

How are technology companies valued in practice? A survey of CFOs operating in Finland

Masters dissertation for University of Warwick

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Abstract

The basics of how to value companies are frequently taught in corporate finance curricula, but in practice, no consensus exists on the best way to do it. This study aims to uncover which valuation methods CFOs consider the best and worst for valuing technology companies by surveying 23 CFOs operating in Finland. The study explores two additional elements of valuation: (1) the role of intangibility of assets on valuation of technology firms, and (2) the use of third-party consultants in valuation. In contrast to most of the valuation literature which focuses on the US, this study is local to Finland and focuses specifically on the technology industry. The study finds that the surveyed CFOs rate several methods highly, mainly DCF, earnings-based multiples (especially the EV/EBITDA and EBITDA-multiple), and comparative company analysis. The results indicate that CFOs may use many methods as aids to decision making rather than any single method. The survey also finds that CFOs generally do not consider intangible assets to be well-represented on the balance sheets of technology companies. However, earnings-based valuation methods are rated highly - indicating that practitioners may adjust multipliers accordingly. Results also indicate that the use of third-party consultants for valuation in the deal-making process is widespread in Finland. This study is relevant because it contributes to the body of knowledge about the way practitioners approach valuation in the technology industry.

1. Introduction

Valuation, in general, is the determination of the value of an asset, security, or business. The valuation of a business can be done for several reasons; if the company is public, an investor may want to determine whether its shares are undervalued or overvalued and therefore whether to invest. If a business is private, its directors may wish to determine the company's value for a share issue. Another reason to value a business is to determine a price so that it can be traded in an acquisition.

The methods used for the valuation of businesses are many and varied. These methods usually take the form of an equation into which numerical inputs are fed, and an exact monetary value is output as a result. Several problems are involved with this process that can skew the end results. Firstly, the equation itself may not be based on valid theoretical ground. Second, the inputs can be manipulated accidentally or willingly. Information bias, groupthink, uncertainty in estimates and forecasts, or simply model complexity are just a handful of reasons why valuation is all but straightforward (Damodaran, 2006:2-8).

The study of valuation is peculiar in that it is ostensibly very measurable: accounting data for a company pre-event can be observed together with a realised transaction or market price, and the ex-ante 'predictive power' of different methods can be determined ex-post. For example, Lie & Lie (2002) attempted to determine the accuracy of different models, and found that certain market multiples such as the P/E ratio have good predictive power for M&A deals. However, there is an assumption in this pursuit: that the transaction price represents the value of the business. Nevertheless, notorious instances exist of acquisitions where companies have significantly overpaid for another company, and the value of the purchased business has been marked down shortly after the acquisition. For example Nokia's mobile phone business, after being acquired by Microsoft in 2014 for \$7.2bn, had nearly all of its value written off only a year later. Cases like these show that the transaction price isn't necessarily a good representation of the realised value to the acquirer.

This recognition makes the linear assessment of value models' predictive power potentially unsatisfying. It may be misguided to seek a perfect valuation model. Therefore a more interesting question is, if we know that valuation is commonly practised anyway, then how do practitioners do it, and why do they do it that way? The survey is one method that has been used in the academic literature in an attempt to answer these questions about financial executive behaviour and thinking. Mukherjee et al. (2004) asked Chief Financial Officers (CFOs) about merger motives and valuation techniques and found Discounted Cash Flow (DCF) based methods to be popular, and that Market Multiples were significantly less so. Graham & Harvey (2001) asked CFOs about capital budgeting techniques, cost of capital, and capital structure - relating that data to company characteristics. They found that DCF-based methods are used by CFOs, especially in larger companies. Trahan & Gitman (1995) surveyed CFOs about what they know, do, and wish to know about finance research. They found evidence that there may be a gap between practitioner convention in valuation methods and academic prescription.

The study of these topics is important because an academic understanding of practitioner conventions enables academia to become more relevant to practitioners. It also helps practitioners themselves to find out what other practitioners do, and the reasons and theory behind those decisions, enabling valuation as a practice to improve.

This dissertation looks at which valuation methods CFOs operating in Finland use when valuing technology companies by surveying 23 CFOs with M&A experience and asking them which methods they consider good, bad, and most important. Focusing on the technology

sector also allowed the exploration of the question of to what extent the intangibility of assets affects the valuation methods selected. The topic of third-party consultant use for valuation was also explored. The sample size was relatively small, but it was possible to achieve suggestive results. The study contributes to the body of knowledge about CFO perceptions about valuation especially in relation to valuing technology companies.

The survey results indicated that CFOs were equally likely to consider DCF methods and Market Multiples as 'good' methods when valuing technology companies. The EV/EBITDA ratio and the EBITDA-multiple were the most highly rated multiples. Common methods often mentioned in the literature - the price-to-earnings (P/E) and price-to-book (P/B) ratios were rated poorly. Survey respondents were likely to rate comparative company analysis (CCA) highly, and there was evidence that practitioners generally rely on several methods for valuation. This suggests that CFOs may use valuation methods as aids to decision making rather than as determinations of exact business value.

The study also found that practitioners do not consider intangible assets of technology companies to be well-represented in the balance sheet. However, they consider earnings-based valuation techniques relevant, indicating that practitioners may compensate for the adverse effects of development effort expensing common in the industry (e.g., software development costs, Research and Development (R&D) spending) on earnings in other ways, perhaps by adjusting multipliers. Much of the existing survey-based literature on valuation focuses on surveying executives primarily working in publicly listed companies. In this dissertation, the sample contained CFOs who primarily had experience with private, as opposed to public, company acquisitions which is a novel contribution to the literature. It can also explain some of the differences observed between results of this study and previous work.

The rest of this document is structured as follows: Section 2 provides an overview of the relevant literature. Section 3 outlines the methodology, including survey sampling procedures. Section 4 describes the survey design aspects, results, and discussion of the valuation section of the survey. Section 5 describes the survey design, results, and discussion on intangibles, and Section 6 discusses the use of third-party consultants. Section 7 discusses practitioner perceptions of the success of valuation, and Section 8 concludes.

2. Literature Review

Valuation methodology

No consensus exists on which valuation method is the most accurate predictor of business or project value, and capital budgeting and valuation methods proliferate. The most commonly used techniques by practitioners have changed over time, and they fall into approximately three categories: Discounted Cash Flow methods (including Net Present Value (NPV)), Market Multiples (including comparisons to similar companies), and methods based on various heuristics. Real Options Valuation (ROV) is sometimes mentioned as a viable valuation technique. However, due to the complexity of the model, it is rarely used explicitly by practitioners in capital budgeting or business valuation (McDonald, 2000).

DCF is often considered the most theoretically appropriate method for valuing businesses. Its theoretical validity lies in what Damodaran explains about the philosophy of valuation: “*we buy financial assets for the cash flows we expect to receive from them*” (Damodaran, 2006:1). DCF makes this very explicit; the time value of money is considered by discounting expectations of future cash flows to present values using the cost of capital as a discount rate.

Market multiples are a valuation method popular among practitioners. The process involves the multiplication of an accounting measure (for example, EBITDA) by an industry standard or computed peer group multiplier to arrive at the value of the business. Market multiples have been described by several authors as having no theoretical basis (Mukherjee et al., 2004). Multiples are a form of relative valuation (Damodaran, 2006:233), and much of their usefulness depends on selecting the right peer group of companies to compare to (Schreiner, 2007:48). However, peer-group selection can be far from simple especially when businesses operate in multiple industries such as in the case of conglomerates. Lie & Lie (2002) also note that industry codes (SIC and equivalents) may not be the best identifier for the relevant peer group generally, especially for companies with high R&D spending.

A variety of methods based on different heuristics have also been used for capital budgeting and valuation. Some examples include Hurdle Rates which have the caveat of arbitrary risk premiums, Profitability Index, and Payback Period which does not take into account the time value of money, and where cut-offs are arbitrary (McDonald, 2000; Graham & Harvey, 2001). These methods are intuitive, but their decision making cut-off points tend to be firm-specific

and based on managers' intuition. Young and growth companies also warrant special treatment. Young companies often have low revenues and many depend on external investment. In addition, there is a real risk that these companies cease operations, which makes forecasting difficult (Damodaran, 2009).

Researchers have studied the application in practice of valuation and capital budgeting methods and found that managers frequently make decisions that do not follow best practices of corporate finance literature and research. Mukherjee et al. (2004) studied M&A target valuation via survey and found that while CFOs use DCF when valuing acquisition targets, they use the acquiring company's weighted average cost of capital (WACC) as a discount rate, though theoretically, it is more appropriate to use the target's cost of equity. In their CFO survey, Graham & Harvey (2001) found that while DCF and Internal Rate of Return (IRR) were the most popular capital investment valuation techniques, the more arbitrary Payback Period and Hurdle Rate methods were also frequently used. They found that the methods' popularity was especially linked to older CEOs with long tenures. Trahan & Gitman (1995) similarly found the Payback Period popular among practitioners, despite its theoretical shortcomings. Gompers et al.'s (2020) survey of Venture Capital (VC) investors interestingly found that nearly half of surveyed investors, especially those focusing on young and Information Technology (IT) firms, frequently use their intuition rather than any specific valuation method to make investment decisions.

Researchers have also attempted to understand why practitioners use practices that do not have a solid theoretical base. McDonald (2000) offers a compelling mathematical explanation that arbitrary methods such as the Hurdle Rate or Profitability Index are, in fact, robust against uncertainty and are 'approximately optimal' under many circumstances. Trahan & Gitman (1995) surveyed CFOs and found there to be barriers to the application of sophisticated techniques; namely, that the underlying assumptions of those techniques are considered unrealistic, that the techniques can be challenging to explain to top management and difficult to apply, and that it is difficult to find data for application. Schreiner (2007) offers derivations of intrinsic multiples mathematically: he shows that the P/E multiple can be derived from the Discount Dividend Model (DDM) and that the EV/EBIT-multiple can be derived from DCF. This suggests that some simpler valuation methods are good approximations of sophisticated methods. Though many explanations have been proposed, there is no consensus on why practitioners do not more closely follow the best practices prescribed by academic research.

This study looks at how practitioners behave (what they do) and attempts to draw evidence-based conclusions on the reasons (why they do it). A limitation to the search for conclusive explanations is the research instrument - the survey - and the relatively small sample size. Further research would be required to confirm the conclusions, such as a qualitative interview-based study with practitioners.

Underlying assumptions about value and valuation

There are some implicit assumptions in the pursuit of valuation that have implications on how the practice is studied. One is the assumption that by careful selection of inputs and application of valuation equations, the 'true' value of a business or security can be discovered. If the true value of a business is a matter of its future cash flows, the effort is dependent on our expectations of the future. Since forecasting is always prone to error, often the best method we have to predict the future is to make projections based on the past. In practice, for valuing businesses, this means the use of historical accounting data to predict the financial future of the firm.

