.718	0.84	9,539,071
11	-	-	-	-	-	-	-	-	-	-	-	-
1,943	6.09	4.49	5.71	3.86	5.43	7.65	[5,12 ; 7,06] (110,3)	1.29	0.50	$\hat{y}$ = 5,540 x EBITDA + 47.030	0.47	2,749,396
2,281	5.12	3.97	4.72	2.75	4.68	6.14	[4,39 ; 5,85] (150,0)	1.39	0.54	$\hat{y}$ = 6,605 x EBITDA - 2.152.959	0.83	3,687,758
483	3.68	2.37	3.39	2.17	3.79	4.45	[2,65 ; 4,72] (32,8)	1.08	0.61	$\hat{y}$ = 5,584 x EBITDA - 841.396	0.82	3,978,822
1,546	7.89	5.31	7.26	4.97	6.84	9.15	[5,46 ; 10,32] (123,6)	1.25	0.58	$\hat{y}$ = 6,673 x EBITDA + 357.927	0.59	2,273,824
2,082	8.53	4.96	8.06	4.27	7.33	10.76	[5,67 ; 11,39] (232,9)	0.75	0.63	$\hat{y}$ = 4,465 x EBITDA + 1.401.419	0.60	2,942,210
258	5.93	3.46	5.71	3.21	5.57	7.21	[2,50 ; 9,36] (25,0)	0.61	0.59	$\hat{y}$ = 6,159 x EBITDA - 12.439	0.88	1,346,165
676	7.84	5.16	7.48	5.77	7.41	9.01	[5,77 ; 9,91] (34,9)	1.27	0.44	$\hat{y}$ = 6,525 x EBITDA + 236.419	0.73	829,743
2,260	4.53	3.56	4.01	2.67	3.28	5.62	[3,80 ; 5,27] (433,2)	2.15	0.61	$\hat{y}$ = 3,084 x EBITDA + 539.062	0.39	1,178,611
2,372	7.06	4.49	6.30	3.56	5.68	8.94	[4,91 ; 9,22] (207,9)	1.26	0.68	$\hat{y}$ = 3,393 x EBITDA + 1.176.121	0.23	1,865,890

Data

Scandinavia - Trailing & Forward DEPV/EBIT, 1 January 2020 until 31 December 2022

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

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
81	9.24	4.11	8.80	3.18	5.44	15.92	[-22,70 ; 41,19] (11,6)	0.75	0.86	$\hat{y}$ = 14,016 x EBIT - 5.637	0.75	38,626
333	14.51	13.06	14.66	12.39	14.96	17.15	[11,62 ; 17,41] (14,4)	-0.63	0.23	$\hat{y}$ = 12,795 x EBIT + 537.694	0.60	812,038
821	14.08	8.70	13.54	9.37	10.74	20.40	[6,27 ; 21,89] (92,3)	0.64	0.50	$\hat{y}$ = 16,386 x EBIT - 583.964	0.55	2,219,287
290	13.75	6.57	13.49	7.87	14.81	17.70	[-2,07 ; 29,57] (29,6)	0.14	0.56	$\hat{y}$ = 2,186 x EBIT + 2.416.868	0.25	2,839,619
274	12.50	1.90	12.41	6.46	12.89	17.22	[-1,94 ; 26,94] (31,9)	-0.06	0.58	$\hat{y}$ = 14,371 x EBIT + 66.144	0.91	646,902
419	20.40	10.07	21.32	10.56	26.23	28.01	[-2,00 ; 42,80] (63,8)	-0.77	0.49	$\hat{y}$ = 28,266 x EBIT - 134.390	0.96	324,524
773	11.72	3.57	10.89	7.48	10.37	13.31	[4,29 ; 19,14] (56,1)	1.13	0.58	$\hat{y}$ = 7,696 x EBIT + 2.113.950	0.42	3,320,584
188	14.76	9.86	14.46	9.40	12.51	21.84	[-2,79 ; 32,31] (21,8)	0.45	0.49	$\hat{y}$ = 7,556 x EBIT + 18.321.003	0.65	13,819,163
5	-	-	-	-	-	-	-	-	-	-	-	-
800	5.24	1.19	4.76	1.40	4.76	8.31	[2,28 ; 8,20] (40,4)	1.20	0.82	$\hat{y}$ = 6,933 x EBIT + 1.235	0.83	229,452
1,122	11.31	3.97	10.66	6.76	9.58	14.78	[4,10 ; 18,52] (104,5)	0.77	0.65	$\hat{y}$ = 11,874 x EBIT + 4.558	0.84	934,012
75	6.98	0.81	5.88	1.04	3.95	9.13	[-27,75 ; 41,71] (5,5)	1.43	1.17	$\hat{y}$ = 5,653 x EBIT + 37.325	0.43	199,367
435	13.52	5.71	13.47	5.53	13.59	21.22	[-1,46 ; 28,51] (66,1)	-0.04	0.61	$\hat{y}$ = 20,844 x EBIT - 30.383	0.98	359,444
741	12.13	5.28	11.63	4.07	10.80	20.17	[-0,23 ; 24,50] (107,2)	0.36	0.71	$\hat{y}$ = 20,858 x EBIT - 17.562	0.98	288,615
129	5.10	3.10	4.62	2.63	3.73	6.40	[-0,55 ; 10,75] (10,9)	1.23	0.74	$\hat{y}$ = 3,961 x EBIT + 380	0.99	38,182
247	11.11	8.64	10.75	5.90	10.10	15.81	[3,07 ; 19,15] (29,3)	0.44	0.47	$\hat{y}$ = 5,961 x EBIT + 176.217	0.63	304,519
403	6.24	0.70	5.17	1.50	3.81	9.08	[-3,02 ; 15,50] (30,3)	1.39	1.02	$\hat{y}$ = 11,470 x EBIT - 4.853	0.81	15,865
263	14.25	3.31	14.25	7.26	16.00	20.48	[-4,81 ; 33,30] (31,7)	-0.18	0.58	$\hat{y}$ = 16,924 x EBIT + 52.852	0.86	972,772

