M.L. FISCHER RESEARCH

MAY 2009

Application of valuation methods in M&A transactions

Research Note 01

Mergers & Acquisitions

Valuation

13 Pages

Internet: ISSN 2190-8451

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This empirical study sheds some light in practical valuation issues against the theoretical background. The main objective is to analyze the application of valuation methods in M&A transactions applied by financial advisors and private equity companies in international practice. This survey focuses on the major inputs of discounted cash flow (DCF) valuation and compares the suitability of various existing valuation models for different industries. Even if these valuation approaches rely on quantitative models and seem objective, the inputs leave plenty of room for subjective judgments. This study gives best practice recommendations for the application of DCF approaches. The major findings of this study are consistent with the current literature; however they also support the prevalent view that business valuation is more an art than a science.

RESEARCH QUESTION, RATIONALE AND OBJECTIVE

How do financial advisers and private equity companies evaluate M&A transactions for different industry sectors in practice and how are key value drivers in DCF valuation considered? The application of valuation methods in M&A transactions by financial advisers and private equity companies in Germany and the United Kingdom is analyzed and best practice examples concerning discounted cash flow valuation based on these findings are developed.

Uses of existing approaches to business valuation as well as their inputs vary in theory, and therefore, several questions arise, concerning the discount rate determination, the length of the forecasting period, the basis of cash flow forecasts, sustainable growth in the terminal value phase, possible value discounts or other adjustments in SME valuations, as well as the suitability for existing valuation methods for various industries. Moreover, if the CAPM is applied in practice, how do companies derive the corresponding variables, like the risk-free rate, beta, and the market risk premium? Theory suggests several possibilities, but how is the derivation managed in practice by financial advisers and private equity companies?

As a result, it is worth to analyzing these varieties regarding the application of valuation methods from several angles. Possible differences could be based on country- or sector-specific differences. Therefore, financial advisers (FA) as well as private equity companies (PE) in Germany and the UK are simultaneously investigated with regard to their individual application of valuation methods.

Several inputs to the discounted cash flow approach as well as the relevance of different valuation methods for various industry sectors are therefore investigated in detail within this empirical study, in order to derive recommendations based on best practices regarding the following issues.

DCF VALUATION - METHODOLOGY AND INPUTS

- ✓ Discount rate determination
- ✓ Length of average forecasting period
- ✓ Basis of cash flow forecasts
- ✓ Growth rate assumtions regarding terminal value determination
- ✓ Company discounts or other adjustments in SME valuations

SUITABILITY OF DIFFERENT VALUATION METHODS FOR VARIOUS INDUSTRIES

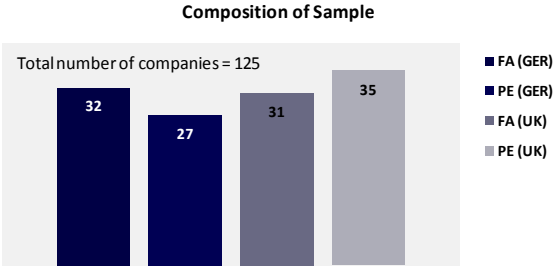
This study tries by focusing on the abovementioned 'valuation issues' to shed some light on applied valuation among financial advisors and private equity companies in an international context.

METHODOLOGY OF THE STUDY

The goal of this empirical analysis was to determine and analyze the application of valuation methods in M&A transactions in practice. Target groups of this analysis were the leading financial advisors in M&A transactions in Germany and the United Kingdom as well as leading private equity companies involved in buyouts and exits (Germany and UK). The selection of the sample companies was based on a sample of league tables (Germany and UK), covering the period from 2006 to 2007 provided by 'Thomson Financial' and 'Mergermarket'.

Target groups are leading financial advisors and private equity companies in Germany and the UK

The sample includes 125 companies, thereof 32 financial advisers and 27 private equity companies (situated in or foreign representation in Germany) as well as 31 financial advisers and 35 private equity companies (situated in or foreign representation in the UK):



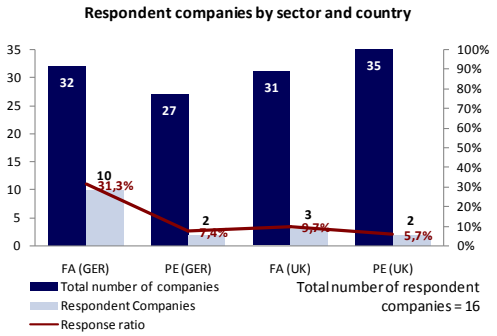
FA = Financial Advisors
PE = Private Equity Companies

A questionnaire was sent to parties frequently involved in M&A-processes. First, questions concerning the determination of an appropriate discount rate (cost of capital) and their derivation according to the capital asset pricing model (CAPM) were analysed, including the risk-free rate, the beta factor, the market risk premium and the cost of debt. Second, the DCF methodology was examined, targeting the basis of cash flow forecasting, the length of the forecasting period, the sustainable growth rate, and the possible use of discounts or other adjustments. Third, valuation methods, their relevance and suitability were researched for a given sample of companies, representing various industry sectors.