Understanding the current or historical meaning of accounting information of businesses is itself not a straightforward task. One of the core difficulties is highlighted by Lev & Gu (2016), who explain that the increasing relative proportion of companies' intangible assets to their tangible assets is a key reason for the decline in value relevance of financial accounting information since the 1980s. Investors increasingly resort to using alternative sources of information to attempt to make sense of firms' value creation mechanisms and competitive advantages.

Lie & Lie (2002) in a systematic data analysis of realised M&A transaction prices, linked the intangibility of assets to business valuation explicitly, stating that (in 2002) value prediction accuracy is significantly lower when the amount of intangibility of assets in a business is high. There is also an intuitive link between valuation and accounting: methods such as market multiples are frequently based on earnings, and earnings depend on how much of a businesses investments are expensed versus capitalised¹. Aboody & Lev (1998) expressed

¹ Consider an extreme example of how accounting affects valuation: Say we are trying to value a small business and we use an EBITDA-multiplier of 10. The business model is development of a Software As A Service (SaaS) product. The company's annual revenue is 100 000 € and its annual software development costs are 80 000 €. Let's assume this is the company's only expense, and that interest, taxes, depreciation and amortisation are negligible. If the entirety of the software development costs are capitalised (i.e. meaning that the software asset of the company appreciates by the development cost), earnings are 100 000 €, and the company is valued at 1 million €. If the software development costs are entirely expensed, earnings are 20 000 € and the company is valued at 200 000 €.

concern already in 1998 that in the software industry in the US, despite the accounting standards setting body (FASB) allowing businesses to capitalise certain software development costs, most businesses opted not to. Though Aboody and Lev associated software capitalisation with higher value relevance of accounting information, Lev (2003) later notes that capitalisation of software development costs can be linked to earnings management (bordering on earnings manipulation). Schreiner (2007:45) also discusses the information quality decrease of earnings resulting from expensing R&D and how it affects earnings-based multiples valuations.

What is often missed in the 'capitalisation versus expensing' discussion is the fundamental problem of mixing incompatible value theories. The securities traded in functional open markets (or M&A markets) always follow the neoclassical theory of value: an asset is worth what it can fetch on the market. On the other hand, ideas such as the capitalization of R&D or software development costs suggest value measured as effort using the value theory of labour². This incompatibility of value theories may be one explanation to why accounting practice hasn't generally taken up ideas about applying R&D or software development costs as assets to balance sheets.

Few solutions to solve the problems of the accounting treatment of intangibles have gained traction but the link is clear: the way in which intangibles are accounted for has implications for valuation. If the value relevance of earnings is on a declining trend (as suggested by Lev & Gu, 2016), what does this mean for earnings-based valuation methodologies, especially in industries with significant proportions of intangible assets, such as the technology industry?

Gompers et al. (2020) found that in Venture Capital, where investments often target young companies, the EBITDA-multiple was a popular valuation technique used in investment decision making. Also, Gompers et al. (2016) found that Comparable Company EBITDA-multiples were used by more than 70% of surveyed PE investors. There is evidence that earnings-based multiples are still popular valuation methods despite the accounting issues outlined above.

This study seeks evidence about how practitioners perceive the accounting representativeness of intangible assets and whether that affects their willingness to use earnings-based valuation methods.

² For an extended discussion on the history of value theory, see Mazzucato (2018), Chapters 1-2

3. Methods

The topic of valuation was studied by conducting a survey targeted at Chief Financial Officers (CFOs) of companies operating in Finland that had acquired technology companies in the past ten years. The survey consisted of 13 questions divided into three sections: (1) Qualifying questions related to M&A experience, (2) Company valuation, intangible assets and valuation success, and (3) Use of third-party consultants. The full questionnaire is attached in Appendix A.

Exploratory interviews were conducted with experts in M&A and valuation to inform the crafting of the survey instrument. During the developmental stage, two subject matter experts were interviewed; one group financial controller and one technology acquisition expert. The interview themes revolved around valuation and M&A processes in Finland and Due Diligence in the technology sector, among other topics. These interviews along with the research topic informed the formation of the survey questions. In addition, the supervisor for this academic work, Jesus Gorriñ, gave further advice on constructing the instrument.

It is assumed in the analysis that CFOs who answered the study did so truthfully. Anonymity was assured, and no identifying data was collected. Other authors, such as Pinegar & Wilbricht (1989), have used anonymous surveys, with the rationale that this ensures candour of respondents. The brevity of the survey was considered necessary in the survey design, primarily to mitigate adverse survey completion effects associated with lengthy web surveys (de Leeuw, 2008:121).

The questions in this survey most closely resemble those of Mukherjee et al. (2004), who issued a questionnaire in which CFOs were asked about target valuation specifically in an M&A context. Comparisons are made to Mukherjee et al. (2004) and other authors.

All work described, including preparation and distribution of the survey, and analysis of results was conducted by this dissertation's author.

Testing and Delivery

The survey was tested in four phases: (1) Draft content testing with experts, (2) Language and consistency testing with non-experts, (3) Full content and language testing with experts, and (4) Full testing with a member of the target audience. This process roughly follows Campanelli's (2008:177) recommendations for survey testing procedure.

First, a draft version of the survey was tested with subject matter experts. Following feedback, some questions were removed and added. The first draft of the survey included a question that attempted to directly link the use of multiples to the intangibility of assets. The subject-matter testers found this question too confusing, so it was removed³. A question was added instead that measured respondents' perception of the accuracy of valuation methods.

The questionnaire's content was constructed in English and translated into Finnish. After initial content validation, the two language versions of the survey were compared with the help of a bi-lingual non-expert to check that the translation was representative of the English version. Then, one of the same experts who tested the draft content tested the survey for content and language. Some improvements for clarity were made.

Finally, the complete survey was tested by a CFO currently working for a technology company operating in Finland. One change was made as a result: Comparative Company Analysis (CCA) was added as an explicit option for questions relating to valuation methods. The CFO noted that valuation is often done using the "golden trio": DCF, multiples, and CCA. Although the use of multiples typically assumes comparison to a peer group (for example, Schreiner (2007) considers comparison to be a step in the valuation process by multiples), the option of CCA was added in any case to observe how the respondents would perceive it.

The survey was conducted as a traditional mail survey, with an option to respond digitally. Paper was chosen as the primary medium for the survey in an attempt to increase the response rate. Paper mail communications have declined sharply over the past years in Finland, while digital communications have proportionally increased (Yle, 2022). The logic was that a paper letter might catch the attention of a busy executive. The letters were sent to the CFOs' current employers' business addresses and were personally addressed to the CFOs by name. The contents of the letter were not further personalised. The documents included in the letter were: (1) An introduction leaflet in Finnish and English, including a QR code and link to respond digitally, (2) A questionnaire sheet in Finnish, and (3) A pre-paid envelope with return address. Only the Finnish copy of the questionnaire was included, as it was expected that most respondents would respond in Finnish. Aalto Executive Education (AaltoEE) allowed the use of their address for the return envelopes. The introduction leaflet allowed the option to respond digitally in English. Figure 1 describes the setup.

³ Other authors have found that questions that are very technical can be too difficult for the target audience. For example, Mukherjee et al. (2004) found that specific questions on different types of DCF analyses were considered by CFOs as too difficult. This finding informed the decision to keep the survey simple in this study.

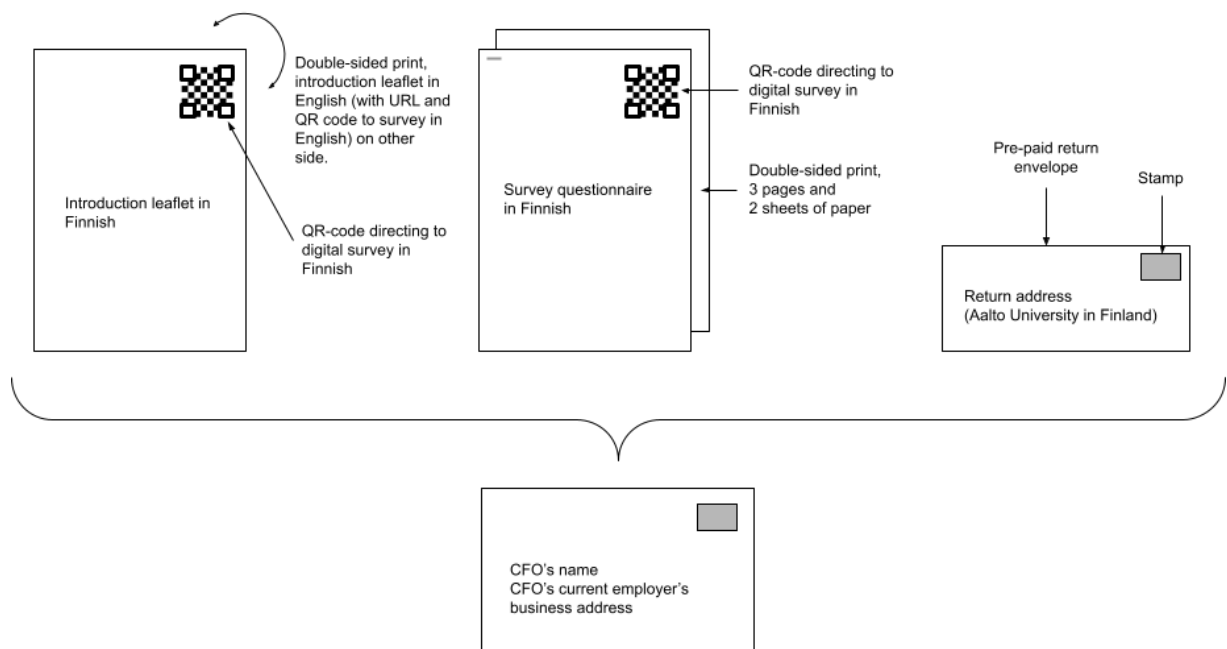


Figure 1: A graphical illustration of the mail survey components

The questions of the digital survey were identical to the paper survey, and the user interaction design closely resembled that of paper. None of the digital survey's questions were mandatory, allowing non-response in a way that emulates answering a paper questionnaire. Survey testers had pointed out that they were much more likely to respond digitally, therefore it was seen as important to allow this option. A discussion of the limitations of the digital survey is included in Appendix B.