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
140	8.99	6.51	8.98	7.31	8.87	9.95	[4,48 ; 13,49] (7,7)	0.06	0.38	$\hat{y}$ = 9,506 x EBIT + 163.603	0.84	1,788,797
488	9.29	8.60	8.81	7.77	8.45	9.83	[7,40 ; 11,17] (116,8)	2.20	0.33	$\hat{y}$ = 7,474 x EBIT + 601.770	0.70	752,880
1,658	7.41	5.22	6.03	3.48	5.71	8.60	[3,48 ; 11,34] (377,6)	2.40	0.80	$\hat{y}$ = 4,529 x EBIT + 856.594	0.60	1,926,674
1,578	12.58	7.17	12.37	7.38	10.29	18.89	[7,02 ; 18,13] (206,2)	0.36	0.55	$\hat{y}$ = 1,122 x EBIT + 4.337.217	0.09	4,526,929
2,748	7.00	4.51	6.84	3.04	7.86	10.49	[5,58 ; 8,43] (184,4)	0.49	0.58	$\hat{y}$ = 11,073 x EBIT - 3.566.636	0.87	3,620,563
2,399	9.89	8.58	9.12	7.32	7.99	11.41	[8,16 ; 11,61] (221,7)	1.72	0.44	$\hat{y}$ = 10,752 x EBIT - 416.538	0.73	2,559,671
3,365	8.32	7.36	7.99	6.86	7.77	9.39	[7,49 ; 9,15] (2.337,0)	2.52	0.39	$\hat{y}$ = 10,649 x EBIT - 1.178.552	0.90	2,581,276
349	3.60	1.16	2.72	0.78	0.93	5.00	[-1,62 ; 8,82] (32,1)	1.56	1.29	$\hat{y}$ = 0,847 x EBIT + 1.338.480	0.84	9,540,510
11	-	-	-	-	-	-	-	-	-	-	-	-
1,954	7.41	5.54	6.82	4.97	7.00	8.41	[5,93 ; 8,89] (351,6)	2.01	0.51	$\hat{y}$ = 7,544 x EBIT - 167.443	0.53	2,592,795
2,265	9.55	6.15	8.70	3.98	8.32	13.41	[5,80 ; 13,30] (212,8)	0.89	0.66	$\hat{y}$ = 13,087 x EBIT - 2.954.696	0.63	5,444,251
381	6.44	3.89	6.02	4.66	4.95	8.67	[2,43 ; 10,44] (36,2)	1.65	0.64	$\hat{y}$ = 6,804 x EBIT - 293.490	0.80	4,452,874
1,513	11.29	7.15	10.23	6.79	8.43	14.48	[5,54 ; 17,03] (123,8)	1.22	0.62	$\hat{y}$ = 8,024 x EBIT + 565.231	0.56	2,300,812
2,039	12.67	7.49	11.89	7.01	10.54	15.71	[6,72 ; 18,61] (200,3)	0.87	0.61	$\hat{y}$ = 6,812 x EBIT + 1.245.925	0.68	2,615,903
268	7.31	4.34	6.85	4.10	6.67	9.10	[2,02 ; 12,60] (22,3)	0.80	0.60	$\hat{y}$ = 6,762 x EBIT - 4.180	0.88	1,356,777
687	8.06	5.13	7.43	5.61	7.33	8.79	[4,98 ; 11,14] (81,1)	1.83	0.52	$\hat{y}$ = 6,396 x EBIT + 276.976	0.69	906,657
2,276	6.64	5.34	5.98	4.05	5.01	8.34	[5,28 ; 7,99] (675,8)	2.26	0.57	$\hat{y}$ = 4,671 x EBIT + 524.300	0.40	1,166,154
2,308	9.80	6.69	8.90	5.33	8.60	12.37	[6,31 ; 13,29] (162,7)	1.32	0.62	$\hat{y}$ = 5,789 x EBIT + 900.250	0.33	1,769,498

Data

Scandinavia - Trailing DEPV/Invested Capital, 1 January 2020 until 31 December 2022

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

Britain - Trailing DEPV/Invested Capital, 1 January 2020 until 31 December 2022

	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

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
107	0.70	0.58	0.69	0.47	0.65	0.92	[0,66 ; 0,73] (14,4)	0.11	0.39	$\hat{y}$ = 0,774 x IC - 2.635	0.85	50,619
408	0.82	0.78	0.82	0.71	0.80	0.92	[0,82 ; 0,83] (25,1)	0.19	0.21	$\hat{y}$ = 0,767 x IC + 245.055	0.79	672,019
542	0.97	0.79	1.01	0.90	1.05	1.13	[0,96 ; 0,98] (42,5)	-1.57	0.25	$\hat{y}$ = 1,142 x IC - 121.472	0.99	366,799
676	0.75	0.04	0.78	0.59	0.81	0.93	[0,74 ; 0,77] (47,0)	-0.69	0.36	$\hat{y}$ = 0,651 x IC + 231.282	0.88	589,500
1,503	0.43	0.30	0.39	0.24	0.34	0.52	[0,42 ; 0,44] (141,9)	1.26	0.64	$\hat{y}$ = 0,342 x IC + 178.898	0.41	1,039,087
2,034	0.83	0.72	0.83	0.60	0.78	1.10	[0,82 ; 0,84] (267,7)	-0.07	0.32	$\hat{y}$ = 0,543 x IC + 970.287	0.78	920,045
1,846	0.85	0.58	0.87	0.65	0.90	1.07	[0,84 ; 0,86] (163,0)	-0.65	0.32	$\hat{y}$ = 0,864 x IC - 9.055	0.90	886,700
333	0.58	0.53	0.56	0.47	0.54	0.63	[0,57 ; 0,59] (21,9)	1.17	0.33	$\hat{y}$ = 0,554 x IC - 1.059.760	0.93	6,395,026
27	0.90	0.58	0.90	0.85	1.08	1.12	[0,78 ; 1,02] (1,0)	-1.09	0.41	$\hat{y}$ = 0,337 x IC + 90.869	-0.05	167,584
2,007	0.67	0.37	0.67	0.49	0.66	0.88	[0,66 ; 0,68] (190,6)	-0.02	0.43	$\hat{y}$ = 0,499 x IC + 344.309	0.88	644,826
1,030	0.78	0.55	0.79	0.54	0.78	1.04	[0,77 ; 0,79] (116,2)	-0.34	0.38	$\hat{y}$ = 0,751 x IC + 71.078	0.94	343,761
392	0.60	0.33	0.59	0.33	0.58	0.89	[0,57 ; 0,62] (47,4)	0.11	0.53	$\hat{y}$ = 0,381 x IC + 98.178	0.74	229,839
1,073	0.73	0.56	0.73	0.53	0.73	0.92	[0,72 ; 0,74] (113,3)	-0.09	0.39	$\hat{y}$ = 0,832 x IC - 159.488	0.82	831,184
1,632	0.74	0.59	0.75	0.52	0.76	0.95	[0,73 ; 0,75] (173,4)	-0.16	0.36	$\hat{y}$ = 0,511 x IC + 355.387	0.92	941,512
537	0.77	0.61	0.79	0.61	0.80	0.99	[0,75 ; 0,78] (54,1)	-0.54	0.35	$\hat{y}$ = 0,861 x IC + 16.061	0.94	216,610
907	0.70	0.19	0.69	0.51	0.68	0.89	[0,69 ; 0,71] (70,9)	0.02	0.35	$\hat{y}$ = 0,456 x IC + 420.574	0.82	679,695
2,474	0.69	0.45	0.69	0.53	0.63	0.91	[0,69 ; 0,70] (190,0)	0.00	0.37	$\hat{y}$ = 0,806 x IC - 240.464	0.82	715,492
988	0.71	0.51	0.72	0.53	0.72	0.91	[0,70 ; 0,73] (93,3)	-0.24	0.39	$\hat{y}$ = 0,706 x IC + 41.726	0.83	595,740