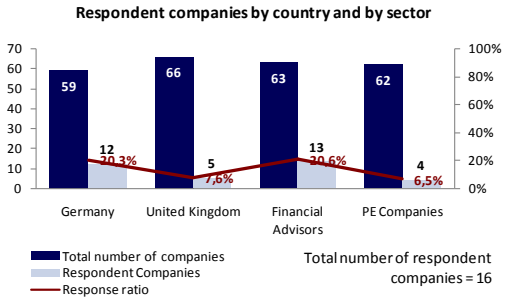
The following section presents and analyses the major findings of the accomplished empirical analysis regarding inputs and methodology of discounted cash flow valuation, and the application of various valuation approaches in mergers and acquisitions for different industries.

ANALYSIS AND RESULTS

In the following paragraphs, the results of the individual responses to the questions asked in the questionnaire are presented and analysed. Part I of the questionnaire deals with the determination of discount rates. Part II focuses on the methodology and other value drivers in DCF valuations. Lastly, the suitability and application of different valuation models for various industries are exposed in part III.



A critical success factor of the empirical analysis lies in the rate of response of the target companies. A ratio of replies of 20% is regarded as very good, 10% barely acceptable. In summary, the overall response ratio of the survey of 13.6% is regarded as satisfactory. Concerning the ratio of replies, UK companies unfortunately only account 7.6%, compared to German companies with 20.3%.



However, this result is not surprising because a higher response rate from German financial advisers and PE companies was expected to begin with. The highest ratio of replies was reached by German Financial Advisors with a share of 31.3%. The following table tabulates an analysis of respondent companies by country and sector.

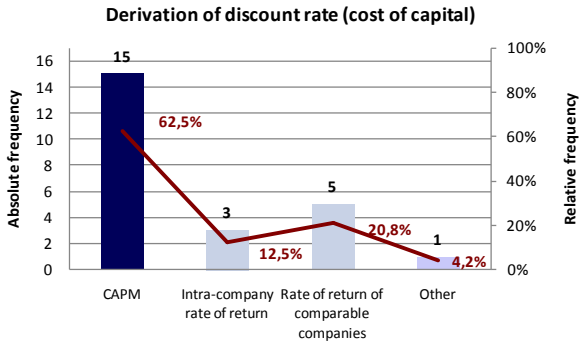
Almost one third of the German financial advisors returned their questionnaire

Country / Sector	Whole Survey Sample	Respondent Companies	
	Number of Companies	Number of Companies	in %
Germany	59	12	**20.3%**
FA (GER)	32	10	31.3%
PE (GER)	27	2	7.4%
United Kingdom	66	5	**7.6%**
FA (UK)	31	3	9.7%
PE (UK)	35	2	5.7%
Financial Advisers	63	13	**20.6%**
GER	32	10	31.3%
UK	31	3	9.7%
PE-Companies	62	4	**6.5%**
GER	27	2	7.4%
UK	35	2	5.7%
TOTAL	125	17	**13.6%**

Part I: Determination discount rate (cost of capital)

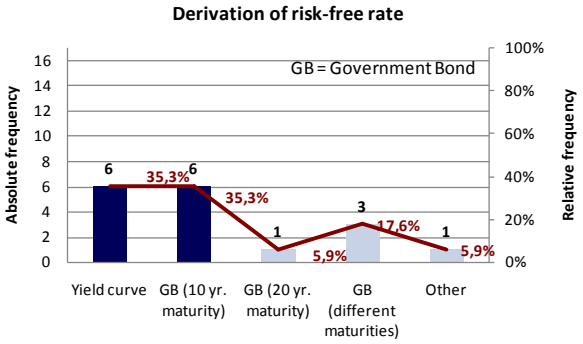
The CAPM is market standard

Question 1 *– Which approach do you use for the computation of the discount rate / cost of capital?*



Based on the survey findings, the CAPM is the dominant approach to determine the cost of capital. 88.2% of the surveyed companies state that they use the capital asset pricing model to determine the cost of equity, which factors into the determination of the discount rate applied in DCF valuation. The intra-company rate-of return, preset by customers (17.6%), and the return of comparable companies, also referred to as peer group rate of return (29.4%), are both less commonly used. All cross-national financial advisors (100%) apply the capital asset pricing model, whereas the peer group rate of return is favoured by 75% of the private equity companies. Other competing asset pricing models, such as the APT of Fama-French three factor model, are not named and apparently do not seem feasible for practical implementation. On the other hand, the capital asset pricing model (CAPM) is comprehensible and easy to use, and therefore meets the requirements of practitioners in order to determine an appropriate discount rate for the use of discounted cash flow valuation.