To increase the response rate further, an email reminder was sent two weeks after the paper survey was sent in the mail. Since the survey was anonymous, the reminder email was sent to each CFO regardless of whether they had already answered by letter. The email reminder included a link to the digital survey. The reminder had an apparent positive effect on the digital response rate; before the email reminder, 3 digital survey responses had been received. One week after the email reminder was sent, 11 digital survey responses had been received. Appendix C describes the email address-gathering process and some caveats.

Sampling

The survey was sent to 133 CFOs or equivalent financial directors working in companies that had been involved in an acquisition or merger with a technology company in the past ten years (2013 - 2023). The sampling process was done in two stages: First, companies that

had acquired technology companies in the past ten years were selected. Second, the current CFO of that company was identified and added to the sample. This process did not guarantee that the sample would necessarily contain CFOs with M&A experience (for example, a CFO could have joined the company after the acquisition) - but it acted as a reasonable proxy.

A. Company sampling

The aim of company sampling was to reach a big enough sample of suitable companies. Sample size had to be kept within reason also for cost (both resource, e.g. postal, and time cost) purposes.

A list of companies that had acquired Finnish IT companies issued by Tivi was used as a starting point to list relevant companies. Tivi is a Finnish news publisher that focuses on technology and IT (Alma Media, 2023), and its M&A listing includes transactions involving companies whose official listed industry belongs to one of four TOL2008⁴ categories: (C26) Manufacture of computer, electronic and optical products; (J61) Telecommunications, (J62) Computer programming, consultancy and related activities, and (J63) Information service activities. While the sampling was based on IT companies, the survey questions technically focus more broadly on 'technology' companies.

From the M&A listing, the acquiring company was selected and added to the sampling list. This is because a CFO of the acquiring company would be well-suited for assessing the valuation of a technology company (the target). Then, the list was reduced according to the following procedure:

1. Exclude acquisitions outside the timeframe of 1st January 2013 - 11th March 2023.
2. Exclude businesses where the buyer is a foreign company (e.g. Ltd, Plc, etc.) - as it would be much more difficult to issue the survey to companies outside of Finland.
3. Exclude cases where the event was a partial transfer of ownership or shares but did not appear to be an M&A event.
4. Exclude cases where a new company was founded to acquire the target company.

⁴ Finnish industry classification

B. CFO sampling

For each company from part A, a company search was done on finder.fi, a website listing details of businesses operating in Finland. If the company was not found on finder.fi, it was excluded. The most typical reason for this was that the company had ceased to operate.

If the company was found on finder.fi under a changed name (for example, the search term was now an operating alias due to acquisition or rebranding), then the company's new name was added to the sampling list. If the company was assumed majority owned by another company (for example, if their website states "[Company], part of [Parent Company]"), then the parent company was added to the sampling list.

Each company's business address and TOL2008 code were recorded from details on finder.fi. Then for each company, the current CFO's name was found by searching the web for "[Company name] CFO" and following leads. Leads were mostly the company's website or the CFO's LinkedIn profile page. In some cases, a CFO-equivalent person was found (see Appendix D).

If no reliable data could be found on whether the company had a CFO, the company was removed from the sample. If the company was in the process of changing its CFO, for example, if a web search resulted in news articles stating that a new CFO would be starting in their position in a matter of months, the company was removed from the sample.

There were some caveats in the sampling process. Sampling did not explicitly target the CFOs operating in the sample companies during acquisitions. The sampling process aimed to achieve a high likelihood of CFOs in the sample who have at least some experience with M&A, but it did not guarantee it. While the survey does ask qualifying questions on M&A experience, the questions on valuation are also relatively universal and can be answered by CFOs who have not been involved in acquisitions directly - this was by design. Because sampling was done over a three-month timespan (February 2023 - April 2023), changes in CFO positions may have happened during that time - therefore, the sample may also have contained contact details that were no longer relevant.

The survey's design principle was that only opinions and perceptions should be measured. The main driver behind this was to ensure a high response rate. This is why the survey does not ask about experiences of deal sizes, company size, or anything too specific about the current employer.

The 133 letters to CFOs were mailed on 5th May 2023. Email reminders were sent on 22nd May, one week before the recommended response deadline indicated in communications as 29th May. The digital survey was closed to responses on 30th May (one day after the given deadline). Return envelopes were gathered from Aalto University's postal box on 5th June.

Summary Statistics

From a sample of 133 CFOs to whom the survey questionnaire was sent, 23 replies were received, 12 via mail and 11 via the digital version. All responses were received in Finnish, i.e. none of the respondents used the available digital English version of the survey. The response rate was 17%, which compares relatively favourably to other CFO mail surveys; Mukherjee et al. (2004)'s CFO survey had 75 usable responses out of 636 for a response rate of 12%. Graham & Harvey's (2001) survey of CFOs in the US and Canada achieved a response rate of 9% (with a total of 392 responses) using fax and mail. Trahan & Gitman's (1995) CFO mail survey had 84 responses and achieved a response rate of 12%. Pinegar & Wilbricht (1989) also surveyed CFOs in the US via mail and received 203 responses for a response rate of 41%.

This study's sample size of 23 was considered too small to obtain statistically significant results by means of t-tests. Instead, results are discussed with reference to the literature and visualised using graphs.

According to de Leeuw & Hox (2008), a survey should begin with easy questions and subsequently move on to more difficult questions to reduce the risk of survey abandonment. In this spirit, CFOs were first asked whether they had ever worked at a company during a Merger or Acquisition and then whether they had worked as a CFO during the time. Each respondent answered affirmatively that they had been CFOs during an M&A event, confirming explicitly that all responses in the sample were from CFOs.

Respondents were asked to indicate their experience with M&A in terms of the number of times they have overseen acquisitions as CFO. Their experience was measured in three ways: the number of acquisitions overseen in total, the number of acquisitions overseen when the target was publicly listed, and the number of acquisitions overseen when the target was a technology company. These metrics will be referred to as "M&A experience". Table 1 shows the number of responses for each category of experience.

Number of acquisitions overseen as CFO ("M&A experience")	0	1	2	3 - 9	10 +
<i>Number of responses - total</i>	0	3	2	13	5
<i>Number of responses - publicly listed targets</i>	20 ⁵	0	2	1	0
<i>Number of responses - technology company targets</i>	4	7	1	8	3

Table 1: Characteristics of CFOs in survey sample (23 responses)

The option scale was chosen with the following considerations: Mergers and acquisitions are a relatively rare event for most businesses, but they will be much more commonplace for some businesses. If an M&A event has occurred once or twice in a CFOs career, they will likely remember the exact number of occasions. The most M&A-experienced CFOs will likely have lost count after about ten occasions. Only one option was selected in between to allow for easy answering without too much recall effort on the part of the respondent, also reducing concern that respondents could make mistakes when attempting to report precise numbers of events.

The amount of M&A experience was selected as the only explicit sample differentiator, as the survey was not designed to measure anything about the respondents' current employers. This is similar to the design of surveys by Gompers et al. (2016), in their survey "What do private equity firms say they do?" - where the emphasis is on the practitioners' perceptions. However, most CFO surveys ask about the current employer, the size of completed deals, and other details (Graham & Harvey, 2001; Mukherjee et al., 2004). Finland is a small country with a relatively small IT sector⁶, so any questions relating to deal size or company size were omitted, as these could be considered too identifying.

The vast majority of practical experience respondents had when responding to this survey explicitly related to private companies: very few respondents (3 out of 23) had any experience with M&A events where the target company was publicly listed. Because of this, few conclusions can be drawn about the differences between CFOs with public acquisition experience versus private acquisition experience. The executives who did have public company acquisition experience were more generally experienced with M&A (belonging to

⁵ One respondent answered "Not applicable" to whether they had experience with publicly listed targets. This can be interpreted as a "0", as "Not applicable" would be a valid answer if the same respondent's answer to the question about general M&A experience was "0" (which was not the case).

⁶ The Finnish IT sector had about 96 000 total employees in 2021, according to Tivi's Industry Classification- definition of the IT sector (Statistics Finland, 2023)

either the '3 - 9' or '10+' groups when measured by total M&A experience). While much of the CFO survey literature focuses mainly on responses from CFOs of publicly listed companies, this survey's qualifying questions do not indicate whether the respondents work for a publicly listed or private company.

Most respondents had some experience with M&A where the target company was a technology company. The sample contains a balanced mixture of CFOs both relatively experienced and inexperienced with technology company acquisitions, allowing for comparison between those groups.

4. Valuation

The survey was designed to study how company valuation is done in practice by CFOs. This section describes the findings of other authors in relation to valuation in practice, and explains the design decisions behind the valuation-related questions of the survey. Then, the findings are reported and discussed.

Design

Though valuation is sometimes described as an art rather than a science, valuation methods are scientific in nature. Sensitivity analysis can be used to vary inputs to achieve a range of outcomes, but the whole exercise remains a calculation. This, at least, is what theory tells us about valuation.

Gompers et al. (2020) found that in VC, many investors do not use any calculations when investing in companies. While the effect might be attributable to poor data availability for young companies, the same can be said about companies in distress or with negative earnings: different calculations must be used in different circumstances. Another often-mentioned caveat of valuation is that different valuation methods are supposed to be applied to different industries (Schreiner, 2007:19). This is frequently stated, but less research has been done to find which methods practitioners in different industries prefer, and why they prefer those methods. While the academic literature is somewhat lacking industry specificity, in practice valuation in the technology industry happens all the time: in acquisitions, mergers, investments and IPOs.

This dissertation tries to fill in part of that gap, to measure what the scope of appropriate methods is for technology company valuation in Finland. Technology companies, and

especially IT companies have certain characteristics: they tend to have high levels of intangible assets, they have high operational expenses (due to intangible asset-building activities, such as software, are typically expensed rather than capitalised), and many acquired technology companies are in the growth-stage of their lifecycle. The technology industry can be considered a 'growth industry' on its own, or it cannot be described as an industry because all modern companies must use technology, making it harder for a company not to be a technology company.

The results of this dissertation are compared to studies by Graham & Harvey (2001) and Mukherjee et al. (2004), who surveyed CFOs, and to Gompers et al. (2016), who surveyed PE investors. One of the research questions here was whether practitioners actually use valuation techniques that account for the specificities of technology companies or whether they broadly use the same techniques as for other industries.

In the survey section on valuation, respondents were first asked which valuation techniques they considered to be "good" for the valuation of technology companies specifically⁷, from a set of options. The question was intentionally formulated as an opinion question rather than asking how frequently respondents had applied the method. This allowed respondents to encapsulate learning to their answers, i.e., what CFOs consider to be 'good practice'. This is similar to the studies of Gompers et al. (2016) in that it tests "what practitioners say" and similar to Trahan & Gitman (1995) in that it looks at whether we can observe differences between theory and practice (via survey).