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
290	0.62	0.48	0.61	0.39	0.58	0.75	[0,60 ; 0,64] (29,5)	0.45	0.46	$\hat{y}$ = 0,623 x IC - 19.400	0.99	474,100
220	0.66	0.44	0.65	0.44	0.55	0.85	[0,63 ; 0,68] (23,6)	0.15	0.44	$\hat{y}$ = 0,550 x IC + 81.336	0.95	361,562
392	0.64	0.37	0.65	0.42	0.69	0.86	[0,62 ; 0,66] (47,2)	-0.19	0.48	$\hat{y}$ = 0,686 x IC + 214.576	0.95	973,082
982	0.61	0.37	0.61	0.35	0.56	0.87	[0,60 ; 0,63] (126,5)	0.22	0.53	$\hat{y}$ = 0,469 x IC + 50.148	0.99	2,001,602
601	0.58	0.44	0.57	0.39	0.53	0.75	[0,57 ; 0,60] (55,1)	0.51	0.44	$\hat{y}$ = 0,661 x IC + 10.149	0.97	419,883
757	0.67	0.47	0.67	0.43	0.68	0.88	[0,66 ; 0,68] (86,0)	-0.10	0.44	$\hat{y}$ = 0,543 x IC + 33.572	0.89	556,578
1,020	0.69	0.37	0.70	0.42	0.64	0.99	[0,67 ; 0,71] (136,4)	0.15	0.53	$\hat{y}$ = 0,198 x IC + 2.177.683	0.32	3,111,388
231	0.47	0.20	0.45	0.25	0.31	0.73	[0,44 ; 0,50] (25,7)	0.71	0.65	$\hat{y}$ = 0,757 x IC - 320.276	0.97	745,823
123	0.86	0.77	0.87	0.84	0.87	0.91	[0,84 ; 0,87] (5,1)	-1.13	0.23	$\hat{y}$ = 0,848 x IC + 93.658	0.93	1,000,276
1,454	0.56	0.22	0.54	0.39	0.54	0.73	[0,55 ; 0,57] (107,4)	0.42	0.50	$\hat{y}$ = 0,661 x IC - 277.527	0.83	1,243,145
1,556	0.57	0.34	0.56	0.34	0.53	0.78	[0,56 ; 0,58] (171,4)	0.42	0.53	$\hat{y}$ = 0,468 x IC - 24.051	0.98	2,480,730
843	0.47	0.13	0.44	0.33	0.42	0.58	[0,46 ; 0,48] (51,4)	0.83	0.52	$\hat{y}$ = 0,454 x IC - 52.004	0.61	1,596,894
1,208	0.64	0.35	0.63	0.40	0.59	0.89	[0,62 ; 0,65] (140,0)	0.13	0.49	$\hat{y}$ = 0,498 x IC + 18.478	0.91	1,621,917
1,599	0.65	0.36	0.64	0.38	0.61	0.91	[0,63 ; 0,66] (205,2)	0.13	0.50	$\hat{y}$ = 0,430 x IC + 77.633	0.97	1,781,023
3,231	0.66	0.10	0.66	0.44	0.66	0.88	[0,65 ; 0,66] (346,9)	-0.18	0.46	$\hat{y}$ = 0,408 x IC + 224.271	0.73	1,202,672
671	0.63	0.55	0.63	0.52	0.60	0.75	[0,63 ; 0,64] (20,5)	0.37	0.31	$\hat{y}$ = 0,623 x IC - 59.947	0.91	928,514
1,422	0.63	0.37	0.62	0.36	0.59	0.86	[0,61 ; 0,64] (170,8)	0.17	0.49	$\hat{y}$ = 0,137 x IC + 144.779	0.32	279,694
1,057	0.67	0.20	0.68	0.43	0.70	0.88	[0,65 ; 0,68] (118,5)	-0.12	0.48	$\hat{y}$ = 0,543 x IC + 334.531	0.84	1,268,900

Data

Britain - Trailing & Forward DEPV/Sales (operating), 1 January 2020 until 31 December 2022

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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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		
	x̄a	x̄h	x̄t	Q₁	Q₂	Q₃	95% (JB)	sk	cv	ŷ = DEPV (TEUR)	R̄²	se_y
365	1.17	0.46	1.11	0.39	0.88	1.83	[0,99 ; 1,35] (48,4)	0.55	0.75	ŷ = 0,632 x Sales + 734.453	0.72	2,582,711
172	0.74	0.46	0.67	0.46	0.59	0.84	[0,67 ; 0,80] (16,5)	1.72	0.61	ŷ = 0,644 x Sales + 295.844	0.59	1,785,744
381	0.87	0.34	0.81	0.33	0.78	1.15	[0,78 ; 0,95] (32,5)	0.77	0.70	ŷ = 0,644 x Sales + 427.453	0.91	1,387,210
821	1.08	0.58	1.02	0.50	0.86	1.56	[1,00 ; 1,16] (103,9)	0.57	0.67	ŷ = 0,897 x Sales - 7.165	0.99	1,652,929
526	0.88	0.47	0.81	0.39	0.71	1.24	[0,81 ; 0,95] (33,6)	1.16	0.68	ŷ = 0,930 x Sales + 186.026	0.85	1,150,544
821	0.99	0.58	0.90	0.51	0.75	1.23	[0,92 ; 1,05] (72,5)	1.10	0.67	ŷ = 0,858 x Sales + 98.529	0.95	374,776
816	1.19	0.48	1.15	0.46	0.84	1.99	[1,06 ; 1,31] (125,3)	0.45	0.74	ŷ = 0,419 x Sales + 1.083.976	0.43	2,546,829
118	1.18	0.07	1.21	0.36	1.47	1.94	[0,92 ; 1,44] (20,2)	-0.30	0.67	ŷ = 1,610 x Sales - 351.495	0.96	1,313,016
113	1.61	1.29	1.58	1.02	1.47	1.98	[1,38 ; 1,84] (14,7)	0.53	0.46	ŷ = 2,178 x Sales - 330.693	0.82	1,352,701
800	0.66	0.20	0.55	0.17	0.36	0.91	[0,59 ; 0,74] (65,0)	1.53	1.02	ŷ = 0,206 x Sales + 412.117	0.18	1,065,572
1,503	0.73	0.18	0.60	0.19	0.49	0.91	[0,66 ; 0,79] (133,8)	1.39	0.99	ŷ = 0,932 x Sales - 533.877	0.94	4,646,442
843	0.85	0.16	0.73	0.24	0.41	1.29	[0,74 ; 0,97] (101,5)	1.16	1.01	ŷ = 0,297 x Sales + 527.466	0.36	1,801,283
1,385	1.29	0.35	1.25	0.60	1.17	2.05	[1,20 ; 1,37] (185,8)	0.34	0.65	ŷ = 1,274 x Sales - 64.864	0.95	1,048,760
1,793	1.30	0.42	1.26	0.67	1.22	2.00	[1,23 ; 1,36] (224,8)	0.29	0.60	ŷ = 1,405 x Sales - 65.890	0.99	1,088,849
1,047	1.50	0.38	1.51	0.63	1.57	2.44	[1,38 ; 1,61] (165,5)	-0.05	0.61	ŷ = 0,436 x Sales + 375.064	0.84	1,376,362
64	1.25	0.71	1.20	0.59	1.04	1.70	[0,87 ; 1,64] (8,0)	0.54	0.66	ŷ = 0,465 x Sales + 86.960	0.58	242,298
1,342	0.99	0.35	0.93	0.34	0.84	1.51	[0,93 ; 1,06] (154,7)	0.61	0.74	ŷ = 0,176 x Sales + 171.825	0.25	355,484
843	1.17	0.57	1.13	0.53	0.92	1.80	[1,08 ; 1,27] (109,2)	0.48	0.66	ŷ = 1,116 x Sales + 20.811	0.66	1,184,495

