UNIVERSIDADE CATÓLICA PORTUGUESA

Valuation Methodologies.

A Case-Study

Beatriz Isabel Pacheco Damião

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A Case-Study

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Beatriz Isabel Pacheco Damião

under the guidance of
Professor Doutor Luís Pedro Krug Pacheco

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Abstract

This paper titled "Valuation Methodologies. A Case-Study" explores valuation approaches used in the business context, focusing on a specific practical case, addressed in the context of a curricular internship at the company *Triple A - Capital & Finance*, based in Porto, Portugal. The research analyzes methods such as Discounted Cash Flow (DCF) analysis, Multiples analysis and Options Analysis (admittedly, the less commonly used), highlighting their limitations and strengths. By studying the methodologies and applying the most appropriate ones to the practical case of the company in question (ABC, Inc.), the study seeks bases to support its intrinsic value and the impact of external factors such as the current war situation in the Middle East and the rise in inflation and interest rates. Conclusions derived from the comparison of the approaches suggest, in this specific case, considering the company used and its financial data, an effective complementarity between DCF and Multiples analysis, providing a comprehensive valuation for the company in question. This research tries not only to contribute to the understanding of valuation methodologies but also to offer relevant practical applications for the business world.

Keywords: Valuation, Companies, Methodologies, Discounted Cash Flow, Multiples, Case-Study.

Resumo

O presente trabalho, intitulado "Metodologias de Avaliação. Um Caso de Estudo" explora abordagens de avaliação utilizadas no contexto empresarial, centrando-se num caso prático específico, abordado no âmbito de um estágio curricular na empresa *Triple A - Capital & Finance*, sediada no Porto, Portugal. A investigação analisa métodos como o Fluxo de Caixa Descontados (FCD), a análise de Múltiplos e a Análise de Opções (reconhecidamente, a menos utilizada), destacando as suas limitações e os seus pontos fortes. Ao estudar as metodologias e aplicar as mais adequadas ao caso prático da empresa em questão (ABC, Inc.), o estudo procura bases para fundamentar o seu valor intrínseco e o impacto de factores externos como, por exemplo, a atual situação de guerra no Médio Oriente e a subida da inflação e das taxas de juro. As conclusões derivadas da comparação das abordagens sugerem, neste caso específico, considerando a empresa utilizada e os seus dados financeiros, uma complementaridade efectiva entre o FCD e a análise de Múltiplos, proporcionando uma avaliação abrangente da empresa em questão. Esta investigação procura não só contribuir para a compreensão das metodologias de avaliação, mas também oferecer aplicações práticas relevantes para o mundo empresarial.

Palavras-chave: Avaliação, Empresas, Metodologias, Fluxo de Caixa Descontados, Múltiplos, Caso Prático.

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List of Abbreviations and Acronyms

DCF – Discounted Cash Flow Method

IPO – Initial Public Offerings

EVA – Economic Value Added

NPV – Net Present Value

CF – Cash Flow

TV – Terminal Value

WACC – Weighted Average Cost of Capital

FCF – Free Cash Flow

FCFF – Free Cash Flow to Firm

FCFE – Free Cash Flow to Equity

NWC – Net Working Capital

CAPEX – Capital Expenditure

EBIT – Earnings Before Interest and Taxes

EBITDA – Earnings Before Interest, Taxes, Depreciation and Amortization

CAPM – Capital Asset Pricing Model

APV – Adjusted Present Value

ECF – Equity Cash Flow

CCF – Capital Cash Flow

ITS – Interest Tax Shields

CMVM – "Comissão do Mercado de Valores Mobiliários" (Portuguese Securities Exchange Commission)

ECB – European Central Bank

EU – European Union

AIMMAP - Associação dos Industriais Metalúrgicos Metalomecânicos e Afins de Portugal

Chapter 1
Introduction

Valuing companies is an essential part of the financial world, offering valuable insights for investors, managers, and stakeholders. Among the many valuation methodologies existing, the Discounted Cash Flow (DCF) and Multiples analysis are widely recognized and used.

The DCF method computes the current value of a company's future cash flows, considering the time value of money and applying an appropriate discount rate. This methodology offers a comprehensive view of a company's financial status by considering factors like projected growth, cost of capital, and industry-specific risks.

On the other hand, the Multiples analysis compares a company to its competitors or the market itself using metrics like, for example, the Enterprise Value to EBITDA ratio (EV/EBITDA). Also known as the Relative Valuation, it helps identify valuation differences and assess a company's performance within its industry, serving as a valuable supplement to other valuation techniques.

This study will begin by exploring both methods above mentioned and will address a less common method for company valuation, the Option-Pricing Analysis. By studying their strengths, limitations, and practical applications, it is achieved a more comprehensive understanding of how these tools can be used together to perform a detailed and informed valuation of companies.