The set of options included several common valuation techniques, and a free-text 'Other' option. As this study looks at the link between multiples and intangibles, the valuation options list was heavily skewed toward multiples and ratios. EV/EBITDA, EV/EBIT, EV/Revenue, P/E, and the EBITDA-multiple were included since they are common earnings-derivative valuation methods, which is relevant to study the effect of intangibles. Lie & Lie's (2002) study of the prediction power of accounting multiples to transaction price accuracy showed that earnings-based multiples generally had good predictive ability. In Gompers et al.'s (2016) survey of PE investors, the EBITDA-multiple was considered a popular deal evaluation metric. The P/B ratio was included in this survey because it has

⁷ The definition of a technology company was given in the survey as: *"...a company whose business relies on the operation, building, manufacture or ownership of digital or technology-intensive products or services."*

This is a different definition than used in the sampling process, and was designed with the intent that it should be an intuitive definition for practitioners to respond to. It would likely have caused too much recall difficulty if a strict technical industry-code definition was imposed in the questionnaire.

been highlighted as a useful multiple in the financial industry (Schreiner, 2007:35) - so it was expected to be unpopular for the technology industry. Annual Recurring Revenue (ARR) was included because it came up in background interviews for this study as potentially a key multiple used by practitioners.

DCF was included in only one form for simplicity. No further questions were asked in this survey about DCF because the relevant thing was to know how practitioners rate the importance of DCF against other methods.

Real Options were included in an early draft of the questionnaire. However, testing showed that it was not a relevant option. McDonald (2000) argues that real options may often be 'priced in' implicitly into more arbitrary methods. Note that while Graham & Harvey (2001) and Trahan & Gitman (1995) found that the Payback Period was commonly used in capital budgeting, this concept never came up during the study of more modern literature (or business studies curriculum) on company valuation. It was also not mentioned by any of the testers, so the Payback method was not included in the list of options.

In this survey, CFOs were also asked about which methods they considered "bad or unsuitable" methods for technology company valuation. This is an unusual question compared to other CFO surveys, but it is included as a mechanism to draw out more opinionated responses. Also, the valuation questions do not specify explicitly whether the respondent should consider these valuation techniques solely in the M&A context. The qualifying questions at the beginning of the survey were intended to orient the respondent to consider the M&A context.

Results and discussion

The results are shown in Figure 2 and Figure 3. In Figure 2, the colour intensity denotes the respondents' M&A experience in general. In Figure 3, colour intensity shows the respondents' experience with technology company acquisitions. All 23 respondents answered the question relating to 'good' methods, and 21 answered the question relating to 'bad' methods (others leaving it blank).

Respondents typically selected more 'good' valuation methods than 'bad' methods. Table 2 shows that CFOs in all experience groups generally selected 4 - 5 'good' methods and 1 - 2 'bad' methods. One respondent wrote in the "Other" free-text option for 'bad' methods: *"I do not think there are any bad valuation methods [...] there is a time and place for each one"* -

which may well represent the general sentiment of respondents, and explain why more good options were selected than bad options. No significant difference appears between the number of options selected and experience. The homogeneity across the number of options chosen for good and bad methods across groups supports the notion that practitioners, regardless of their experience level, use several methods to perform valuation.

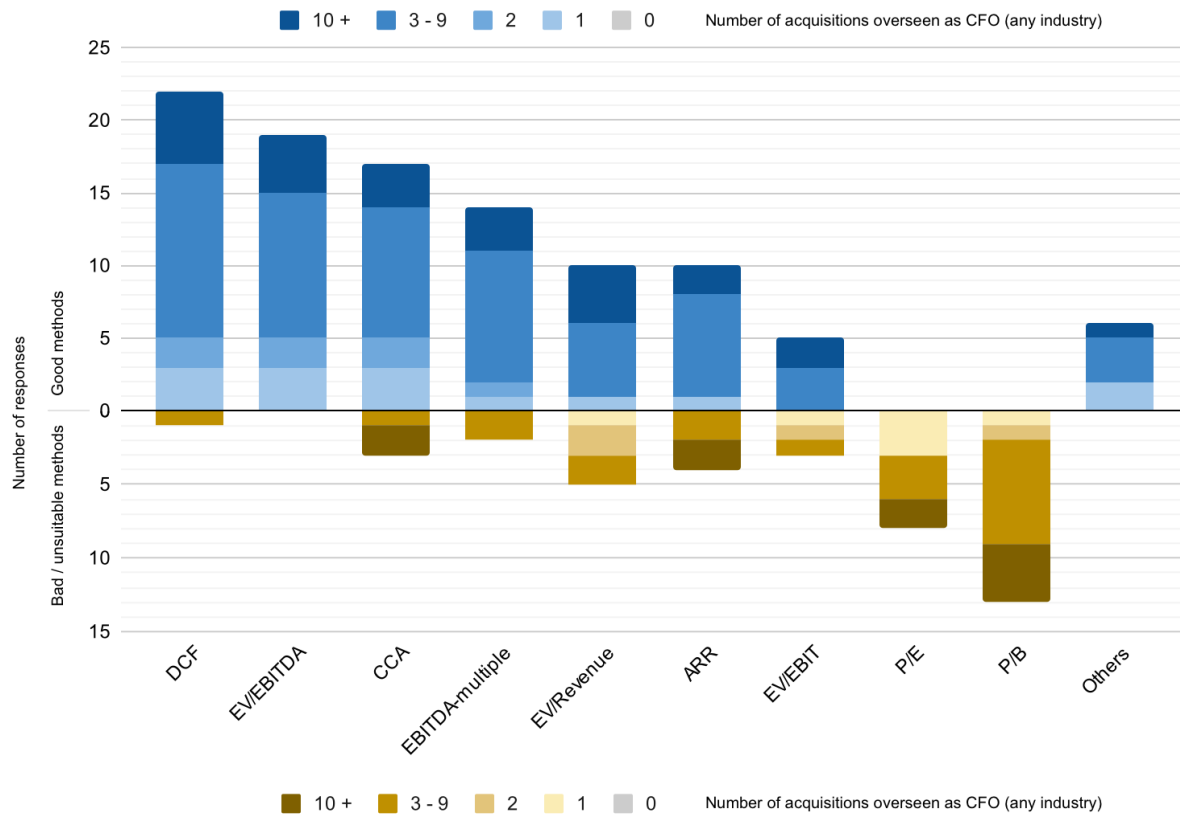


Figure 2: Technology company valuation methods considered 'good' and 'bad' by CFOs, based on number of acquisitions overseen as CFO in any industry

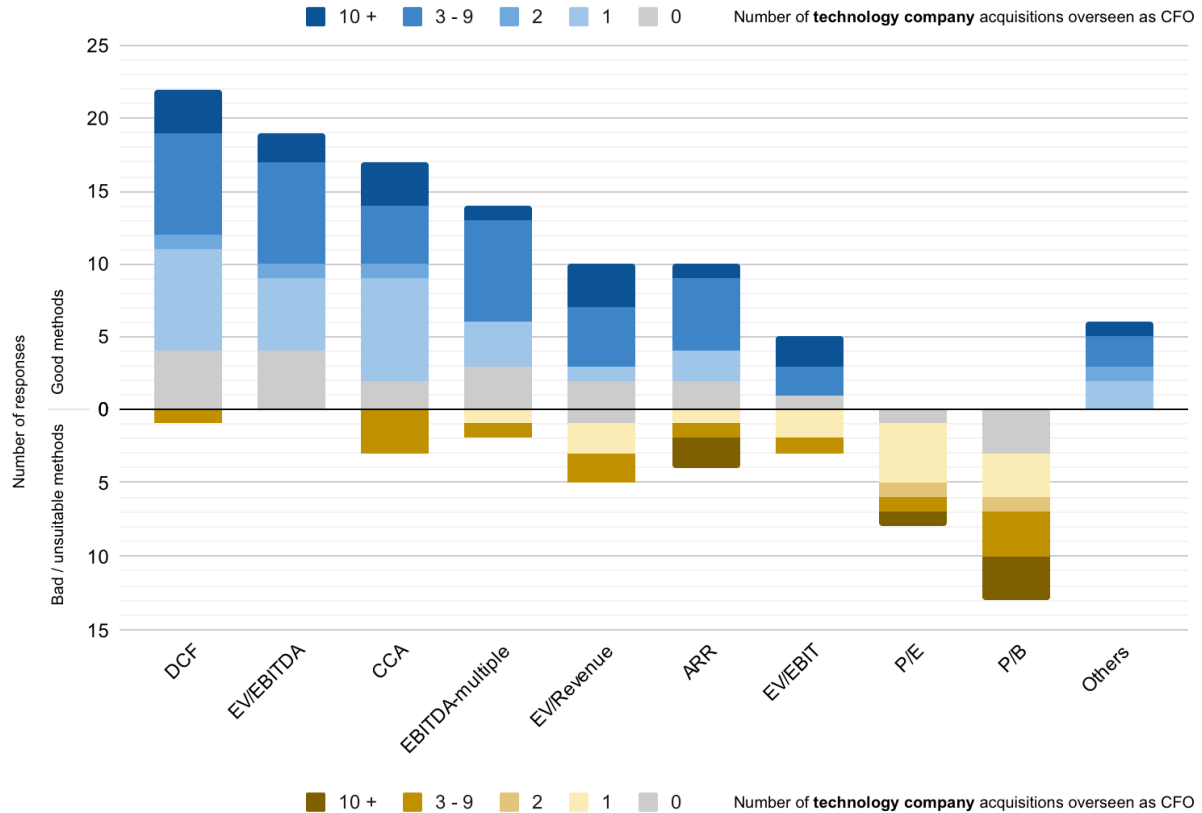


Figure 3: Technology company valuation methods considered 'good' and 'bad' by CFOs, based on number of technology company acquisitions overseen as CFO

	Group	Sample size	Number of "good valuation methods" chosen		Number of "bad valuation methods" chosen	
			Average	Median	Average	Median
All respondents	All	23	4.5	5.0	1.7	2.0
M&A experience (any industry)			Average	Median	Average	Median
	10 +	5	4.8	5.0	2.0	2.0
	3 - 9	13	4.5	5.0	1.5	2.0
	2	2	3.5	3.5	2.0	2.0
	1	3	4.7	5.0	2.0	2.0
	0	0	-	-	-	-
M&A experience (technology industry)			Average	Median	Average	Median
	10 +	3	5.3	6.0	2.0	2.0
	3 - 9	8	4.8	5.0	1.8	2.0
	2	1	4.0	4.0	1.0	2.0
	1	7	3.9	4.0	1.9	2.0
	0	4	4.5	5.0	1.3	1.5

Table 2: Number of 'good' and 'bad' valuation methods chosen by CFOs based on general and technology company M&A experience

Respondents were most likely to select DCF as a 'good' method (22 out of 23) and equally likely to select at least one multiple or ratio as a 'good' method. One respondent considered DCF both good and bad, indicating perhaps that if applied poorly, it can be unsuitable (although no explanation was given). The next most highly rated methods were EV/EBITDA with 19+ / 0-, Comparative Company Analysis (CCA) with 17+ / 3-, and the EBITDA-multiple with 14+ / 2- selections. More controversial were Annual Recurring Revenue (ARR) with 10+ / 4-, EV/Revenue with 10+ / 5-, and EV/EBIT with 5+ / 3-. Two techniques were rated only unsuitable; P/E with 8- and P/B with 13-. Six other methods were mentioned as 'good', but each only once⁸.