n	Forward DEPV/Sales (operating) Multiples									Forward Sales (operating) Regression		
	x̄a	x̄h	x̄t	Q₁	Q₂	Q₃	95% (JB)	sk	cv	ŷ = DEPV (TEUR)	R̄²	se_y
295	1.09	0.50	1.06	0.53	0.92	1.60	[0,97 ; 1,20] (30,1)	0.49	0.62	ŷ = 2,091 x Sales - 1.109.924	0.99	1,584,073
107	0.58	0.42	0.50	0.41	0.45	0.65	[0,52 ; 0,65] (11,3)	1.79	0.66	ŷ = 0,509 x Sales + 480.557	0.48	2,263,486
236	0.98	0.53	0.92	0.57	0.90	1.14	[0,86 ; 1,09] (16,8)	1.05	0.64	ŷ = 1,201 x Sales - 243.133	0.81	2,341,291
923	0.91	0.42	0.84	0.46	0.76	1.18	[0,85 ; 0,97] (68,4)	0.90	0.68	ŷ = 0,496 x Sales + 454.852	0.98	2,394,312
483	0.69	0.27	0.59	0.33	0.47	0.91	[0,62 ; 0,76] (39,2)	1.51	0.84	ŷ = 0,800 x Sales + 370.445	0.77	1,399,615
569	0.92	0.59	0.82	0.47	0.65	1.21	[0,84 ; 1,01] (51,2)	1.33	0.73	ŷ = 0,667 x Sales + 97.765	0.97	334,402
810	1.02	0.48	0.98	0.44	1.01	1.34	[0,94 ; 1,09] (101,8)	0.46	0.66	ŷ = 0,473 x Sales + 1.918.743	0.43	2,878,141
97	1.19	0.02	1.19	1.14	1.35	1.44	[1,03 ; 1,34] (4,7)	-0.65	0.48	ŷ = 1,211 x Sales + 325.301	0.94	2,048,922
102	0.84	0.21	0.78	0.13	0.19	1.49	[0,41 ; 1,27] (14,0)	0.93	1.16	ŷ = 2,055 x Sales - 2.409.782	0.58	2,233,972
864	0.67	0.23	0.64	0.19	0.61	1.16	[0,63 ; 0,70] (100,5)	0.47	0.75	ŷ = 0,607 x Sales + 385.130	0.29	2,648,410
1,234	0.56	0.20	0.48	0.19	0.42	0.75	[0,53 ; 0,60] (94,1)	1.39	0.89	ŷ = 0,518 x Sales + 381.246	0.89	7,064,466
429	0.67	0.34	0.57	0.23	0.41	0.95	[0,60 ; 0,75] (35,7)	1.37	0.88	ŷ = 0,400 x Sales + 501.103	0.35	3,302,079
902	1.32	0.66	1.28	0.61	1.20	1.97	[1,22 ; 1,41] (112,2)	0.36	0.60	ŷ = 1,283 x Sales - 242.116	0.96	1,257,297
1,288	1.30	0.73	1.26	0.71	1.28	1.80	[1,23 ; 1,37] (142,8)	0.39	0.58	ŷ = 1,348 x Sales - 211.455	0.98	1,449,595
751	1.29	0.37	1.28	0.49	1.18	2.19	[1,17 ; 1,41] (115,9)	0.09	0.67	ŷ = 0,268 x Sales + 716.920	0.66	2,543,289
91	0.73	0.42	0.63	0.25	0.61	0.77	[0,52 ; 0,94] (11,7)	1.87	0.91	ŷ = 0,357 x Sales + 43.869	0.63	501,810
784	0.87	0.32	0.79	0.24	0.74	1.18	[0,79 ; 0,95] (78,2)	0.86	0.80	ŷ = 0,122 x Sales + 325.845	0.16	413,997
896	1.03	0.46	0.99	0.51	1.03	1.30	[0,97 ; 1,09] (71,2)	0.55	0.61	ŷ = 1,044 x Sales + 76.959	0.85	1,240,691

Data

Britain - Trailing & Forward DEPV/EBITDA, 1 January 2020 until 31 December 2022

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
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M71, M72, M74, M75	Architectural/engineering/other professional activities, technical testing, scientific R&D, veterinary activities