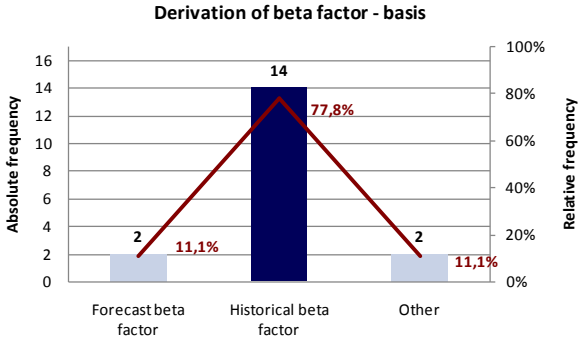
In practice, the risk-free rate is mainly derived from ten-year government bonds and the yield curve



Question 2 *- What is the basis for the calculation of the risk-free rate?*

Theory suggests the use of long-term government bonds in order to estimate the risk-free rate. Moreover, the use of government bonds with a maturity of 10 years is favoured as they are more liquid. The IDW, in contrast, recommends a derivation based on the interest curve. Regarding the determination of a risk-free rate of return, the answers of the survey are in compliance with the prevailing opinions in theory. With a relative frequency of 70.6%, the risk-free rate in practice is mainly derived from the yield curve or from government bonds with a maturity of ten years. It is especially noticeable that 41.7% of the German financial advisors derive the risk free rate from yield curves, as proposed by the IDW. Also, short-term interest rates like the LIBOR and the EURIBOR are taken as a reference by one German financial advisor. The less frequent use of 20-year or longer-term maturities can be explained with a lack of sufficiently liquid long-term bonds in the capital market.

Beta factors are predominantly derived from historical data

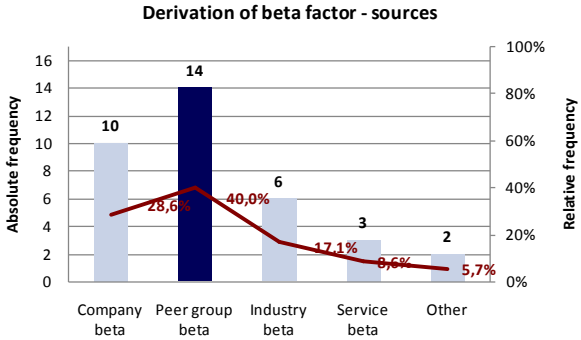


Question 3 *- What is the basis for the calculation of the beta factor?*

Basically beta factors can be derived in various ways. The most common method according to theory should be historical (ex post) beta factors rather than ex ante or forecast beta factors.

In practice, beta factors are also mainly derived from historical data. In total, approximately 82.4% of the responding companies therefore apply historical beta factors through regression. The remainder favours forecast beta factors or follow analyst judgements.

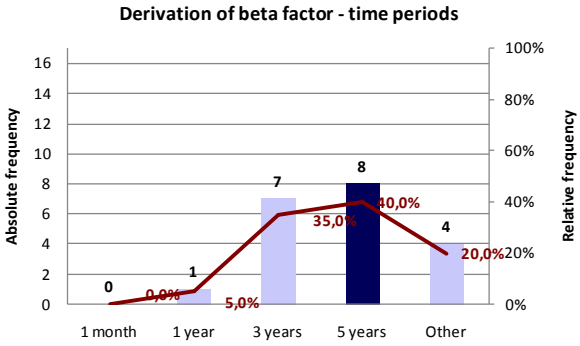
Peer group betas play an important role



Question 4 *- Which beta factor do you use to calculate the cost of capital?*

Beta factors can be obtained from several sources. Besides company betas -if available-, peer group betas, industry betas, as well as (adjusted) service betas are possible sources. All in all, 14 out of 17 (82.4%) responding companies prefer betas derived from comparable companies. Company betas (58.8%) and industry betas (53.3%) are both used to a lesser extent. Concerning the former, possible reasons could be that for valuing privately-held companies, no representative beta factors are available. Industry betas may be less suitable than peer group betas, as comparable companies usually better capture the operating risks of the valuation object than an average beta of the whole industry. Adjusted service betas in contrast are mostly avoided. One financial advisor additionally relies on analyst judgements based on an analysis of company-internal risks.