There does not appear to be a significant discrepancy between what more experienced and less experienced respondents responded: What is considered a good or bad valuation method seems uncorrelated with the level of experience. Some effect can be seen in that the most experienced CFOs were more likely to answer that P/B is a bad or unsuitable method for technology company valuation.

The closest comparison in terms of setting and types of questions for this study's results is that of Mukherjee et al. (2004), who surveyed CFOs on acquisition valuation directly. Although the question formulation does not explicitly state that respondents should only consider M&A target valuation, the context of the survey and preceding questions allude that this survey is related to M&A. Mukherjee et al. (2004) found that when firms valued both publicly and privately owned companies, DCF methods were the most commonly used technique, either alone or in combination with other methods. Our results show that using multiples in general is on par in popularity with DCF, although DCF stands out as the single most likely method considered 'good'. Mukherjee et al. (2004) also found that for private companies, applying industry P/E-multiples to the target was more popular (31%) than the use of "other multiples" including EBITDA-multiple or comparable firms (14%). This study's results are significantly different; in our study, CFOs did not consider the P/E-multiple a good method, instead ranking it very badly. Other multiples were significantly more popular.

Mukherjee et al. (2004) also measured whether CFOs advocated applying industry P/B-multiples to private acquisition targets for valuation and found that it was not a popular method (6%). This study's finding is consistent with their result that CFOs rate the P/B ratio

⁸ The 'other' responses for 'good' methods mentioned were: Expense-based current value, Reverse venture capital method, "Multiples of past transactions and listed companies", ARR-growth, Price/Revenue, and Revenue-multiple.

poorly. Some of the P/E and P/B ratios' unpopularity in this study may be attributable to the price element being present in the formulas, as the sample respondents were mainly responding from a private company M&A valuation context. Price data is less existent, less publicly available, and moves more slowly for private companies.

Other authors have studied what CFOs and other practitioners thought of different valuation and capital budgeting methods, and this study's results can also be compared to theirs. Graham & Harvey (2001) found that CFOs were likely to use NPV (DCF) and IRR methods for capital investment valuation, but Hurdle Rate and Payback Period were also popular. This study also finds that DCF-methods are popular, but finds no mentions of Hurdle Rate or Payback Period, which may have fallen out of favour or not be relevant in an M&A context. Gompers et al. (2016) studied which valuation techniques Private Equity (PE) investors claim to use and found that PE investors use DCF rarely, which is different from our finding that DCF is rated highly. Gompers et al. (2016) do, however, find that the EBITDA-multiple is popular, which is similar to this dissertation's findings. Gompers et al. (2020) investigate financial metrics for investment decisions of VC investors and compare their results to those of Graham & Harvey (2001) and Gompers et al. (2016). They find that VC investors are unlikely to use NPV methods and instead use MOIC (multiples of invested capital) and IRR. Their results support the notion that NPV/DCF methods are less relevant for young, growing companies.

Respondents were also asked in a subsequent question of this study's survey to rate the three most important methods. This is similar to Gompers et al. (2016), who ask first which investment evaluation methods are used, then ask to rank them. In this study the question was formulated as a free-text question, and 21 out of 23 respondents answered (two left the field blank).

CFOs in the sample were most likely to rate DCF as one of the most important methods with 14 responses, followed by the EBITDA-multiple with 10, CCA with 9, ARR with 7, and EV/EBITDA with 6 responses. Five other methods not on the options list were mentioned⁹. Figures 4 and 5 show the distribution of responses based on M&A experience.

⁹ The 'other' responses for most important methods mentioned were: EBIT-multiple, Revenue, Market Value, ARR-growth, and Reverse VC method.

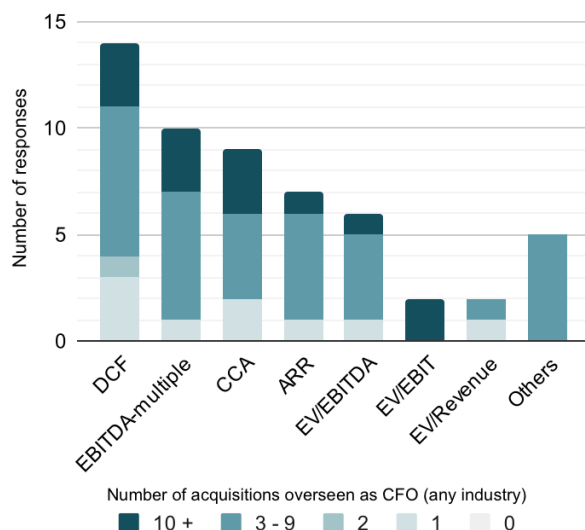


Figure 4: Technology company valuation methods considered 'most important' by CFOs, based on acquisitions overseen as CFO in any industry

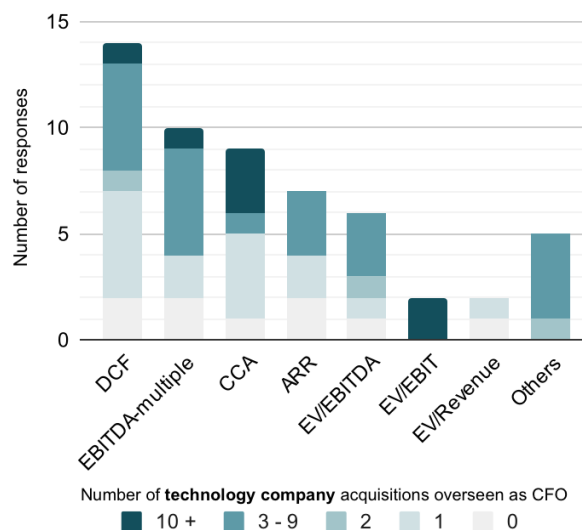


Figure 5: Technology company valuation methods considered 'most important' by CFOs, based on number of technology company acquisitions overseen as CFO

While the EBITDA-multiple was the fourth most commonly mentioned 'good' method, it was second in the 'most important' methods. CCA was the third most likely to be considered a 'most important' method. Figure 6 shows the incidence of responses for the most important methods against generally considered 'good' methods.

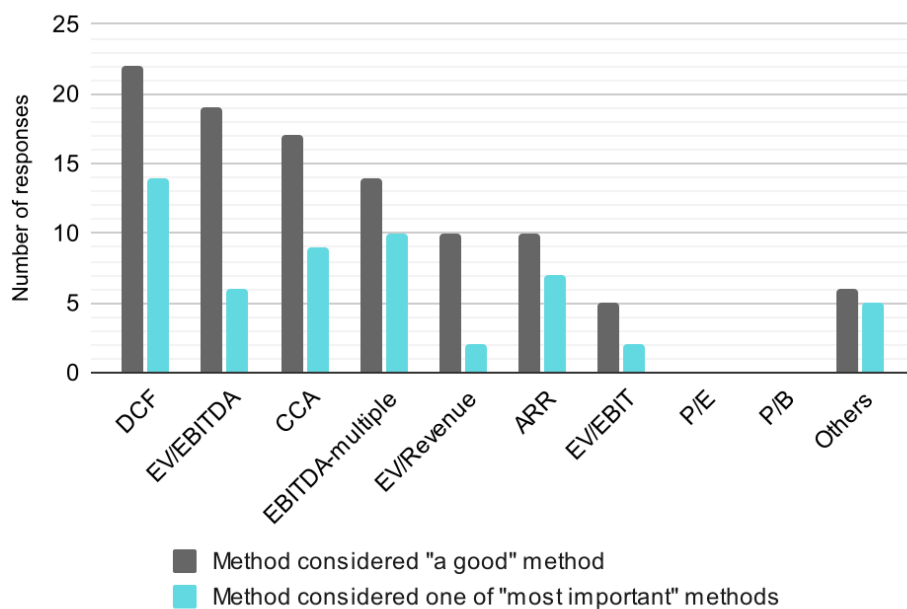


Figure 6: Methods considered 'most important' and methods considered 'good'

CFOs less experienced with technology company acquisitions (groups 0 - 1) were very slightly more likely (7 out of 11) to select DCF as one of the most important methods than more experienced (groups '3 - 9', '10 +') CFOs (6 out of 11), but the difference is minor. All respondents who ranked 'other' methods as most important were in the '3 - 9' general M&A experience group.

Although the sample size is small, respondents to the survey considered DCF to be a good method and one of the most important methods when valuing technology companies. This is consistent with the findings of Mukherjee et al. (2004), who studied CFO behaviour in M&A contexts, but less consistent Gompers et al. (2016) and Gompers et al. (2020), who studied PE and VC investor behaviour. The difference is probably explained by the difference in survey target audience. It appears that CFOs use a set of relatively standard methods when the valuation targets are technology companies.

Most respondents (15 out of 23, 65%) explicitly selected one method from each category (Multiples, DCF, and CCA). This provides some evidence that the 'golden trio' of methods is used widely by CFOs when conducting valuation - that is, methods from each category are used. The number is much higher if CCA is assumed implicitly in the use of multiples; 21 out of 23 selected as 'good' methods both DCF and at least one multiple. However, when asked explicitly to name the three most important methods, only six respondents answered with a combination of DCF, CCA and a multiple.

The question about 'good' valuation methods, despite containing many options, is one-dimensional. Several nuances were left unmeasured due to a desire to optimise for questionnaire brevity. For example, questions about which methods are good for valuing growth businesses, mature businesses, or businesses under distress were left out. Also, the 'technology industry' is a very broad categorisation: more granularity could have been applied. Due to the nuance involved in the practice of valuation, one question was included that asked whether respondents would use different methods for valuing service or product companies¹⁰. This was merely a psychological insertion to allow respondents to recognize that the survey issuer recognizes some of the misgivings they may have about responding too simplistically to questions about 'good or bad' methods. The results to this question were

¹⁰ These were defined in the questionnaire as: "A service company is defined as a company whose business relies on selling services (e.g. consulting, auditing, managed services etc.) A product company is defined as a company whose business relies on creating and selling tangible or digital products, or selling products via a subscription model (e.g. SaaS-companies, device manufacturers, etc.)"

mixed, with six stating they would use different valuation methods, four stating they would use the same valuation methods, and thirteen stating that they would use some different, some similar methods. There was also an error in issuing this question: The digital version of the survey contained slightly different wording of the three options compared to the paper version of the survey, though information content of the options was approximately the same.