Additionally, a study case will be presented to apply the two main methods to a specific situation, providing an opportunity for detailed analysis, exploring the nuances and challenges associated with applying these techniques, considering factors such as cash flow projections, choice of discount rates, and careful selection of relevant multiples. This practical approach will not only boost

the theoretical understanding of valuation methods but also enable a contextualized analysis of the difficulties faced in real-world company valuation, like for example the current economic situation with the Middle East war and the increase in inflation and interest rates.

In conclusion, after analyzing and comparing the results of the two main methodologies employed when valuing the company in the case study, considering their limitations and strengths, it is evident that the DCF valuation approach and the multiples analysis played complementary and valuable roles in this case. Despite the complexities of the economic landscape, these methodologies provided crucial insights into understanding the company's value. The synergy between the approaches stood out, providing a comprehensive perspective that significantly contributed to achieving the valuation's objectives. This combination of methods allowed for a more robust analysis, reinforcing confidence in the conclusions reached.

Chapter 2
Literature Review

2.1. The Valuation Concept

To begin with, it is important to understand what company valuation entails.

To do that, it is crucial to distinguish Price and Value. In Fernandez's (2023) and Damodaran (2019) perspective, price refers to the settled amount between the purchaser and seller during a company sale, which is subjective by demand and supply dynamics and other elements like production costs, resource availability, market reaction, and current trends. On the other hand, value covers a wider range of components such as cash flows, growth forecasts, and risk levels.

Company Valuation is the process of computing the fair value (or financial/economic worth) of a business based on different financial and non-financial factors, such as, for example, cash flows, risk, market conditions and comparable assets. It is conducted to estimate the worth of a company for various purposes, incorporating mergers and acquisitions, IPO, internal decision-making, investment assessment and financial reporting (Fernandez, 2023).

Valuation plays an indispensable role in the finance field. Accurate and trustworthy valuation is essential for investors, analysts, and financial professionals to assess the fair value of a company, identify investment opportunities, and make informed investment decisions. (Damodaran, 2015).

Koller et al. (2020) states that valuation supplements value in a company, which promotes its success because it generates actual financial value for shareholders. When managers put shareholder value first, their companies grow stronger and create more jobs, higher living standards, and stronger economies.

2.2. Valuation Methodologies

Analysts utilize a wide-ranging choice of techniques, from the most basic to the most advanced, where they share some features and can be grouped more broadly, although they often rely on different assumptions about the underlying factors that influence value (Damodaran, 2015). This means that the company's true value is not objectively determined. In fact, it is the outcome of different assessment approaches, leading to a range of the fair value of the company being evaluated (Schmidlin, 2014).

Fernandez (2023) recognized six categories in business valuation methods, highlighting that there are different perspectives to determine the value of a company. The methods associated with the balance sheet, such as Book Value and Adjusted Book Value, focus on the recorded assets and liabilities. Income Statement valuation utilizes multiples such as P/E, EV/EBITDA, and EV/Sales ratio, while DCF, such as Free Cash Flow and Cash Flow to Equity, seek to quantify the present value of future cash flows. Value creation is addressed through metrics like EVA and Economic Profit, while Option Valuation employs methods like Black-Scholes to price financial options. This diversity reflects the inherent complexity in business valuation, where different methodologies are applied based on the nature and specific objectives of each valuation.

It is important to acknowledge that there is no singular universally applicable method for valuation (Schmidlin, 2014). However, according to many authors such as Kaplan and Ruback (1995), Fernandez (2023), Fang(2023) and Koller et al. (2020) the most commonly used methodology to measure the core value of a business is the Discounted Cash Flow (DCF) method, where it assumes that the value of the company is the present value of the future cash flows, discounting it at a rate that reflects its cash flows risk. Other technique is the Relative Valuation, also called the Market Multiples valuation, which involves comparing a firm's

financial metrics to similar firms to assess its relative market value (Fang, 2023). Finally, Koller et al. (2020) highlights the Real Option Analysis, that is characterized by its flexibility, arguing that investor behaviour and cash flows may undergo changes according to the market.

2.2.1. Discounted Cash Flow Method

The Discounted Cash Flow (DCF) technique is a way to assess a company's value by calculating the present value of its expected future cash flows. Basically, it considers the projected cash flows and the appropriate discount rate to determine the company's Equity and Enterprise Value (Schmidlin, 2014).

In the sixties and seventies of 20th century, the DCF method emerged as a prominent valuation model. Kaplan and Ruback (1995) acknowledged its dominance, a sentiment that continues to be shared by contemporary authors such as Fernandez (2023) and Fang (2023). The firm's value is predominantly dependent on the application of discount rates to cash flows, following the framework established by Schmidlin (2014):

$$V = \sum_{t=1}^{n} \frac{CF_t}{(1+r)^t}$$

Where:

- V = firm's market value at the time of valuation;
- CF_t = cash flow generated in period *t;*
- r = risk adjusted discount rate;
- n = number of years of the forecasting period.