A period of five years is preferred to derive historical beta factors

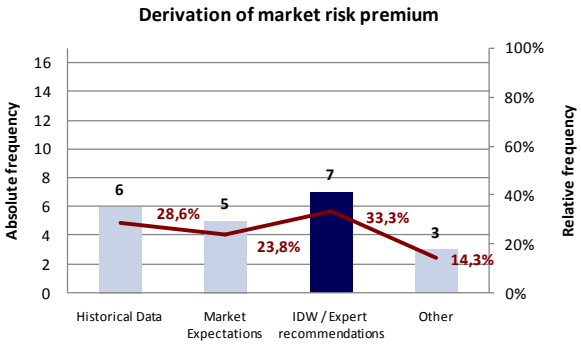


Question 5 *- Which time period do you look at to determine the beta factor?*

Concerning the observation period of historical betas, a length of five years is preferred in order to compute historical betas. Although a less current beta factor may not describe a company's current market risk, historical betas based on a period between three to five years are primarily applied.

Possible reasons behind these 'senior betas' could be the preference for continuous beta factors compared to more recently appearing betas, and the avoidance of current short-term market distortions. Moreover, in deriving historical betas from regression analysis, a sufficient number of data points are necessary in order to deliver reliable results.

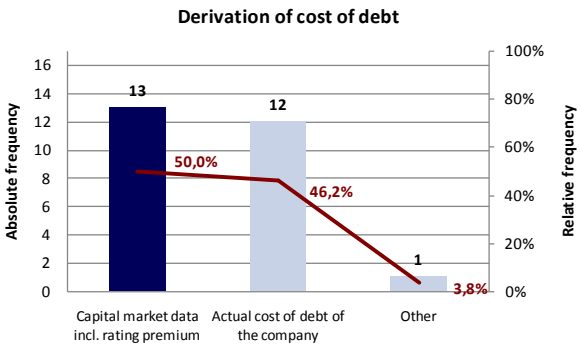
Practitioners prefer expert recommendations in order to derive the market risk premium



Question 6 *- How is the market risk premium derived?*

Regarding the determination of market risk premiums, there is a multitude of different routes to go. Market risk premiums can be calculated from historical data, they can be based on market expectations (surveys) or can be based on expert recommendations. The survey results show that the market risk premium in practice is predominantly based on expert recommendations or derived from historical data. All in all, 41.2% of the surveyed companies rely on expert recommendations, whereas 35.3% derive the market risk premium from historical data, followed by 29.4% who use ex-ante expectations. Some of the sample, companies additionally consult own research studies or academic papers. Applied market risk premiums extremely diverge, whether based on expert recommendations, surveys about future expectations (ex-ante), or historical (ex-post). Even the regression of historical betas leaves lots of options to choose and use different variables, i.e. choice of a market index and risk-free security, as well as the observation period and the calculation methods (arithmetic or geometric). Expert recommendations that are not extremely transparent, but allow for a better comparison of discount rates used in discounted cash flow valuations.

Cost of debt calculations are often based on capital market data including a rating premium



Question 7 *- In order to calculate the WACC, which cost of debt do you apply?*

When using the free cash flow to firm model, the appropriate discount rate should reflect a weighted average of the return required by equity as well as debt investors (WACC). As presented before, the cost of equity generally is derived from the capital asset pricing model. Thus the derivation of the cost of debt also needs to be investigated. A common approach for determining the cost of debt is to take the risk-free rate and add a default spread representing the individual default risk of the company. The default spread can be based on the company's rating or on a synthetic rating or recent borrowing history. According to the relative frequency of the survey

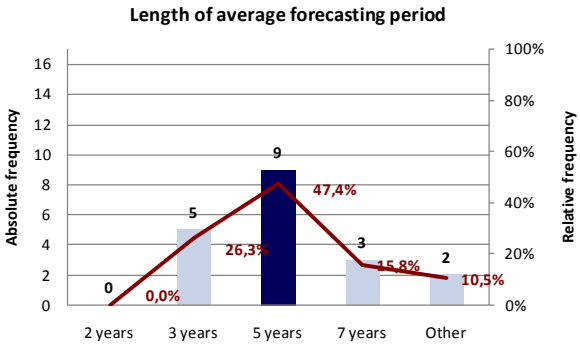
results, the cost of debt is mostly derived –as proposed by theory- through capital market data, followed by the application of the actual cost of debt of the company. Nevertheless, especially for non-rated companies, respectively their outstanding debt securities, it seems problematic to set up an artificial rating for private companies using external financing via the capital market. Thus, the actual cost of debt is also important in order to determine the weighted average cost of capital in valuations based on entity cash flows.