In conclusion, CFOs were most likely to select DCF as a good method and one of the most important methods that they use. This shows that DCF is still a valued technique and popular among CFOs when valuing technology companies. CFOs were most likely to rate the P/B method as unsuitable, followed by the P/E method. This may be related to the 'price' component of these ratios and our sample CFOs having more experience in private company M&A. However, the unsuitability of P/B was more pronounced than that of P/E; respondents were sceptical about the validity of the ratio in this context. There is evidence that CFOs also consider multiples important in valuation and that it is common to use the 'golden trio' of DCF, CCA, and multiples to perform valuation.

5. Intangibles

This section describes the design decisions related to the survey question on asset intangibility, with reference to existing literature. Findings are reported and discussed.

Design

Many company valuation techniques in the category of multiples utilise historical financial reports and forecasts. Especially earnings-derived valuation methods, such as EBIT, EBITDA- derivatives, or the P/E method use earnings as part of the formula. Earnings, however, vary depending on the accounting treatment for various assets and expenses. Lie & Lie (2002) and Lev & Gu (2016) discuss that in certain industries, such as pharmaceuticals, R&D costs are expensed. Similarly, Aboody & Lev (1998) comment that software development costs in US companies in 1998 were usually expensed rather than capitalised. Lev & Gu (2016:87) point out that there are issues with valuing intangible assets; they are typically not traded in transparent markets, so it is much more difficult to value them than tangibles, such as Property, Plant, and Equipment (PP&E). A high level of intangibles investment is linked to new, high-tech industries such as IT and biotech and is a relatively new phenomenon in world history, trending upwards from the 1980s (Lev & Gu, 2016:88). Yet accounting for assets has remained largely the same for a century (Lev & Gu, 2016:1).

Capitalisation of software or R&D comes with issues: for example, Lev (2003) has associated it with earnings manipulation. Software can be difficult to capitalise due to the uncertainty of the value it creates. Rautiainen & Luoma-aho (2021) also comment on the difficulty of estimating value for intangible assets, and suggest that some intangibles are more tangible than others: a 'scale of intangibility' could be used to differentiate assets.

Accounting standards are relatively homogenous both globally (Lev & Gu, 2016:1) and across industries such as the software industry (Aboody & Lev, 1998). For any single firm to deviate from commonly accepted accounting convention can be an indicator of distress (Rosner, 2003). So if practitioners cannot affect accounting itself, do they take its shortcomings into account when using financial statements in valuation? This is in spirit a similar question to McDonald's (2000) study which asked whether practitioners account for the complexity of Real Options valuation models by arbitrarily raising the acceptability criterion of more simplistic methods.

Conceivably, if earnings are dependent on the level of capitalisation of intangible assets, one possibility is that practitioners would reject the value relevance of earnings and derivative valuation methods. If indeed practitioners use earnings-related methods in valuation, they may adjust the multipliers. For example, perhaps a company with a large amount of tangible assets would be valued with a 7-times EBITDA multiple, and an idea-company with few tangible assets would be valued with a 15-times EBITDA multiple. While this study cannot answer exactly what practitioners do to account for the shortcomings of accounting, it is possible to find some evidence that practitioners might work around the limitations.

Results and discussion

In this survey to measure practitioner perception about the value relevance of intangible assets, CFOs were asked whether they agree or disagree with the following statement: "*The value of intangible assets of a technology company is represented well in the balance sheet*".

In this study, the CFOs surveyed tended to either fully or somewhat disagree (19 responses, 83%) than fully or somewhat agree (3 responses, 13%). The most common answer was to somewhat disagree (12), and the second most common answer was to fully disagree (7). The responses of CFOs surveyed are shown in Figure 7 by M&A experience generally, and in Figure 8 by M&A experience with technology companies. Only one respondent (4%)

neither agreed or disagreed. It is notable that the most experienced CFOs across general and technology axes slightly disagreed.

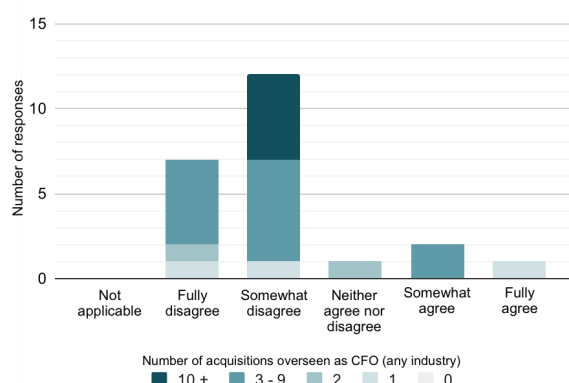


Figure 7: Whether CFOs consider intangible assets of technology companies to be well-represented in the balance sheet (by M&A experience in any industry)

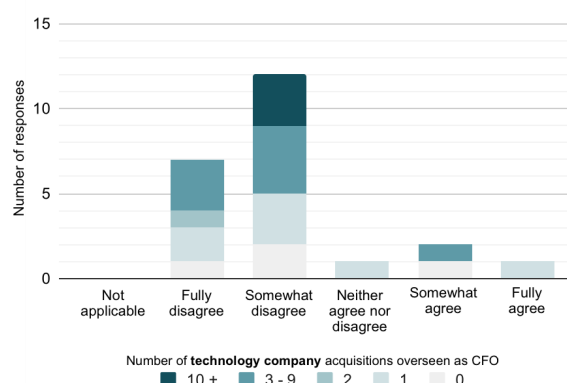


Figure 8: Whether CFOs consider intangible assets of technology companies to be well-represented in the balance sheet (by acquisition experience of technology companies)

There were no meaningful differences between intangibles accounting ‘cynics’ and non-cynics on how likely they were to advocate earnings-derivative valuation methods. The vast majority of respondents (89%) who disagreed that intangible assets are well-represented in the balance sheet advocated using at least one earnings-derived valuation method (EBITDA, EBIT or -/E). This shows that practitioners who are sceptical about the representativeness of intangible assets on the balance sheet do not reject earnings-derived valuation methods, but are likely to consider them ‘good’ methods. There was also no notable difference between the number of ‘good’ or ‘bad’ method options selected depending on whether the respondents considered intangibles well-represented on the balance sheet or not.

The results about intangibles are conceptually consistent with the finding that practitioners rate the P/B method poorly. If CFOs believe that the (book) value of assets in accounting statements is value irrelevant for technology companies, they are unlikely to use a valuation method that relies entirely on that book value. There are few comparison points as CFO perceptions on the representation ability of the balance sheet have not been widely studied via surveys.

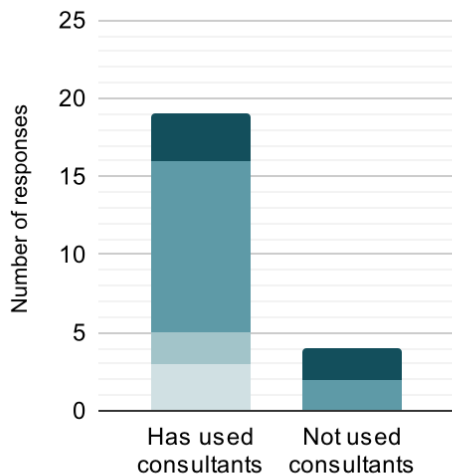
In conclusion, the CFOs surveyed in this study believe that the balance sheets of technology companies are poor representations of intangible assets. The belief in the balance sheet’s

representativeness of intangible assets did not affect perceptions about the suitability of earnings-derived valuation methods. This indicates that there may be an effect at play where the earnings-based valuation methods are adjusted by practitioners to account for the poor value relevance of earnings that comes from intangible assets not being capitalised.

6. Consultants

During background interviews for this study, it was found that the use of consultants may be widespread by both the buying and selling parties during M&A deal-making. CFO surveys that ask about valuation do not typically ask whether third-party consultants play a role in the decision making process, so the literature has few mentions of the phenomenon. In the literature on CFO surveys that measure the use of capital investment evaluation or company valuation methods, there is typically an assumption that the CFO acts with full agency. While this may be true, we do not know how widespread consultant use is, or whether it is a regional phenomenon.

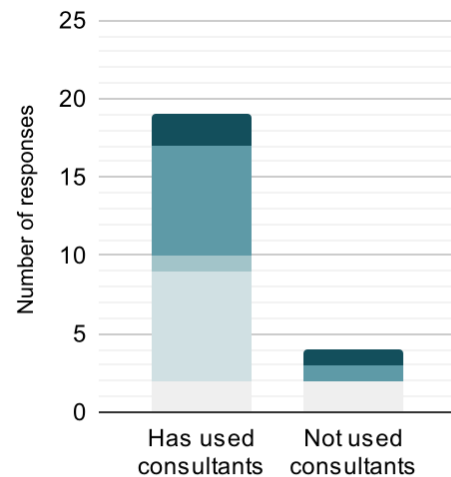
The CFOs surveyed in this study were asked whether they had used third-party consultants for valuation purposes when making acquisition deals. Most respondents (19 out of 23, 83%) had used consultants for valuation purposes, while 4 (17%) had not. Whether respondents had or had not used consultants does not appear to correlate much with their M&A experience. The M&A experience-based distribution of respondents is shown in Figures 9 and 10.



Number of acquisitions overseen as CFO (any industry)

10+ 3-9 2 1 0

Figure 9: CFO responses to whether they had used third-party consultants for valuation needs (by M&A experience in any industry)



Number of **technology company** acquisitions overseen as CFO

10+ 3-9 2 1 0

Figure 10: CFO responses to whether they had used third-party consultants for valuation needs (by acquisition experience of technology companies)

The questionnaire also asked in free-text form for respondents to provide opinions about the use of consultants for valuation needs. Most respondents (18 out of 23) answered this question. The responses were analysed by measuring how frequently various themes were mentioned. The most common theme with five mentions was that third-party consultants offer a second opinion. A similar note (two mentions) was that consultants can offer an independent opinion. Three CFOs mentioned that consultants 'will use the same valuation methods that you can use yourself'. It was also mentioned three times that "not everything can be outsourced" - that decision making itself cannot be outsourced to consultants. Topics that were mentioned twice included: consultants are useful for other purposes (legal, tax, finance); consultants are useful during the Due Diligence process; consultants bring professionalism to the deal making process; and that consultants can be useful especially if they are specialised in the area or industry that the deal relates to. Some other topics were mentioned but without repeats.