In this methodology, Koller et al. (2020) states that, in the DCF, an examination of the company's historical performance is conducted, normally about 2-3 years and, taking that into consideration, it is projected the future cash flows for a period of 5-10 years (Schmidlin, 2014), known as the "forecasting period" (n), because of the potentially high or unlimited economic life of the company. However, considering the stability of cash flows at the conclusion of this period, a Terminal Value is estimated under the assumption of steady-state conditions. Therefore, each of the cash flow discounting-based methods start with the subsequent expression (Fernandez, 2023):

$$V = \sum_{t=1}^{n} \frac{CF_t}{(1+r)^t} + \frac{TV_n}{(1+r)^n}$$

Where:

- TV_n = Terminal Value of the company at the conclusion of the forecasting period (n).

The various approaches of the DCF method are distinguished based on the specific cash flow used and the applicable discount rates. Still, all methods are supposed to yield identical outcomes, at least in principle (Schmidlin, 2014).

To understand and explore the different techniques when valuing assets based on cash flow discounting, it is vital to first establish the specific categories of cash flow that can be utilized in the valuation process. These categories include free cash flow, equity cash flow, and debt cash flow (Fernandez, 2023).

The following chart provides a visual representation of the various CF, along with the respective discount rates linked to each and a small description for better understanding.

Relevant Cash Flow	Appropriate Discount Rate	Description
Free Cash Flow (FCF)	Weighted average cost of capital (WACC)	Characterizes the cash flow available to all capital providers, including shareholders and creditors.
Equity Cash Flow (ECF)	Required return to equity (K_e)	Emphases on the available cash flow for the shareholders (or equity holders) of the company.
Debt Cash Flow (CFd)	Required return to debt (K_d)	Centers on the cash flow available for servicing debt, which includes interest payments and principal repayments.

Table 1: *Different CF and the suitable discount rates for each flow. Source: Fernandez (2023)*

Schmidlin (2019) and Fernandez (2023) outline four main methodologies utilized in the discounted cash flow valuation approach: the Free Cash Flow (Entity Method), APV, Equity Cash Flow (Equity method) and the Capital Cash Flow.

I. Free Cash Flow (FCF) or Entity Method

Also known by Schmidlin (2014) as the Entity Approach, the FCF illustrates the sustainable cash flow that is produced while upholding the operational scale and production capacity of the company (Fang, 2023). Basically, it means the operating cash flow, commonly referred to as the cash flow generated by operations, without taking into consideration borrowing (financial debt) and taxes. This cash flow denotes the sum accessible for distribution to shareholders in the absence of debt. It considers the resources that can be allocated after meeting fixed asset investment and working capital needs, presuming the non-existence of debt and, consequently, financial costs (Fernandez, 2023).

According to Damodaran (2015), there are two types of cash flows used in the FCF, the Free Cash Flow to the Firm (FCFF) and the Free Cash Flow to Equity

(FCFE). The FCFF represents the cash flow available to both debt and equity holders, whereas the FCFE is exclusively accessible to equity holders. By utilizing the FCFF, one can determine the enterprise value of the company, while the FCFE provides insights into the equity value. Given that acquirers typically assume all liabilities, including debt and equity, the FCFF approach holds greater relevance for this project.

Basically, it is calculated as follows:

$$FCFF = EBIT\ (1 - T)\ +\ Depreciation\ -\ (\Delta NWC\ +\ CAPEX)$$

i) The Weighted Average Cost of Capital (WACC)

Koller et al. (2020) affirms that the FCF requires the application of the weighted average cost of capital, also after tax, to discount all future FCFs to calculate their NPVs. The WACC is a measure of the company's financing cost, considering the expected return demanded by both lenders and investors, which can be expressed as follows:

$$WACC = w_e \times r_e\ +\ w_d \times r_d\ \times\ (1\ -\ T)$$

Where:

- w_d = Weight of Debt
- r_d = Cost of Debt
- w_e = Weight of Equity
- r_e = Cost of Equity
- T = Tax Rate

ii) Cost of Equity

Koller et al. (2020), Kaplan & Ruback (1995) and Damodaran (2015) refer that the cost of equity (r_e) can determined from an appropriate model, such as the Capital Asset Pricing Model (CAPM) with the following formula:

$$r_e = r_f + \beta(r_m - r_f)$$

Where:

- r_f = risk free rate, normally based on the yield of a government bond with virtually no default risk;
- β = firm's unlevered beta (systematic risk), which measures its sensitivity to market movements;
- r_m = expected return on the whole market.

The part "$(r_m - r_f)$" is the market risk premium, which means the additional return expected by investors for assuming the systematic risk linked to investing in the overall market, exceeding the risk-free rate (Kaplan & Ruback, 1995).