In the next paragraph, the survey results of the second part are presented, dealing with the methodology and application of discounted cash flow approaches with respect to the length of the average forecasting period, the basis of cash flow forecasts, the sustainable growth rate, and equity value discounts or other adjustments in case of valuing small- and medium-sized enterprises.

Part II: DCF approaches - methodology

A minimum length of three years for the forecasting period is claimed – five years are preferred

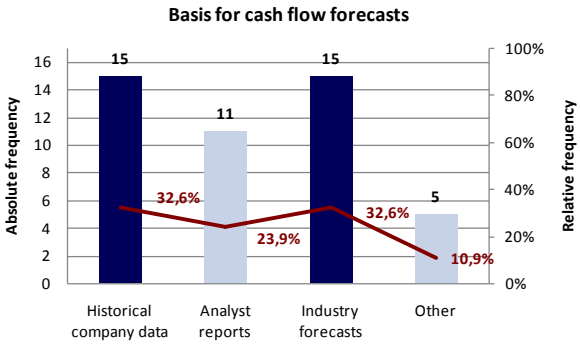
Question 1 *– How long is your average forecasting period in case of company valuations?*



As evaluated in section 3.2.4, theory suggests using the longest possible period for the detailed forecast period. Some mention a period of 10-15 years, others oppose that a period longer than 10 years is not appropriate. At least a minimum length of 3 years is claimed in textbooks. Looking at the survey results in terms of relative frequency, the last requirement is met without difficulties, as most of the surveyed companies apply an average forecasting period of 5 years (47.4%) or at least 3 years (26.3%). However, the remaining companies prefer longer periods up to ten years, yet depending on the business. Summing up, neither financial advisors nor private equity companies apply detailed planning periods of less than 3 years.

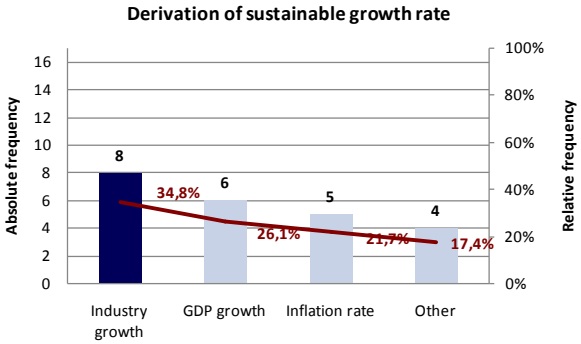
Cash flow forecasts are established on the basis of diverse sources

Question 2 *- On which basis do you establish cash flow forecasts?*



Usually, cash flow forecasts should be based on various sources of information. Besides historical company data, industry forecasts based on expert opinions as well as analyst forecasts can be helpful to estimate the future development of a company. The survey results show that the most important sources for cash flow forecasts are historical company data and industry forecasts. Analyst reports are apparently less important, probably due to the fact that they only cover quotes companies. Some of the surveyed companies additionally rely on their own forecasts carried out by their sector experts.

Industry growth is predominantly used for the sustainable growth rate

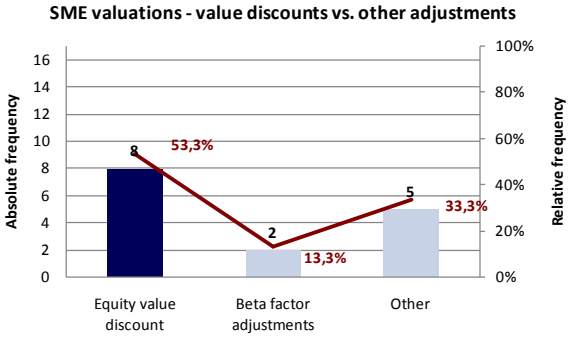


Question 3 *- Which growth rate do you assume for forecasts beyond the forecast period (growing perpetuity)?*

Possible growth rates used in the determination of the terminal value as a growing perpetuity can be derived from industry growth, the growth of the overall economy or the inflation rate - depending on the specific situation of the business to be valued. Looking at the survey results, industry growth, with a relative frequency of 34.8%, seems to have the highest impact on sustainable growth, followed by the situation of the overall economy (26.1%) and inflation (21.7%).

The discrepancy between conservative and more optimistic assumptions is not too distinctive. The surveyed UK financial advisors and private equity companies rather rely on GDP growth (60%) than on the inflation rate (0.0%), whereas more than 40% of the German (or Germany-based) companies prefer the inflation rate compared to 58.9% relying on industry growth. Nevertheless, it should be noted that the growth rate applied is likely to be more conservative by buy-side advisors and more optimistic by sell-side advisors.