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
322	7.70	5.09	7.28	4.55	5.90	12.24	[2,20 ; 13,20] (34,3)	0.80	0.61	$\hat{y}$ = 5,418 x EBITDA + 636.607	0.75	2,554,501
145	6.99	5.80	6.95	4.83	6.03	9.33	[3,96 ; 10,01] (19,4)	0.33	0.41	$\hat{y}$ = 5,009 x EBITDA + 62.780	0.80	1,312,071
295	6.32	2.13	5.85	3.39	5.40	7.22	[1,60 ; 11,04] (24,5)	1.05	0.67	$\hat{y}$ = 5,111 x EBITDA + 265.125	0.97	856,924
671	7.77	5.37	7.41	4.54	6.86	10.67	[4,55 ; 10,98] (70,6)	0.68	0.55	$\hat{y}$ = 5,895 x EBITDA + 1.250.375	0.88	7,823,878
553	5.72	4.08	5.53	3.70	5.60	7.08	[4,17 ; 7,27] (37,8)	0.61	0.50	$\hat{y}$ = 3,958 x EBITDA + 293.137	0.75	1,595,845
633	9.29	5.93	9.16	5.84	9.18	13.42	[5,16 ; 13,43] (76,6)	0.14	0.52	$\hat{y}$ = 5,887 x EBITDA + 130.578	0.97	331,446
735	9.44	4.93	9.11	3.61	8.70	11.96	[3,63 ; 15,25] (88,6)	0.49	0.62	$\hat{y}$ = 6,348 x EBITDA + 1.122.896	0.76	1,712,537
134	8.58	5.20	8.31	4.27	8.22	13.06	[-2,18 ; 19,33] (17,1)	0.56	0.61	$\hat{y}$ = 9,068 x EBITDA + 163.906	0.95	1,315,286
140	7.56	6.78	7.67	5.39	8.06	9.16	[5,61 ; 9,52] (20,6)	-0.27	0.30	$\hat{y}$ = 5,887 x EBITDA + 795.704	0.81	1,636,890
800	7.75	4.48	7.46	3.74	6.89	11.43	[4,25 ; 11,25] (89,9)	0.47	0.60	$\hat{y}$ = 4,641 x EBITDA + 546.282	0.41	1,631,363
1,315	6.22	2.94	5.76	2.98	4.84	8.66	[4,01 ; 8,43] (137,9)	0.91	0.68	$\hat{y}$ = 4,587 x EBITDA + 148.792	0.93	5,431,382
649	5.04	0.72	4.37	2.90	3.82	5.73	[2,34 ; 7,75] (66,5)	1.81	0.77	$\hat{y}$ = 3,903 x EBITDA + 227.345	0.44	1,793,989
1,030	7.79	5.07	7.32	3.71	7.03	10.67	[4,68 ; 10,89] (109,8)	0.68	0.60	$\hat{y}$ = 3,738 x EBITDA + 350.789	0.95	1,364,158
1,385	7.40	4.41	7.02	3.82	6.78	10.28	[5,06 ; 9,74] (133,0)	0.70	0.59	$\hat{y}$ = 3,498 x EBITDA + 279.028	0.98	1,680,165
912	8.81	4.61	8.50	4.08	8.06	11.96	[4,51 ; 13,12] (114,4)	0.37	0.61	$\hat{y}$ = 5,871 x EBITDA + 300.616	0.92	1,002,207
263	12.38	9.41	12.65	9.77	13.37	15.40	[6,97 ; 17,78] (26,8)	-0.76	0.36	$\hat{y}$ = 9,646 x EBITDA + 581.856	0.71	1,624,413
1,191	6.79	4.18	6.40	3.95	5.49	9.39	[4,57 ; 9,01] (121,7)	0.83	0.61	$\hat{y}$ = 10,183 x EBITDA - 212.712	0.86	562,985
585	9.34	6.10	9.23	5.39	8.40	13.48	[5,02 ; 13,67] (80,5)	0.18	0.51	$\hat{y}$ = 5,857 x EBITDA + 241.504	0.96	505,285

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
225	6.73	5.34	6.15	4.37	5.42	7.99	[3,00 ; 10,46] (17,2)	1.38	0.52	$\hat{y}$ = 4,301 x EBITDA + 945.787	0.99	2,852,246
107	4.34	3.03	3.98	2.79	3.87	4.55	[1,36 ; 7,32] (8,2)	1.05	0.60	$\hat{y}$ = 5,337 x EBITDA - 471.683	0.78	1,475,426
242	7.60	4.75	7.07	4.11	5.20	9.93	[0,16 ; 15,04] (24,9)	0.99	0.66	$\hat{y}$ = 4,356 x EBITDA + 379.291	0.97	1,000,087
966	6.32	3.77	5.82	3.07	5.21	8.23	[3,75 ; 8,90] (83,6)	1.03	0.66	$\hat{y}$ = 2,442 x EBITDA + 1.476.293	0.84	7,607,782
483	3.54	0.91	3.31	2.08	3.08	4.76	[2,47 ; 4,61] (24,6)	1.16	0.64	$\hat{y}$ = 4,021 x EBITDA - 17.361	0.92	814,295
617	6.81	4.63	6.32	4.37	5.44	8.17	[3,60 ; 10,02] (57,9)	1.11	0.62	$\hat{y}$ = 4,971 x EBITDA + 166.981	0.93	491,010
810	6.86	3.86	6.74	3.22	7.74	9.26	[4,38 ; 9,34] (56,0)	0.40	0.57	$\hat{y}$ = 3,786 x EBITDA + 1.757.225	0.43	2,872,706
97	3.48	0.58	3.25	2.06	2.34	4.88	[1,07 ; 5,89] (9,2)	1.58	0.66	$\hat{y}$ = 3,666 x EBITDA + 483.538	0.89	2,760,295
113	3.24	1.75	2.92	0.93	2.37	5.26	[0,95 ; 5,53] (8,8)	0.91	0.71	$\hat{y}$ = 3,730 x EBITDA + 414.109	0.66	2,414,506
1,020	6.92	3.73	6.31	3.29	5.09	10.20	[3,73 ; 10,11] (93,1)	0.92	0.68	$\hat{y}$ = 8,190 x EBITDA - 198.222	0.58	2,060,414
1,132	5.04	3.31	4.59	2.69	4.29	7.12	[3,59 ; 6,49] (76,5)	1.27	0.65	$\hat{y}$ = 2,557 x EBITDA + 1.207.155	0.95	4,986,155
365	3.95	3.44	3.85	2.76	3.55	5.18	[3,43 ; 4,47] (43,7)	0.55	0.37	$\hat{y}$ = 5,550 x EBITDA - 844.765	0.87	1,577,246
993	7.61	5.46	7.19	4.00	6.57	10.53	[4,96 ; 10,26] (110,2)	0.75	0.56	$\hat{y}$ = 3,471 x EBITDA + 390.593	0.96	1,239,037
1,369	7.89	5.52	7.53	4.04	6.65	11.57	[5,47 ; 10,31] (161,8)	0.62	0.56	$\hat{y}$ = 3,977 x EBITDA + 312.832	0.97	1,925,336
886	7.11	1.21	6.78	3.98	7.13	9.25	[4,32 ; 9,90] (69,2)	0.59	0.60	$\hat{y}$ = 1,226 x EBITDA + 1.338.197	0.24	3,528,169
429	11.91	7.55	12.26	7.26	13.64	17.20	[5,11 ; 18,71] (60,5)	-0.36	0.47	$\hat{y}$ = 12,894 x EBITDA - 44.399	0.63	1,651,689
778	5.58	3.84	5.04	3.17	4.18	7.42	[3,53 ; 7,63] (62,3)	1.31	0.64	$\hat{y}$ = 7,905 x EBITDA - 362.100	0.89	618,422
853	7.91	5.23	7.73	4.27	8.42	10.61	[5,45 ; 10,38] (75,0)	0.28	0.50	$\hat{y}$ = 8,999 x EBITDA - 68.348	0.87	1,188,257