II. Adjusted Present Value (APV)[1]

Schmidlin (2014) highlights that the APV method is a variation of the FCF approach, considering cash flows related to all sources of capital. The key difference between these methodologies is the treatment of debt tax benefits, where the entity approach includes tax advantages by factoring in the tax rate within the WACC formula, while the APV method computes the tax benefit independently from the firm's intrinsic value.

[1] To explore this subject further, one can consult the 7th edition of "*Valuation: Measuring and Managing the Value of Companies*" by Koller, T., Goedhart, M., & Wessels, D. (2020), which was published by John Wiley & Sons.

This is an alternative model within the DCF model family (such as the compressed APV), but it will not be applied in this study.

III. Equity Cash Flow (ECF) or Equity Method[2]

According to Koller et al. (2020), the Equity Cash Flow model measures the value of equity by discounting cash flows that are specifically related to equity, rather than considering the Weighted Average Cost of Capital (WACC). Nevertheless, accurately implementing this method can be quite challenging due to the incorporation of capital structure within the cash flow, which adds to the difficulty of forecasting. However, for companies engaged in financing activities, such as financial institutions, the Equity Method is considered appropriate and applicable.

This can be expressed as follows, stated by Fernandez (2023):

$$ECF = FCF - [interest\ payments \times (1 - T)] - principal\ repayments + new\ debt$$

Restating the equity cash flow involves assessing the value of a company's equity (E) and subsequently utilizing the suitable discount rate, referred to as the required return to equity (r_e). To compute the overall value of the company, it is necessary to calculate the sum of the existing debt (D) and the equity value (E) (Fernandez, 2023).

[2] To explore this subject further, one can consult the 7th edition of "*Valuation: Measuring and Managing the Value of Companies*" by Koller, T., Goedhart, M., & Wessels, D. (2020), which was published by John Wiley & Sons.

IV. Capital Cash Flow(CCF)[3]

The Capital Cash Flow (CCF) method includes all cash flows, including interest tax shields, that are available to capital providers, in contrasts with the free cash flow (FCF) method, which does not consider them. The inclusion of interest tax shields in the CCF method results in a reduction of taxable income, leading to a decrease in taxes and ultimately an increase in after-tax cash flows. In essence, CCFs can be calculated by adding FCFs to the interest tax shields (ITS) (Ruback, 2002).

According to Koller et al. (2020), it can be computed as follows:

$$V = NPV(CCF) = \sum_{t=1}^{n} \frac{FCF_t}{(1+k_e)^t} + \frac{ITS_t}{(1+k_e)^n}$$

Furthermore, the CCF is determined by combining the Debt Cash Flow and Equity Cash Flow, where the Debt component consisting of interest payments and principal repayments. Therefore, the CCF can be expressed as follows (Fernandez, 2023):

$$CCF = ECF + DCF = ECF + I - \Delta D$$

Where:

$$I = D \times K_d$$

The FCF and CCF methods handle interest tax shields differently, the FCF method requires re-estimating the after-tax WACC every period, as it depends on value-weights and the firm's value needs to be estimated simultaneously. The

[3] To explore this subject further, one can consult the 7th edition of "*Valuation: Measuring and Managing the Value of Companies*" by Koller, T., Goedhart, M., & Wessels, D. (2020), which was published by John Wiley & Sons.

CCF method is particularly useful for valuing highly leveraged firms with varying capital structures (Ruback, 2002).

However, for Koller et al. (2020), this valuation combines the free cash flow and the interest tax shield into a single metric, which makes it more challenging when comparing the performance of companies and tracking it over time.

2.3.1.2. Conclusions and Limitations

As we can see, FCF, APV, ECF and CCF are all intertwined. The labeling of the distinct techniques is based on the nature of the cash flow employed and the discount rates. Nevertheless, in theory, all the methods yield identical outcomes (Schmidlin, 2014).

Despite being the most used and precise method based on financial data, the Discounted Cash Flow (DCF) method has limitations. It requires more data, analytical skills and subjective presumptions that impact accuracy. Also, computing future dividends, cash flows, and discount rates is challenging, making it not suitable for short-term transaction pricing or quick response to market movements (Fang, 2023).

Fernandez (2023) identified common errors in valuations in his life, including mistakes in discount rate determination, misjudging risk level, inaccurate cash flow projections, errors in terminal value determination, inconsistencies, conceptual errors, and misinterpretations of valuation. Examples include using incorrect risk-free rates, overestimating cash flows due to excessive optimism, and conducting valuations without verifying client forecasts.