The results show that third-party consultant use is likely an integral part of M&A valuation in Finland in the technology sector. The thematic analysis of opinions indicates that consultant analysis may be used as a supplementary confirmation of valuations. Background interviews for this study indicated that it is common for the buyer and the seller in an M&A transaction to use consultant opinions to neutralise negotiating tensions arising from different valuation outcomes. Naturally, during deal-making, the seller has the incentive to produce a high

valuation, and the buyer has the incentive to value the business at a lower price. Consultants can therefore be used as an intermediary to offer second or independent opinions. This study gives some indicative support for this narrative.

Another topic that came up in both background interviews and the survey results is that consultants do not use significantly different techniques for valuation than CFOs can use by themselves. Consultants' analyses are transparent and clear; there is no 'magic' involved. One advantage to consultant use is that the data sets for comparison and past transaction data may be proprietary, ready-to-use as a service, and larger than for the average CFO. In general, the opinions stated in this questionnaire did not give any indication that consultants have significantly better valuation ability or that their methods differ significantly. Therefore, we can conclude that it does not appear that the use of consultants can be explained by consultants being better at valuation.

Widespread use of consultants in the deal-making process has some interesting implications; if we assume that there are fewer consultancies offering deal-making assistance than companies themselves, then consultancies may continually apply a set of preferred methods, leading to a convergence of specific methods being most highly rated. Implicitly consultants shape the conception of what is good practice. If some unsuitable methods are continually pushed by certain consultants, those mistakes may be applied widely. Consultant opinions also take out a certain agency from the process; as some respondents mentioned, decision making must be done by parties involved in the deal and it cannot be outsourced. The nature of consulting offering in this field would therefore be important to study further: is the service simply running the numbers, or is it providing decision making advice? And is decision making advice biased in any direction, are any particular set of methods more convincing?

The findings on widespread use of consultants in the valuation process may give some support to the idea that "there is no one perfect valuation method", but that a selection of methods and mechanisms is the most common way to do valuation.

7. Valuation success

The surveyed CFOs were also asked to rate how successful they perceived technology company valuations to have been based on their experiences. CFOs were asked whether

they agreed with the statement: *“Initial valuations of technology companies tend to accurately estimate the realised value of the investment.”*

Figures 11 and 12 show the distribution of responses based on M&A experience. The results are mixed, with respondents most likely to ‘somewhat agree’ (11 responses). The next most common response was to ‘somewhat disagree’ (4) or neither agree nor disagree (3). Few fully disagreed (1) or fully agreed (1), and three said the question was not applicable. Three out of four respondents who had no experience with technology company acquisitions as CFO nevertheless ‘somewhat agreed’ to this statement pertaining to the realised value of technology company acquisitions.

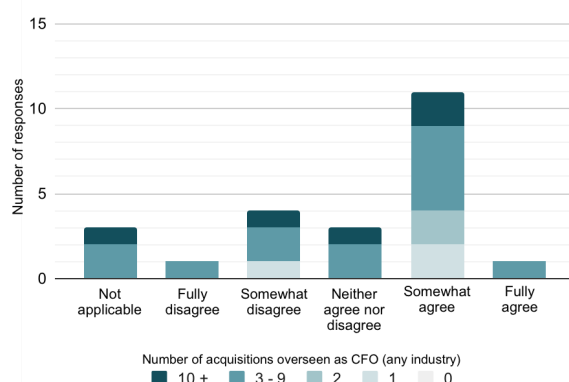


Figure 11: Initial valuation success perception (by M&A experience in any industry)

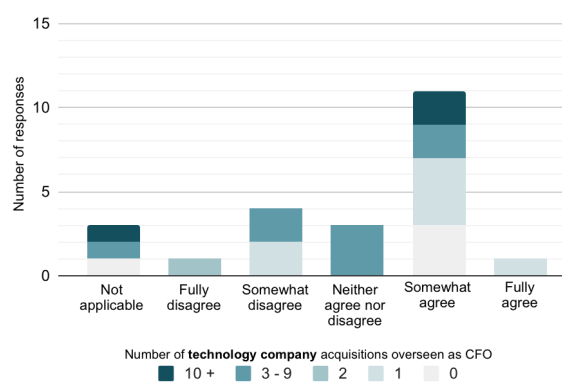


Figure 12: Initial valuation success perception (by acquisition experience of technology companies)

The minority of respondents who believed that intangible assets are well-represented in the balance sheets of technology companies also believed that initial valuations had generally well-represented investment value. Most of the minority of respondents who had not used third-party consultants believed that initial valuations had well-represented the eventual value of the investment. Figures 13 and 14 show the distribution of results based on these parameters.

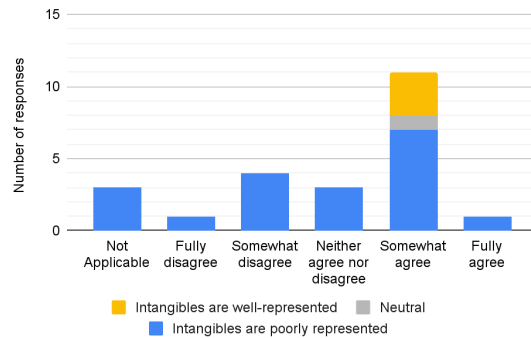


Figure 13: Initial valuation success perception by intangibles perception

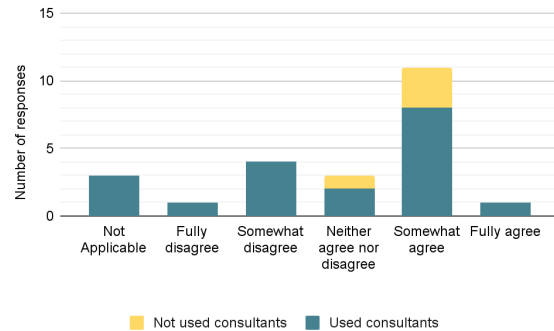


Figure 14: Initial valuation success perception by experience using consultants for valuation

There were no notable correlations between any one valuation technique considered ‘good’ or ‘bad’ and perceptions about historical valuation success. There were also no notable differences in how many methods respondents selected as ‘good’ or ‘bad’ depending on what they thought of valuation success.

The caveats of the analysis are however that the question is very general: It asks to give an indication of trend, which requires conceptual summarisation. Additionally, practitioner perceptions may not be entirely representative of the trends they report - for example, due to biased recall of mostly successful instances, or recall of mostly failures.

It could be expected that the most experienced CFOs would agree more, as perhaps valuation accuracy gets better with experience. Then again, the more experienced the respondent, the more likely they will encounter problematic valuations along their career. The purpose of this question was to see if perceived valuation success correlates with any of the other measured elements, such as experience, which methods are considered good, use of consultants or perceptions on intangible assets.

There was no observable difference between what respondents who agreed or disagreed that initial valuation is a good estimate of eventual realised value thought were good or bad methods. This indicates that practitioners may consider no one particular method to have high predictive accuracy.

8. Conclusions

The aim of this study was to understand both how valuation is done in practice by CFOs in Finland when they value technology companies and to potentially understand why they choose to use certain methods over others. 23 CFOs were surveyed, and the responses were analysed for patterns indicating information about decision making behaviour.

The survey results show that CFOs favour DCF as a valuation technique but are equally likely to rate at least one market multiple as a good method. Comparative company analysis was also found to be considered a good valuation method. CFOs were likely to consider P/E and especially P/B poor methods. P/B was considered the worst method of all, possibly due to a lack of confidence in the representation of intangible assets on balance sheets. The findings are in line with a similar study by Mukherjee et al. (2004) in that DCF is rated highly. However, this study finds much more widespread positive sentiment for market multiples than previous studies, at least for valuing technology companies. There is some evidence from the results that CFOs use many valuation methods as aids to decision making, especially a combination of DCF, CCA, and market multiples.

The study also found, perhaps surprisingly, that when CFOs were asked explicitly about whether intangible assets of technology companies are represented well on the balance sheet, the majority disagreed. This result lends credence to the notion that financial reporting conventions may not be fit-for-purpose for the technology industry. The study finds that CFOs, however, do not reject earnings-derived valuation methods but instead are likely to rate them highly. This may mean that the effect of intangibility of assets on reported earnings is accounted for by practitioners in other ways, for example, by adjusting multipliers.

The sample size of this study was relatively small and limited. In addition, due to the anonymity and brevity of the survey, few dimensions could be measured, meaning that conclusions are somewhat indicative and not entirely conclusive. Many questions were also very general. To explore these topics further, similar research could be repeated to observe whether the same effects occur with larger samples. Further dimensions and nuances of valuation (such as differences between growing and mature companies) could be studied using a longer and more detailed survey. To confirm any conclusions about why executives use the techniques that they do, and to understand how they account for limitations of accounting in practice, and why the use of consultants is so widespread, qualitative interview-based studies should be conducted.

The findings of this study expand on what has previously been reported in the literature on executive decision making. The study also proposes possible explanations for practitioner behaviour based on survey evidence. These results are particularly relevant for practitioners in Finland, as they indicate which valuation methods are rated most highly by local CFOs for application to technology companies.

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Appendix

Invitation to participate in study of CFO opinions on company valuation

Dear Sir/Madam,

You are invited to take part in an academic research study of CFO opinions related to company valuation in Finland. You can participate by answering the brief survey enclosed in this envelope (in Finnish), or by answering the questionnaire digitally in English. If you wish to submit a response digitally, please scan the adjacent QR code. Answering the survey will take about 10 minutes of your time. If you choose to respond with paper, please return the questionnaire using the enclosed pre-paid envelope.



You can submit your response digitally by scanning the above QR code, or at:
<http://valuationsurvey.minnacaptain.com>

If you wish to participate, please submit your response by 29th May 2023.

This questionnaire is anonymous, so you do not need to provide any identifying details. The questions relate to your views and opinions based on your experience.

This study is conducted in affiliation with the University of Warwick (Warwick Business School). Aalto Executive Education (AaltoEE) is kindly helping with postal practicalities.

How to answer the questions:

Single-choice questions are marked with a circle (○). Please select only one option.
Example:

- ☒ Yes
- ☐ No

Multiple-choice questions are marked with a checkbox (☐). You can select multiple options.
Example:

- ☒ Option 1
- ☐ Option 2
- ☒ Option 3

Interested in the results? Results will be available upon study completion (expected late 2023) at:

<http://surveyresults.minnacaptain.com>

Have any questions? Get in touch:

minna.captain@warwick.ac.uk

Many thanks for your participation!