Britain - Trailing & Forward DEPV/EBIT, 1 January 2020 until 31 December 2022

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
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H49 - H53	Transportation and storage - Land/pipelines, water, air; warehousing, postal/courier activities
J58 - J60, C18	Publishing activities, programme production, music publishing, broadcasting, printing
J61 - J63	Telecommunications, computer programming/consultancy, information service activities
K64 - K66	Financial and insurance activities
L68	Real estate activities
M69, M70, M73, N77 - N82	Legal/accounting activities, consultancy, advertising/market research, rental/employment/security activities, travel agency
M71, M72, M74, M75	Architectural/engineering/other professional activities, technical testing, scientific R&D, veterinary activities

n	Trailing DEPV/EBIT Multiples									Trailing EBIT Regression		
	x̄ₐ	x̄ₕ	x̄ₜ	Q₁	Q₂	Q₃	95% (JB)	sk	cv	ŷ = DEPV (TEUR)	R̄²	se_y
279	12.19	7.11	11.67	6.26	9.76	16.93	[-3,74 ; 28,13] (34,0)	0.57	0.63	ŷ = 6,494 x EBIT + 750.256	0.72	2,874,716
75	10.50	8.16	10.52	6.75	11.72	13.44	[0,98 ; 20,01] (10,1)	-0.31	0.41	ŷ = 6,286 x EBIT + 182.672	0.67	2,021,667
215	8.92	2.07	8.29	5.53	7.83	11.42	[-1,69 ; 19,52] (9,9)	1.19	0.66	ŷ = 6,374 x EBIT + 446.473	0.96	1,078,456
504	12.68	8.08	12.20	7.93	11.46	17.26	[3,15 ; 22,21] (49,3)	0.52	0.54	ŷ = 9,943 x EBIT + 209.791	0.87	1,547,640
531	9.30	6.29	8.73	5.56	8.40	11.34	[3,79 ; 14,80] (29,4)	1.19	0.57	ŷ = 4,675 x EBIT + 475.551	0.65	1,908,705
483	12.98	7.79	12.56	6.86	13.45	18.16	[1,52 ; 24,43] (56,5)	0.32	0.57	ŷ = 7,819 x EBIT + 214.742	0.96	442,026
553	12.92	5.97	12.83	5.64	14.56	18.53	[2,26 ; 23,58] (72,5)	0.01	0.58	ŷ = 11,037 x EBIT + 829.299	0.73	1,876,624
64	12.86	6.23	13.20	9.04	14.07	18.35	[-12,54 ; 38,27] (8,3)	-0.53	0.52	ŷ = 12,138 x EBIT + 699.592	0.95	1,828,794
107	11.87	10.58	11.88	8.38	11.70	15.32	[5,59 ; 18,16] (16,4)	0.01	0.32	ŷ = 9,239 x EBIT + 1.084.237	0.76	1,990,857
773	11.11	6.04	10.45	4.65	9.34	15.50	[2,39 ; 19,84] (84,9)	0.59	0.66	ŷ = 5,716 x EBIT + 873.753	0.35	2,324,211
998	10.12	4.02	9.30	4.31	8.23	14.64	[2,37 ; 17,87] (104,2)	0.87	0.73	ŷ = 12,754 x EBIT - 331.541	0.94	2,734,425
445	10.52	0.83	9.68	6.40	8.68	14.03	[-0,26 ; 21,30] (32,8)	1.00	0.67	ŷ = 8,134 x EBIT + 248.970	0.74	943,240
767	12.22	7.31	11.66	6.15	9.79	18.19	[2,77 ; 21,67] (94,2)	0.59	0.62	ŷ = 8,933 x EBIT + 123.891	0.97	1,069,546
1,132	12.49	5.99	12.03	7.14	10.29	18.16	[4,69 ; 20,29] (133,2)	0.53	0.61	ŷ = 11,710 x EBIT + 91.037	0.94	2,986,940
1,696	11.50	2.23	10.93	5.75	9.23	18.41	[5,15 ; 17,85] (188,3)	0.60	0.66	ŷ = 6,720 x EBIT + 314.627	0.61	1,726,861
445	16.47	12.74	16.64	13.36	15.75	21.26	[8,87 ; 24,07] (37,4)	-0.18	0.36	ŷ = 12,103 x EBIT + 634.351	0.73	1,775,215
950	11.51	5.81	10.93	6.60	9.42	16.40	[3,99 ; 19,04] (102,4)	0.71	0.62	ŷ = 17,267 x EBIT - 123.283	0.96	336,387
467	14.77	8.96	14.64	8.03	12.97	22.01	[1,43 ; 28,10] (65,8)	0.19	0.54	ŷ = 11,326 x EBIT + 146.679	0.98	323,166

n	Forward DEPV/EBIT Multiples									Forward EBIT Regression		
	x̄ₐ	x̄ₕ	x̄ₜ	Q₁	Q₂	Q₃	95% (JB)	sk	cv	ŷ = DEPV (TEUR)	R̄²	se_y
193	8.39	6.53	8.07	4.84	7.95	10.51	[3,06 ; 13,71] (17,9)	0.74	0.48	ŷ = 4,539 x EBIT + 1.435.747	0.98	3,279,343
97	6.20	4.51	6.14	3.14	6.12	9.18	[1,55 ; 10,86] (16,2)	0.15	0.51	ŷ = 7,231 x EBIT - 248.044	0.74	1,642,004
204	9.52	6.17	8.96	5.04	7.33	10.84	[-2,31 ; 21,35] (21,2)	0.98	0.64	ŷ = 4,752 x EBIT + 810.831	0.93	1,463,402
886	8.81	5.80	8.32	5.28	7.20	11.35	[4,89 ; 12,72] (75,5)	0.94	0.58	ŷ = 3,560 x EBIT + 1.474.277	0.86	7,508,897
424	5.66	1.06	4.89	3.26	4.99	6.15	[0,31 ; 11,02] (284,4)	2.79	0.87	ŷ = 5,256 x EBIT - 31.216	0.94	639,868
580	10.91	6.94	9.91	5.73	9.14	11.53	[0,53 ; 21,30] (52,1)	1.25	0.68	ŷ = 6,140 x EBIT + 210.919	0.92	542,853
617	10.12	5.72	10.05	4.23	9.55	16.18	[3,52 ; 16,71] (96,4)	0.09	0.59	ŷ = 6,988 x EBIT + 1.675.204	0.45	3,102,483
43	6.29	0.32	6.29	6.16	6.86	7.16	[0,57 ; 12,00] (1,0)	-0.83	0.46	ŷ = 5,052 x EBIT + 1.473.440	0.88	3,621,177
113	5.44	3.20	4.89	1.83	3.88	9.10	[-0,99 ; 11,87] (9,6)	0.97	0.71	ŷ = 5,277 x EBIT + 789.412	0.59	2,622,483
1,079	9.62	4.88	9.29	4.54	6.34	16.76	[3,67 ; 15,57] (166,3)	0.43	0.68	ŷ = 9,403 x EBIT + 384.892	0.38	2,652,309
1,084	8.29	5.43	7.60	4.28	7.49	10.21	[4,60 ; 11,98] (64,2)	1.31	0.62	ŷ = 3,692 x EBIT + 1.879.667	0.89	7,543,196
365	9.93	7.86	9.45	5.69	9.34	11.39	[4,62 ; 15,24] (25,9)	0.90	0.48	ŷ = 9,338 x EBIT + 400.017	0.91	1,289,025
955	11.22	7.99	10.24	5.84	9.02	14.68	[4,29 ; 18,15] (82,1)	1.15	0.61	ŷ = 8,115 x EBIT + 186.400	0.98	948,256
1,304	11.56	8.17	10.89	6.79	10.30	14.83	[6,37 ; 16,76] (100,7)	0.91	0.56	ŷ = 9,583 x EBIT + 22.863	0.96	2,095,904
912	7.97	1.89	7.43	3.91	7.36	10.81	[4,46 ; 11,48] (51,8)	0.99	0.61	ŷ = 8,244 x EBIT - 169.413	0.83	1,605,349
531	13.88	8.12	14.10	8.56	15.45	18.85	[5,43 ; 22,33] (65,4)	-0.28	0.47	ŷ = 15,240 x EBIT - 151.601	0.69	1,781,008
789	8.39	5.80	7.49	4.74	6.49	10.89	[3,33 ; 13,45] (61,1)	1.51	0.67	ŷ = 10,721 x EBIT - 304.211	0.86	741,565
821	11.55	7.84	11.62	6.37	12.44	15.63	[6,85 ; 16,26] (93,2)	-0.05	0.47	ŷ = 15,325 x EBIT - 202.472	0.86	1,220,090