However, Koller et al. (2020) suggest that Enterprise DCF (FCF) is still widely preferred by both practitioners and academics due to its reliance on cash flow rather than accounting-based earnings, which can be deceptive. This approach is best for projects, business units, and firms that maintain a specific capital structure. This way, it will be used in the case study on the next chapter. APV

models provides clearer insight into the impact of changing capital structure compared to WACC-based models. However, CCF and ECF valuation models incorporate operational performance and capital structure into cash flow analysis but can have implementation errors. Therefore, these last models are not going to be used in the present case study and normally are avoided except in the case of financial institutions, where capital structure is part of operations.

2.3.2. Relative Valuation

The Relative Valuation uses similar companies, by achieving their valuation criteria or multiples, and determining the target company's valuation grounded on these pointers(Fang, 2023).

According to Kaplan (1995), this system, also known as the Multiples Method, relies on two hypotheticals, that the companies used for comparison have to have analogous upcoming cash flow expectations and threats as the establishment being estimated, and that the chosen performance measure is commensurable to value. If these are indeed factual, it can give a more precise measure of value by incorporating market prospects of future cash flows and discount rates.

Additionally, according to Damodoran (2015), is easier to understand and present to clients and customers.

Koller et al. (2020) states that, when done precisely, this type of analysis has the potential to assess the credibility of cash flow expectations, clarify discrepancies between a corporation's achievements and those of its rivals, and facilitate constructive dialogues regarding the company's strategic advantage over other players in the industry. Therefore, this method it is generally used to supplement the values achieved through the DCF technique (Schmidlin, 2014).

2.3.2.1. Types of Multiples

I. Price-to-Earnings (P/E)[4]

One of the most widely used multiples, the P/E ratio is determined by dividing the market value of a firm's stock by the net earnings of the company, as stated by Fang (2023) and Schmidlin (2014).

Fang (2023) elucidates that the metric represents the market's anticipation of a firm's profits. In other words, the firm's value takes in consideration the market's assessment of its profit/earnings potential.

Koller et al. (2020) found two limitations with this multiple. The first is that the capital structure of the company can affect the ratio. The second is that net income includes nonoperating gains and losses, which can artificially inflate the P/E ratio.

Another drawback of this method, as highlighted by Fang (2023), is its inapplicability when a company's earnings or projected earnings are negative. Additionally, this approach solely relies on short-term income as a parameter, failing to capture the actual value generated through the company's growth. To illustrate this point, let's consider two companies with identical earnings. However, if one company experiences a higher growth rate than the other, using the P/E ratio would inaccurately imply that both companies have an equal market value. Clearly, such an interpretation lacks logical consistency. Consequently, this particular multiple will not be utilized in the present study.

II. Enterprise Value-to-EBITDA (EV/EBITDA)

The EV/EBITDA is computed by dividing the Enterprise Value (EV) by Earnings Before Interest, Taxes, Depreciation and Amortization (EBITDA), which refers to the profit before subtracting interest, income tax, depreciation, and

[4] For a more in-depth analysis of this topic, refer to the latest edition of "Valuation: Measuring and Managing the Value of Companies" authored by Koller, T., Goedhart, M., & Wessels, D. (2020) and published by John Wiley & Sons.

amortization, while enterprise value represents the market worth of all capital invested in the business (Fang, 2023).

Damodoran (2015) states that, when acquiring a business, rather than solely the equity, it is common to value the firm based on an EBITDA multiple. As a buyer of either the equity or the entire firm, a lower multiple is preferable to a higher one. The growth potential and risk associated with the acquired business will influence these multiples.

$$Company\ Equity\ Value^{5} = (Comparable\ Company\ \frac{EV}{EBITDA}) \times Company\ EBITDA - Debt\ Value$$

Fang (2023) argues that using EV/EBITDA for business valuation yields more consistent outcomes across various markets when compared to P/E ratio. This is mainly since EV/EBITDA is not influenced by factors like capital structure, leverage, depreciation and amortization methods, income tax rates, and other variables. Nevertheless, despite its complexity, it is crucial to highlight that EV/EBITDA does not have the ability to predict a company's future growth, unlike P/E ratio. The present study will employ this metric for analysis purposes.

III. Enterprise Value-to-Sales (EV/Sales)

The EV/Sales ratio, as defined by Fernandez (2023), is employed in certain sectors to determine a company's worth, which involves multiplying the company's sales by a specific factor to arrive at its value.

The initial perception may seem contradictory, as the overall sales volume does not necessarily indicate a business's profitability. Even with substantial

[5] The non-operating assets could be added up and the minority interests could be deducted.

sales figures, a company can still suffer financial losses. However, this ratio is a suitable and commonly used valuation metric since sales are less prone to manipulation in accounting compared to other financial indicators and because this ratio can be employed to assess businesses that are experiencing net losses. It is important to highlight that the valuation of such businesses can only be conducted when future profits are anticipated (Schmidlin, 2014). As a result, this multiple will also be utilized in the subsequent case study.