Minna Captain

MBA Student at University of Warwick (Warwick Business School)

For disclosure: I am a working student and my current employer is Futurice Oy. My employer is not involved in this study, and is not sponsoring the study.

Survey of opinions related to company valuation

This survey aims to study CFO opinions on topics of company valuation and Mergers and Acquisitions (M&A). Even if your experience on these subjects is limited, your response is very valuable to the research.

Once you have completed the survey, please use the attached envelope to send back your response. You do not need to provide your name nor any identifying details, as this survey is anonymous.

Please answer all questions, and send your response by
29th May 2023.



You can alternatively respond digitally by
scanning the above QR code, or navigating to:
<http://valuationsurvey.minnacaptain.com>

1. Have you ever worked at a company while it has been involved in a Merger or Acquisition (either as the buying, or selling party)?

- ☐ Yes
- ☐ No

2. If yes, was your position CFO during any of these Merger or Acquisition events?

- ☐ Yes
- ☐ No
- ☐ Not applicable

3. How many acquisitions have you personally overseen (either on the sell-side or buy-side) in the position of CFO?

- ☐ 0
- ☐ 1
- ☐ 2
- ☐ 3 - 9
- ☐ 10 +

4. Thinking of all the acquisitions you have overseen as CFO, how many involved the acquisition of a **publicly listed** company?

- ☐ 0
- ☐ 1
- ☐ 2
- ☐ 3 - 9
- ☐ 10 +
- ☐ Not applicable

5. Thinking of all the acquisitions you have overseen as CFO, how many involved the acquisition of a **technology company**?

i In this context a **technology company** is defined as a company whose business relies on the operation, building, manufacture or ownership of digital or technology-intensive products or services.

- ☐ 0
- ☐ 1
- ☐ 2
- ☐ 3 - 9
- ☐ 10 +
- ☐ Not applicable

Next, you will be asked questions relating to the valuation of technology companies.

6. Thinking of **technology companies** specifically: Which of the following valuation methods in your opinion are **good** for assessing the value of a technology company?

Select all that apply.

Financial multiples

- ☐ EV/EBITDA
- ☐ EV/EBIT
- ☐ EV/Revenue
- ☐ EBITDA-multiple
- ☐ P/E (price-to-earnings ratio)
- ☐ P/B (price-to-book ratio)
- ☐ ARR (Annual Recurring Revenue) multiple

Discounted Cash Flow (DCF)

- ☐ Discounted Cash Flow (DCF) methods

Relative valuation

- ☐ Comparable company analysis

Other

- ☐ Other:

7. Company valuation is typically done using a combination of many different valuation methods. Which of the above methods that you have selected as good, do you consider the **most important** for valuing technology companies? Please choose up to three.

- _____
- _____
- _____

8. When valuing a technology company, would you use different valuation methods for **service companies** and **product companies**?

i A **service company** is defined as a company whose business relies on selling services (e.g. consulting, auditing, managed services etc.)

i A **product company** is defined as a company whose business relies on creating and selling tangible or digital products, or selling products via a subscription model (e.g. SaaS-companies, device manufacturers, etc.)

- ☐ Yes, I would use significantly different valuation methods
- ☐ There would be some similarities and some differences in the methods I would use
- ☐ No, I would use the same methods

9. Which of the following valuation methods in your opinion are **bad** or **unsuitable** for assessing the value of a technology company?
Select all that apply.

Multiples

- ☐ EV/EBITDA
- ☐ EV/EBIT
- ☐ EV/Revenue
- ☐ EBITDA-multiple
- ☐ P/E (price-to-earnings ratio)
- ☐ P/B (price-to-book ratio)
- ☐ ARR (Annual Recurring Revenue) multiple

Discounted Cash Flow (DCF)

- ☐ Discounted Cash Flow (DCF) methods

Relative valuation

- ☐ Comparable company analysis

Other

- ☐ Other:

10. Thinking of the balance sheets of **technology companies** and the accounting treatment of intangible assets: Do you agree with the following statement?

“The value of intangible assets of a technology company is represented well in the balance sheet.”

- ☐ Fully agree
- ☐ Somewhat agree
- ☐ Neither agree nor disagree
- ☐ Somewhat disagree
- ☐ Fully disagree

11. Based on your experience of completed **technology company** acquisitions: Do you agree with the following statement?

“Initial valuations of technology companies tend to accurately estimate the realised value of the investment.”

- ☐ Fully agree
- ☐ Somewhat agree
- ☐ Neither agree nor disagree
- ☐ Somewhat disagree
- ☐ Fully disagree
- ☐ Not applicable

The following questions relate to all industries, not only technology companies.

12. Have you ever used third party consultants to perform company valuation when making an acquisition deal?

- ☐ Yes, I have used consultants for valuation needs
- ☐ No, I have not used consultants for valuation needs

13. If you have (or have not) used third party consultants to perform valuation when making a deal - do you have any opinions about the use of third party consultants for valuation needs?

Thank you for your participation in the survey!

Please return the filled-in survey using the attached pre-paid envelope.

Appendix B: Details about the digital version of the survey

The digital survey version was created using Google Forms, and it was identical as far as possible to the paper version: the same introductory text was used (with references to envelopes and paper omitted); the user was not obstructed from survey completion (no explicitly mandatory fields); the same font (Times New Roman) and colour scheme (Greyscale) were used. Digital survey responses were anonymous.

For questions where response options had subheadings on paper, the question was separated into a Header, followed by separate 'Questions'. All survey testers were able to complete the digital survey without issue. When testers were specifically probed about whether these subheading-questions posed a problem, they responded that they had not even noticed that the options were separated into separate question groups. Figure B.1. shows an example of the digital questionnaire (compare to paper version in Appendix A).

6. Thinking of **technology companies** specifically: Which of the following valuation methods in your opinion are **good** for assessing the value of a technology company?
Select all that apply.

Financial multiples

- ☐ EV/EBITDA
- ☐ EV/EBIT
- ☐ EV/Revenue
- ☐ EBITDA-multiple
- ☐ P/E (price-to-earnings ratio)
- ☐ P/B (price-to-book ratio)
- ☐ ARR (Annual Recurring Revenue) multiple

Discounted Cash Flow (DCF)

- ☐ Discounted Cash Flow (DCF) methods

Relative valuation

- ☐ Comparable company analysis

Figure B.1: Partial screenshot of Question 6 in the digital version of the survey

For Question 7, it was not possible to achieve the same layout digitally as in the paper form. The paper form emphasises the number of expected answers, but this was not translated into digital form. Instead, the response was a free-form text field as shown in Figure B.2.

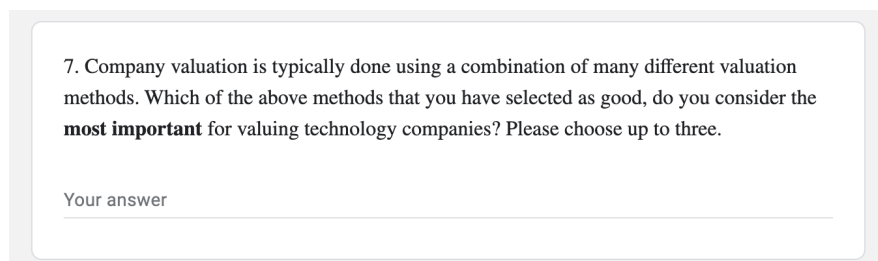
The image shows a digital survey question within a light gray rectangular frame. The question text is: "7. Company valuation is typically done using a combination of many different valuation methods. Which of the above methods that you have selected as good, do you consider the **most important** for valuing technology companies? Please choose up to three." Below the question, there is a text input field with the placeholder text "Your answer" and a horizontal line for typing.

Figure B.2: Layout of Question 7 in the digital version of the survey

The questionnaire was accessible via a public link (i.e. no authentication was required). While this means that the survey could be answered by anyone (rather than the intended recipients of the survey) - it is considered unlikely. This is because the survey link was not publicised in any communications other than the paper letters and emails sent to the sample CFOs themselves.

Appendix C: Email reminder sampling process and caveats

Survey response reminders were sent on 22nd May 2023, which was one week before the recommended response deadline indicated in communications (29th May 2023). The reminder emails were written in Finnish, as it was assumed that recipients would generally speak Finnish.

For each CFO on the survey sample list, the CFO's name and company name were web-searched (using Google). The web search frequently resulted in a page on the company's website, where the CFO's email address was available. In these cases where the CFO's email was available on the company's website directly, the email address was marked as "Certain".

For the remainder of CFOs whose emails were not directly available on company websites, their email addresses were assumed to have the format [firstname.surname@company.com](#). The domain part of the email (e.g. "company.com") was assumed based on other emails available on the company website. For example, if the company provided a customer support email on their website in the form of [info@company.fi](#) - then it was assumed that the CFO's email address would be of the form [firstname.surname@company.fi](#). In these cases where the CFO's email had to be assumed, the email address was marked as "Assumed".

In total, 60 email addresses were marked “Certain” and 70 were marked “Assumed”, totalling 130 email addresses. Three recipients were excluded from the sample for other reasons, such as the CFO having left their position at the company.

There was a small risk, especially with large corporations, that the company may employ several people with the same first name and surname. This meant that there was a risk that email reminders may have been sent to an unintended recipient when the email address was assumed. However, if the “wrong person” would receive communications clearly targeted at a CFO, it is possible they would either ignore the communication or forward it to the correct person. This risk was not considered a significant blocker for email reminders to be sent.

A total of 130 emails were sent on 22nd May 2023 at 12:30 local time. Some of the emails were not delivered by the mail server, for example because the email address did not exist. Table C.1 summarises the email delivery outcomes. No attempt was made to fix email delivery failures, as the vast majority of emails were sent successfully.

<i>Table C.1: Email reminder sending process outcomes</i>	
Number of paper letters sent in mail	133
Number of reminder emails sent	130
Number of email delivery failures (due to non-existing email address)	4
Number of auto-response emails (due to recipient being out of office)	9
Number of email addresses blocked by email provider (Warwick University Email - Outlook)	2

Appendix D: CFO-equivalent roles in sample and their count

<i>Table D.1: Specific roles of CFOs and equivalents included in survey sample</i>	
Role as listed on company website or LinkedIn profile (approximate¹¹)	Count
CFO	99
Financial Director / Manager, Head of Finance, or Head of Finance and Administration	11
Group CFO	10
Interim, Acting or Regional CFO	6
Finance- and funding manager	4
Specific combination of CFO and other role	3
Total	133

¹¹ Some roles are grouped to preserve anonymity of sampled respondents. Some roles have been translated from Finnish, e.g. Talousjohtaja = Chief Financial Officer.