Applied equity value discounts for SMEs range between 10 and 30%



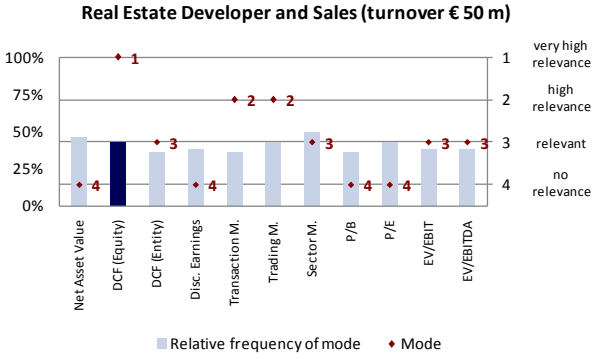
Question 4 *- Do you apply equity value discounts or other adjustments for SME valuations?*

Most of the sample companies use equity value discounts for small and medium sized entities (SMEs), ranging between 10 and 33.3% of the equity value. Others prefer discount rate adjustments including adjustments concerning the market risk premium, the beta factor.

Still, some critical explanatory notes appear regarding overall discounts on account of the company size, as they are theoretically not substantiated.

Part III: Valuation approaches for various industry sectors

Relevance of different valuation methods for various industry sectors



In this part of the survey, the relevance of different valuation methods for various industries is grouped into four different categories: very high relevance (1), high relevance (2), relevant (3) and no relevance (4). A reasonable cross-border comparison between Germany and the United Kingdom was not possible, as especially UK PE companies, which account for 40% of the responding UK companies, only partly filled in PART III of the questionnaire, because these companies mostly focus only on a few specific industries.

The net asset value should not be neglected when valuing real estate developers

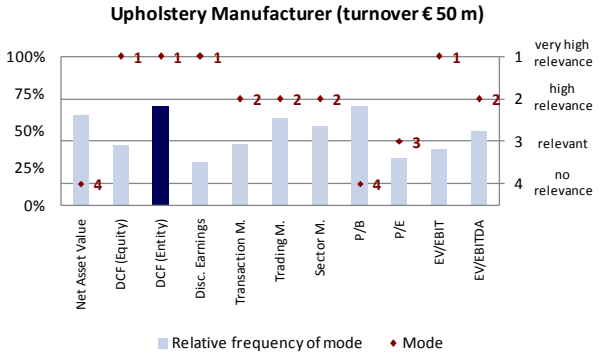
In order to evaluate a real estate developer and sales company, the equity discounted cash flow approach is preferred. With a relative frequency of 42.9%, the surveyed companies attributed a very high relevance to the DCF equity

approach (category 1). Trading and transaction multiples each achieve a mode classified as being highly relevant (category 2). Although the overall results for the net asset value and the P/B multiple offend up in category 4, both are seen ambivalent.

On the one hand, with a relative frequency of 46.7% (35.7%), the NAV (P/B) is classified as being not relevant. On the other hand, 40% (28.6%) of the participants concede the NAV (P/B) a very high relevance. As a conclusion we can say, that the NAV approach should not be neglected when valuing real estate developers. Wondrous seems the fact, that in terms the mode, entity multiples are classified higher than equity multiples, although regarding DCF, the equity approach is favoured.

The entity-DCF is the leading approach for valuing manufacturers...

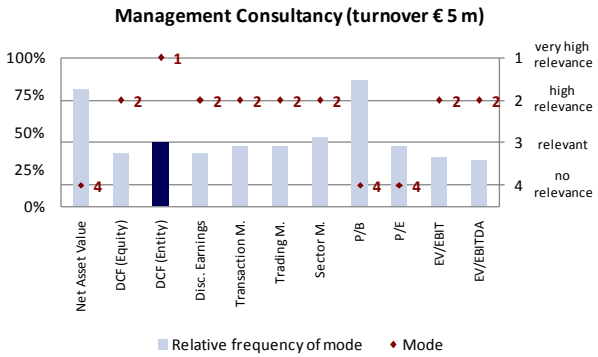
The example of an upholstery manufacturer stands for the manufacturing industry. Here, the survey results show that in practice, the entity-DCF approach is the dominant approach in valuing such 'traditional companies' (manufacturers) as the relative frequency amounts to 66.7% and an overall average classification of 1.4 is obtained.