$Company\ Equity\ Value$[6]

$$= (Comparable\ Company\ \frac{EV}{Sales}) \times Company\ Sales\ -\ Debt\ Value$$

IV. Price-to-Book Value (P/B)[7]

Damodaran (2015) highlighted that investors typically consider the connection between the market's view of equity value and the book value of equity (or net worth) when assessing the value of a stock. This link, known as the price/book value ratio, can vary greatly across sectors due to disparities in growth potential and investment quality. In valuing businesses, this ratio is determined by examining the firm's value and the book value of all capital, rather than focusing solely on equity.

According to Schmidlin (2014), this ratio reveals the premium that the market is willing to pay for a company's net assets, specifically its book value or equity per share. Although it may initially appear illogical to pay more for a business than it's worth in assets minus liabilities, the stock market typically assumes that the business will continue operating and grow. Consequently, some businesses

[6] The non-operating assets could be added up and the minority interests could be deducted.
[7] For a more in-depth analysis of this topic, refer to the latest edition of "Valuation: Measuring and Managing the Value of Companies" authored by Koller, T., Goedhart, M., & Wessels, D. (2020) and published by John Wiley & Sons.

trade at a premium to their book value, while others trade at a discount based on future prospects. This ratio will not be used in the study case.

2.3.2.2. Conclusions and Limitations

According to Fang (2023) and other authors like Damodaran (2015) and Koller et al. (2020), the most widely used, appropriate and intuitive valuation method in a scenario of consistent performance is the price-earnings ratio (P/E) relative valuation approach. However, when valuing firms, the best multiples are the one including the EV (Enterprise Value), meaning the EV/EBITDA and the EV/Sales multiples, being the ones that are going to be used in the study case later.

However, Schmidlin (2014) highlights several drawbacks associated with valuation multiples. Firstly, the lack of specificity arises from the reliance on averaging multiples from a peer group, which fails to account for companies with unique business models. The limited applicability of multiples is evident when they are not suitable for companies with those features or unique economic characteristics, which restricts the usefulness of multiples in such cases. Additionally, the valuation of the entire comparison group may be incorrect, leading to inaccuracies in the valuation of the target company. Furthermore, questionable comparisons may arise when companies with diverse business areas, volumes, and regional characteristics are compared.

Koller et al. (2020) highlight the importance the Multiples analysis for validating DCF forecasts, understanding industry value drivers and should not be seen as a shortcut, but rather approached with the same diligence as DCF analysis for a comprehensive and accurate valuation process.

2.3.3. Option-Pricing Analysis[8]

Luehrman (1997) compares an opportunity to an option in finance, emphasizing that both provide certain rights without imposing obligations. In finance, an option provides the holder with the privilege to purchase or sell an asset at a prearranged price during a designated period. For example, a call option on a stock allows the holder to purchase the stock for a certain value within the next year, even if its current value is below that. This option retains value because it remains valid for a year, during which the stock price may increase. Similarly, corporate opportunities function in a comparable way, where validating a concept is similar to the stock price rising and deciding to invest is equivalent to exercising the option. Additionally, Damodaran (2005) explains that a put option enables the holder to sell the underlying asset at a predetermined price, known as the strike or exercise price, before the option's expiration date.

Fernandez (2023) and Luehrman (1997) argue that traditional approaches to discounting future cash flows are insufficient for assessing the value of projects involving future flexibility. While option valuation is suggested as a more effective method for dealing with uncertainties, the complexities of actual businesses go beyond the basic concepts of options.

Damodaran (2005) emphasizes that the Real Options approach stands out due to its distinctive ability to acknowledge the potential for favorable outcomes in

[8] To explore this subject further, consult the following references:
7th edition of "*Valuation: Measuring and Managing the Value of Companies*" by Koller, T., Goedhart, M., & Wessels, D. (2020), which was published by John Wiley & Sons.
"Valuing Real Options: Frequently Made Errors" by Fernandez, P. (2023).
"The Promise and Peril of Real Options" by Damodaran, A. (2005).

the face of risk. This approach suggests that uncertainty can actually generate additional value for those who possess the capability to exploit it.

Furthermore, Damodaran (2005) argues that equity can be perceived as a call option on the firm, implying that it retains value even if the firm's worth is lower than its obligations. Antill and Lee (2008) provide an illustrative example of this phenomenon through an underdeveloped oilfield. Despite exhibiting a negative net present value based on prevailing oil prices, the oilfield still possesses market value remaining to the likelihood of future price escalations.

The lack of emphasis on option pricing, except in cases of near insolvency, is due to several factors. When a company's asset value exceeds its debt value, intrinsic valuation suffices. Real options are more significant in extreme circumstances, not for established companies. Skepticism exists about applying option pricing models to real assets, but this does not invalidate contingent claims principles. Further research may be necessary for satisfactory results (Antill & Lee, 2008).