News from IVSC

IVSC Perspectives Paper – Deciphering Technology

The introduction of new technology often marks the beginning of a new era: railroads, electrification, and combustion engines produced momentous changes even before the advent of the "digital revolution". The current wave of innovation is one of the factors behind the rise of intangible assets, which now account for a larger proportion of corporate assets than tangible ones.

This transformation towards more intangible assets has had profound effects on the valuation of assets and businesses and is the object of a current series of Perspective Papers by the IVSC. Parts 1 and 2 of this series examine the "Case for Realigning Reporting Standards with Modern Value Creation" and focused on human capital. Part 3 examined brands and reputation. In this latest paper, the fourth in the series, IVSC looks at the topic of technology valuation.

You can read the paper, here: www.ivsc.org/perspectives-paper-deciphering-technology

Exploring Prudential Property Value

The Basel Committee on Banking Supervision (BCBS) introduced new requirements for real estate valuation in the ‚Standardized Credit Risk Assessment Approach' (SCRA) after the global financial crisis.

The SCRA mandates prudently conservative valuation criteria, excluding expectations of price increases and adjusting for market sustainability over the loan's life. These requirements are part of the ‚Basel III Framework' and apply to large international banks since January 2023.

While the European Union and the UK are planning to implement ‚Prudential Property Value' from January 2025, there is currently no agreed interpretation or valuation methodology for this concept. The IVSC is actively engaging with regulatory authorities and stakeholders on Prudential Value and will keep stakeholders informed of future developments.

In August, IVSC issued an article providing further information, available here.

IVSC AGM 2023, Paris – 9-11 October

IVSC is delighted to be hosting its Annual General Meeting (AGM) at Maison de la Chimie, situated in the heart of Paris, from 9-11 October.

The IVSC AGM is a key annual event, uniting the IVSC's boards, working groups, trustees, and member organisations from around the world. Over the course of the three-day program, participants will explore notable trends in valuation and examine the development of international standards. The schedule includes discussions conducted by the IVSC's Technical Standards and Membership Boards and facilitates collaboration among IVSC members through the Advisory Forum.

More information can be found, here: www.ivsc.org/ivsc-agm-2023-9-11-october-paris.
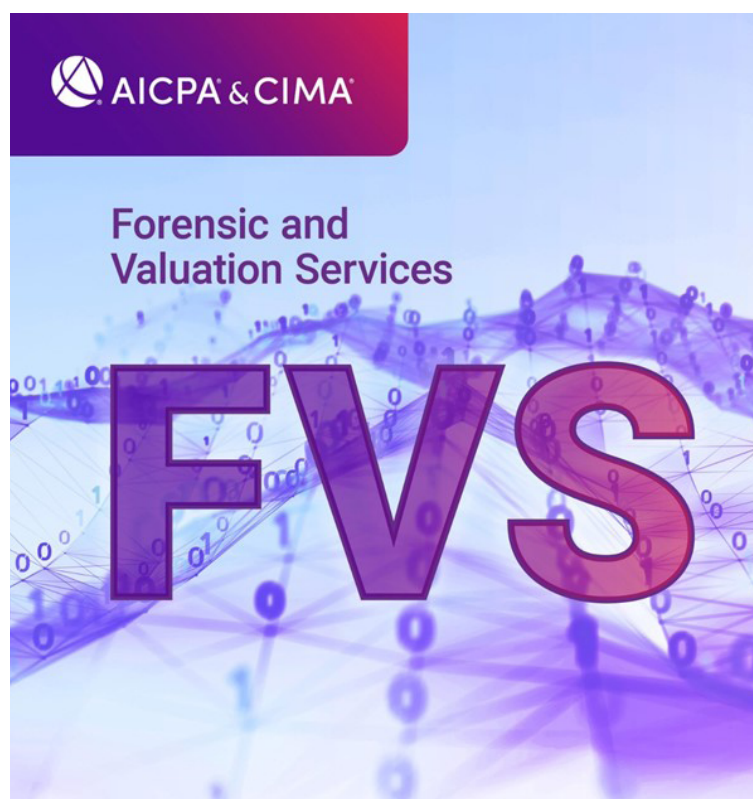
ESG in Business Valuation with AICPA & CIMA's Forensic & Valuation Services Podcast

IVSC Technical Director, Alexander Aronsohn, recently joined Nene Gianfala, CPA/ABV, ASA-BV/IA on the AICPA & CIMA Forensic & Valuation Services podcast to discuss the increasingly important topic of Environmental, Social, and Governance (ESG) in business valuations.

In this enlightening episode, Alexander explores:

- The implicit role ESG has played in IVSC's international valuation standards over the years.
- A retrospective look at IVSC's past Perspective Papers and survey findings on ESG considerations.
- A preview into the new IVSC Exposure Draft that specifically addresses ESG, making these considerations more explicit for valuers

The episode provides invaluable insights into how the industry is shifting from implicit to explicit ESG considerations, ensuring that valuation standards are not only market-relevant but also "fit for purpose"..