Regarding transaction multiples, the respondent companies attest a 'very high relevance' and 'high relevance' – each with a relative frequency of 41.2%. Transaction multiples are also seen as highly relevant with relative frequency of 58.8%. Sector multiples are also commonly seen as highly relevant. Moreover, according to the preference for firm-valuation, the EV/EBIT multiple is seen as the most suitable. The net asset value is barely used in this area.

... and management consultancies as well

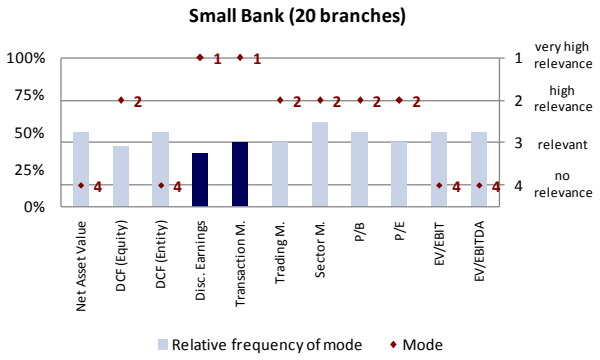
Although, regarding management consultants, the entity-discounted cash flow approach is preferred, it can be concluded that both, equity- and entity- DCF approaches are commonly used to value consultancies.



Equivalent to this preference, enterprise value multiples like the EV/EBIT and EV/EBITDA multiples are commonly applied and classified as highly relevant, whether based on transactions, trading or sector multiples. The net asset value is classified as irrelevant in practice to value consulting firms. The reason for the rejection of the asset-based approach is based on the fact that consultancies do not own a large amount of tangible assets and solely depend on intangible assets, i.e. brand name and human capital.

Banks in contrast should be valued using equity-DCF approaches

Regarding the valuation of banks in practice, equity approaches as suggested in theory are applied, and entity approaches, whether entity discounted cash flow or entity multiples, therefore neglected.



Concerning the survey results, most of the companies review the discounted earnings approach as the dominant approach to evaluate banks. Regarding the average score, the most dominant approaches used to evaluate banks are the equity- DCF approach and transaction multiples - despite their mode of 2, they both score the best average classification (1.9).

After the analysis of the individual parts and questions, the best practices are summarized in the following subsection in order to give a recommendation concerning the practical application of valuation in M&A transactions.

MANAGEMENT SUMMARY AND RECOMMENDATIONS

Recommendations based on best practice

After analysing and discussing the results of the accomplished survey, recommendations based on the majority of the responding companies' point of views are given with regards to the application of valuation methods in mergers and acquisitions. Summing up, the results of the empirical analysis, the most frequently given answers of the surveyed financial advisors and private equity companies are regarded as best practice.

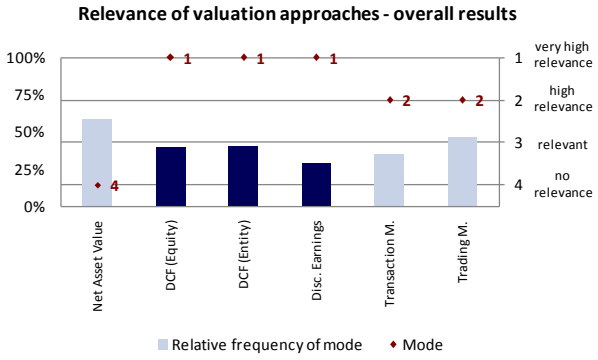
The following table summarizes the best practice approaches concerning methodology and value drivers of discounted cash flow valuation as well as their application in valuing companies belonging to different industries.

EMPIRICAL ANALYSIS - RECOMMENDATIONS	
PART / Questions on…	**Best practice / recommendations**
DETERMINATION DISCOUNT RATE / COST OF CAPITAL	
Derivation of discount rate (cost of capital)	Capital asset pricing model (CAPM)
Derivation of risk-free rate	Government Bonds with a maturity of 10 years and yield curve
Derivation of beta factor - basis	Historical beta factor
Derivation of beta factor - sources	Peer group beta
Derivation of beta factor - time periods	5 years
Derivation of market risk premium	Expert recommendations, e.g. IDW
Derivation of cost of debt	Capital market data incl. rating premium
DCF APPROACHES - METHODOLOGY	
Lenght of average forecasting period	5 years
Basis for cash flow forecasts	Historical company data and expert opinions (industry forecasts)
Derivation of sustainable growth rate	Industry growth
SME valuations - value discount vs. other adjustments	Equity value discount of approx. 10-30%
VALUATION APPROACHES FOR VARIOUS INDUSTRY SECTORS	
Real Estate Developer and Sales (turnover € 50 m)	DCF-equity approach and net asset value (NAV)
Upholstery Manufacturer (turnover € 50 m)	DCF-entity approach
Management Consultancy (turnover € 5 m)	DCF-entity approach
Small Bank (20 branches)	Equity approaches and transaction multiples

Based on the survey results, the following recommendations for valuations in M&A transactions are given.