Managerial flexibility greatly impacts business value by allowing managers to adjust investment decisions based on changing conditions. Standard discounted cash flow (DCF) analysis fails to consider this flexibility. Koller et al. (2020) identify different forms of flexibility, such as postponing, extending, reducing, discarding, or alternating between projects.

However, Antill & Lee (2008) emphasize that assessing the value of this financial instrument requires exceptional expertise. Therefore, for stable firms, option valuation methods may not be the best choice, as alternative methods are easier to use.

Due to these reasons, the Option Pricing Analysis will not be conducted in the study case of this project.

Chapter 3
Data and Methodology

This current research utilizes a Case Study approach, focusing on a specific example observed and worked on during the internship at *Triple A - Capital & Finance*. To adhere to the company strict confidentiality policy, certain data had to be modified for the case study application. This included altering details such as the company's name, date of establishment, shareholders, and specific values, to uphold the company's code of conduct.

The financial valuation is based on the Discounted Cash Flow (DCF) model, using the Free Cash Flow to the Firm, considering future projections and providing a long-term perspective for the analysis. Additionally, a multiples analysis will be conducted as a supplement to the DCF, further enhancing the reasoning.

The choice of the study case for this thesis was based on work done during the internship and with specific criteria, considering the sector of activity and the size of the company.

The methodology is based on data from both internal and external sources, including financial reports, industry data, and relevant information about the local economy. This diversity of sources aims to ensure a comprehensive and robust analysis.

Triple A - Capital & Finance and its consultants do not hold any responsibility for the decisions made and executed by the ABC Administration during this process. The company solely offers solutions based on the information provided, assuming it to be accurate and reflective of the company's situation.

All decisions made or not by the company ABC or its responsible parties are up to them independently and voluntarily.

Case Study – Company ABC

During the internship period it is used a system “past-present-future” that permeated all facets of our work, providing a more comprehensive and profound understanding of the company in question. Through this lens, we were able to conduct a more thorough and informed analysis. Following this line of thinking, the work begins with the purpose of the analysis, followed by a macroeconomic and sectoral framework, providing a solid contextual understanding. Subsequently, the attention is directed to a deep analysis of the company, exploring its strengths and current challenges, by performing a SWOT analysis. Next, we turned to the future prospects of the company, anticipating imminent changes and opportunities. We proceeded with a review of historical financial information, identifying crucial trends for a more accurate valuation. Finally, we concluded the process with a comprehensive quantitative assessment, consolidating our findings and insights to provide a holistic view of the company.

Analysis Purpose

The purpose of this analysis is to provide the administrators of an investment management firm with a comprehensive valuation of their subsidiary company, ABC, Inc. This report must be conducted quarterly in order to adhere to the legal obligations set forth by the “Comissão do Mercado de Valores Mobiliários” (CMVM). Therefore, this valuation refers to December 2023. The valuation aims to offer a detailed analysis of the subsidiary's financial performance, operational efficiency, and overall market position. By conducting this valuation, the

administrators can gather valuable insights and data to present and justify a true valuation of ABC, Inc.

Macroeconomic and Sector Framework

(i) Macroeconomic Framework

Uncertainty is the primary element that characterizes the macroeconomic scenario, both in Portugal and in the rest of the world. The pandemic in 2020 caused a major economic restructuring worldwide, including in Portugal. Governments had to adjust monetary and budgetary policies due to the unprecedented decline in economic activity. However, in 2021, there was a recovery in economic activity thanks to progress in vaccination. Currently in 2023, the impact of the pandemic is diminishing due to vaccination and general immunity. However, conflicts in Ukraine and the Middle East have led to increased prices of energy goods and raw materials, affecting production costs. This has resulted in lower profits for companies and less money for consumers to spend on other goods and services. Central Banks have increased interest rates to combat high inflation caused by the price increases.

According to the Bank of Portugal, the Portuguese economy is expected to surpass the euro area economy by 2025 through sustainable growth driven by exports and investment (Figure 1). The ECB predicts slow growth for the euro area in the remainder of 2023 due to stricter financing conditions and weak external demand. Prices are expected to continue rising, although at a slower pace, reaching close to 2% in 2025, mainly driven by energy and food prices (Figure 2). The ECB expects inflation to decrease in the next two years as cost pressures ease and their monetary policy measures take effect. Increasing interest rates will help control price increases and protect household purchasing power.