You can listen to the podcast, here: https://fvssection.libsyn.com/fvs/esg-highlights-from-the-ivsc

News

News from EACVA

EACVA Comments on IVS Exposure Draft 2023

On 25 July 2023, EACVA commented on the Exposure Draft of the International Valuation Standards (IVS), which will be effective from 2024.

In addition to various comments on formal corrections and improved rigour, a key comment was the planned introduction of the term „valuation risk" with the following definition „The risk that the resultant value is not appropriate for its intended use".

EACVA has strongly recommended the use of the term „Valuation Deficiencies" instead of the term „Valuation Risk" with the following definition: „Individual or organisational deficiencies that result in a value that is not appropriate for its intended use". The background to this is that in business valuation and many other disciplines, the term risk is not understood as incorrect data or model application due to a lack of competence, but as a negative deviation (downside risk) or a positive/negative deviation from an expected value.

EACVA's Live Web Seminar: Start-Up Valuation

– Analysis and Valuation of Young and Innovative Business Models –
On Wednesday, **15 November 2023** (14:00 – 16:15 (CET)) EACVA will host a live web seminar on the valuation of start-ups and young innovative companies, where you will learn about the necessary analytical steps, common techniques and approaches for the valuation of start-ups and innovative business models. Several *practical examples and cases* will complement the presentation.

How you will benefit: After completing this web seminar, you will be able to apply proper fundamental analysis techniques to different start-up cases, to approach the valuation problem with appropriate techniques and to deal with the often huge uncertainty that exists in early stage business models.

Content:
• Fundamentals of start-up companies' analysis
• Specific challenges in understanding young business models (drivers, failures)
• Approaching data-driven companies
• Valuation techniques, approaches and special cases
• Typical pitfalls in valuing start-up companies

Speaker: Prof. Dr. Matthias Meitner, CFA, Managing Partner at VALUESQUE; Professor for Finance, Accounting & Business Valuation, International School of Management (ISM) in Munich, Germany; Chair of the Centre for Business Values, International School of Management (ISM); Head of the Expert Network „Equity Valuation and Analysis" of the CFA Society Germany; Member of the Capital Market Advisory Committee (CMAC) of the IFRS Foundation; Member of the EU-linked European Financial Reporting Advisory Group (EFRAG) User Panel. » Learn more and register...

EACVA's 16th Annual International Business Valuation Conference

30 November and 1 December 2023 I Berlin

We cordially invite you to attend our International Business Valuation Conference, which has become established as one of Europe's leading international valuation congresses, providing an exciting learning opportunity to hear from some of the most renowned speakers in the field of business valuation, and offering the most valuable continuing professional education and networking opportunities for the business valuation and consulting industry.

Highlights include:
• A varied conference program featuring 2 keynotes and 23 , parallel sessions
• Current business valuation topics
• 32 of the most renowned speakers taking the conference stage to share their knowledge with you
• Networking Dinner and MAD MAGIC Show at the magnificent WINTERGARTEN Varieté Berlin theatre
• Excellent opportunities to expand your professional network and share experiences and challenges, exchange ideas and best practices and much more…
Early bird discount until 30 September 2023 » register now: www.ValuationConference.de

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Around the Valuation World (AVW) International

To keep our members up to date on industry trends and updates for the business valuation profession on international valuation issues from leading business valuation experts, the Global Association of Certified Valuators and Analysts (GACVA) launched *a new exclusive member benefit Around the Valuation World International* in January 2021.

The monthly live webcast series is free to view for all members worldwide, so they can be confident that their knowledge is current and accurate at all times. AVWI is designed for business valuation and financial litigation practitioners who wish to advance their skill set and remain current with trends and activities in the financial consulting niches. The webcast is hosted by chapter leaders from Europe (*Wolfgang Kniest, CVA* I EACVA), Canada (*Andrew Neuman, CPA, CA, CFE, CA.IFA, CFF, CVA*) and India (*Pratik Shah, CVA* I ACVA). They interview and engage in technical dialogue with the experts during the live webcast and moderate questions from participants.

Upcoming dates:
• October 23, 2023
• November 20, 2023: Do You Really Know Your Cost of Capital? With Prof. Peter Nyberg, D.Sc. (Econ.)
• December 11, 2023

» Learn more about AVWI and other benefits of EACVA membership.

IVSC Members Introduce Themselves:

ICAEW, the Institute of Chartered Accountants in England and Wales, provides qualifications and professional development; shares knowledge, insight, and technical expertise; and protects the quality and integrity of the accountancy and finance profession. Together, we support, develop, and promote the role of chartered accountants as trusted business leaders, difference makers and advisers.

Explain in one sentence what your organisation/ association does.
ICAEW is a global professional body for chartered accountants, representing more than 200,000 members and students around the world.

Please tell us about your member structure!
ICAEW has a long history of serving the public interest and we continue to work with governments, regulators and business leaders globally. And, as a world-leading improvement regulator, we supervise and monitor around 12,000 firms, holding them, and all ICAEW members and students, to the highest standards of professional competency and conduct.

What are your member benefits?
We promote inclusivity, diversity and fairness and we give talented professionals the skills and values they need to build resilient businesses, economies, and societies, while ensuring our planet's resources are managed sustainably.

Our premium qualification sets members apart as a member of a highly influential and respected professional body. ICAEW members gain access to world-leading information resources, technical guidance, member offers and discounts, advisory services and local member networks.

ICAEW is a founding member of Chartered Accountants Worldwide (CAW), a global family that connects over 1.8m chartered accountants and students in more than 190 countries. Together, we support, develop, and promote the role of chartered accountants as trusted business leaders, difference makers and advisers.

What are the most challenging valuation topics for your members right now?
We currently have over 8,000 members as part of our Valuation Community. For those undertaking valuations for financial reporting purposes, ESG (environmental, social and governance) factors are often raised by reviewers. It is our experience that there is, as still no settled practice in this area and there is uncertainty as to any impact upon risk or cash flows. For other members there are increasing challenges in the valuation of complex share classes, which are often used to provide incentives to management.

What (other) valuation standards do your members follow?
In addition to IVS 2022, our members with an international practice are aware of uniform standards of professional appraisal practice (USPAP) in the USA, and its equivalent in Canada as issued by the CBV, together with the related bridging documents.

Guidance issued by The Appraisal Foundation on specific valuation areas also has persuasive force for many of our members.

Why are you a member with IVSC?
We see the IVSC as the body which is filling the vacuum in respect of valuation standards worldwide. We consider the development of international valuation standards to be a very valuable initiative in the same way that international accounting standards have done a great deal both to harmonise and to raise standards internationally. ICAEW is an international body and some of our members have a global reach. We are therefore very supportive of international harmonisation. ◆

EBVM

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