Regarding discounted cash flow valuation, cash flows should be forecasted for at least three to five years, based on historical data (historical company data) as well as future prospects, i.e. industry forecasts given by experts (expert opinions). After the explicit forecast period, a sustainable growth rate based on industry growth should be used.

In order to determine the discount rate, there is no way around the application of the capital asset pricing model (CAPM). As an equivalent for the risk-free rate, government bonds with a maturity of ten years are preferred; alternatively a risk-free rate derived from the yield curve can be applied. In order to estimate the beta factor, historical peer group factors are appropriate, calculated over period of five years. Most of the practitioners rely on expert opinions (e.g. IDW) in order to assess the market risk premium. The cost of debt should be recalculated by considering capital market data and the company's individual rating of the valuation object.



The relevance of the individual valuation approaches differ. The net asset value (NAV) as an asset-based approach has no relevance in most instances. With an overall relative frequency of 58.6% and using the mode, the net asset value is classified in total as not relevant. Compared to the NAV, the overall mode for the discounted cash flow approaches is 1, implying that all DCF approaches are seen as highly relevant. Multiples, whether trading or transaction, in contrast, score an overall mode of 2 and are, therefore generally classified as being relevant.

To conclude, the discounted cash flow approaches can be seen as the principal and dominant methods for valuing businesses in mergers and acquisitions. Nevertheless, multiples are also highly relevant and can be especially used for monitoring and controlling discounted cash flow results.

There is no way around DCF - Multiples should be used for monitoring and controlling DCF results

CONCLUSION

The main objective of this survey was to analyse the application of valuation methods in M&A transactions applied by financial advisors and private equity companies in international practice through an empirical analysis.

The survey focused on the major inputs and issues of discounted cash flow valuation, inter alia discount rate, forecasting and terminal value issues, and the suitability of various existing valuation models for different industries.

Generally it is suggested by theory to apply the capital asset pricing model in order to derive the cost of equity and accordingly the cost of capital. Although the existing critique on the part of theory concerning the empiricism and validity of this asset pricing model, the capital asset pricing is predominantly used in practice due to its simplicity and traceability compared to competing asset pricing models like the arbitrage pricing theory and the Fama-French three factor

model. The variables of the capital asset pricing model are nevertheless derived differently in practice. Additionally, other inputs of discounted cash flow valuation, e.g. length of the average forecasting period, derivation of the sustainable growth rate, the basis of cash flow forecasts and possibly value discounts in small and medium entity-valuations also vary.

Moreover, regarding the relevance of the individual approaches for different industry sectors, whether absolute or relative valuation, differences were identified. The survey notwithstanding confirms the requested application of discounted cash flow approaches on the part of theory in practical application. Nevertheless, the popularity of multiples is obvious as they are especially used for monitoring and controlling discounted cash flow results.

The covered topic and content lead to the discussion whether business valuation is more an art than science. With regard to theory and practical implementation, both features appear.

Multiples and DCF are both well established in practice

Valuations are performed using various methods, inter alia discounted cash flow approaches and relative valuation. The discounted cash flow approaches are derived from theoretical frameworks and based on fundamental principles of finance like risk-return and present value mechanics or time value of money – discounted cash flow valuation thus is certainly a science. Although relative valuation in theory is seen very conflicting, multiples like DCF valuation are both well established in practice.

DCF approaches are based on a strong theoretical framework but leave plenty of room for subjective judgements in practical application

Discounted cash flow valuation not only includes a theoretical framework, but also needs reliable inputs. In order to carry out a business valuation, a clear picture of the company, and several assumptions have to be made, including the derivation of a discount rate, forecasting and terminal value issues. Discounted cash flow valuation relies on quantitative models and thus at first view seems objective. Nevertheless, the inputs of discounted cash flow approaches leave plenty of room for subjective judgments in practice as theory does not give clear answers on the application in practice. The conclusion therefore is that despite the fact that discounted cash flow valuation is based on a strong theoretical framework, the application in practice is not standardized with regard to the requires inputs. As the application in practice varies, due to the different involved judgements on required inputs of discounted cash flow valuation, valuation seems to be more art than science.

Concluding, the best practice recommendations developed above brought some light into the diversity of applied application in mergers and acquisitions. The more practitioners follow these best practices, the less valuation seems subjective and thus the objectivity required by theory is advanced and thus can be likewise attained in practical application.

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Internet: ISSN 2190-8451