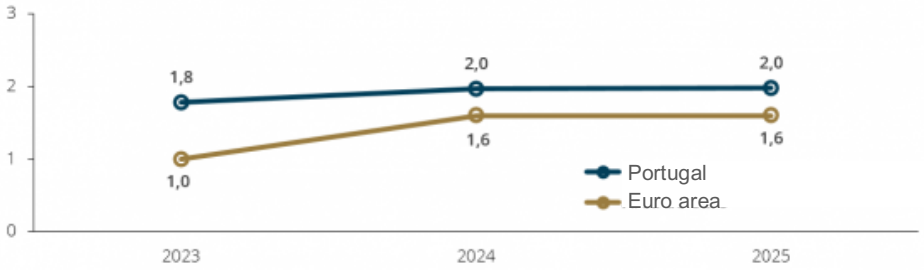

Figure 1: *Gross Domestic Product in Portugal and in the Euro area (annual variation in %). Source: Banco de Portugal (march, 2023)*

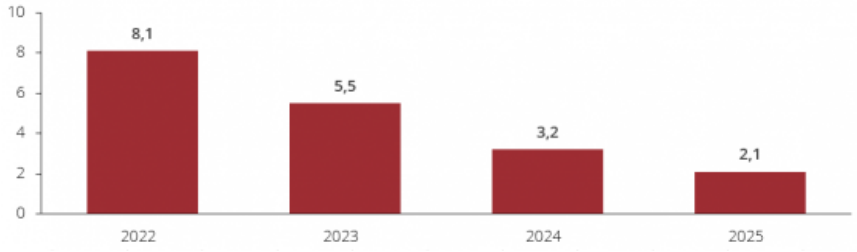

Figure 2: *Harmonised Index of Consumer Prices (annual variation in %). Source: Banco de Portugal (march, 2023)*

(ii) Sector Framework

The manufacturing industry of metal construction structures has been highly significant in the Portuguese industry over the years. Despite undergoing various changes over time, it has consistently managed to adapt and survive, primarily due to its globally recognized know-how and its significant focus on exports. This is a highly diversified industry, as stated by the Bank of Portugal, with 1.263 companies and 19.590 workers in 2022. The industry benefited from Portugal's entry into the EU, allowing for increased production capacity, modernization, and training. It offers competitive advantages such as quality-to-price ratio, skilled workforce, and responsiveness to customer demands. Despite

challenges like the 2008 financial crisis, the sector has consistently shown strong growth, confirming its dynamic nature.

Portuguese metallurgy exports hit a record high of 24.017 billion euros in 2023, marking a 4,3% increase from the previous year. December played a crucial role in this achievement, accounting for six out of the top 10 monthly results, as reported by AIMMAP.

These figures demonstrate that the sector has been resilient and even growing, despite some companies experiencing order cancellations and shortages of raw materials and components. Even in an uncertain scenario, improvements are now starting to be felt as the pandemic is being overcome and the impact of the war is also being incorporated.

Company Information

The focus of ABC, Inc. is to produce, market, install, and provide vertical and horizontal signage services, along with other safety-related products. They have developed a business model that integrates modern security systems for roads, highways, and railways.

Although the company offers a wide range of services, such as supplying and installing steel guards, motor guards, gantries, traffic signs, various indication plates, and even providing horizontal signaling painting services, most of their projects involve maintaining existing signaling and infrastructure. This is due to the limited current investment in new roads.

ABC, Inc. commenced its operations in the field of Road Signage and Safety in the third quarter of 2018, with a registered capital of €1.500.000.

In its creation year, ABC, Inc. had a positive EBITDA of six thousand euros. In 2019, after merging with another company, the company saw improved

performance with a turnover of 2.977 thousand euros and a gross margin of 48%. However, the EBITDA remained at negative 154 thousand euros and the net result was also at negative 378 thousand euros, mainly due to an impairment loss of 247 thousand euros from non-recovered credit. In 2020, despite the pandemic, ABC, Inc. had a stronger financial position with a significant increase in EBITDA of 476 thousand euros. By December 2021, the company saw a 43% increase in turnover, reaching 4.521 thousand euros, showing hope for economic recovery despite ongoing pandemic impacts.

In 2022, ABC, Inc. faced challenges due to the pandemic and Russia's invasion of Ukraine. These events led to increased inflation, supply chain difficulties, and higher prices for raw materials and energy goods. Despite these obstacles, ABC, Inc. continued to provide majority services.

In 2023, it is important to note that despite some positive signs for the future, the previously identified conditions continue to persist. One major challenge has been the significant rise in inflation, prompting the European Central Bank to take strong measures to control this issue. These measures include a substantial increase in interest rates as part of their monetary policy, which has impacted economic activity and consequently affected the financial performance of the company.

Despite this, the outlook is positive as a new contract with other companies guarantees an annual pipeline of 2.2 million euros for the next three years, strengthening the company's market position. Additionally, this partnership will bring benefits and positive synergies, increasing turnover and profitability while enabling specialization and process optimization.

SWOT Analysis

The SWOT analysis of ABC, Inc. provides a comprehensive view of the strengths, weaknesses, opportunities, and threats that shape its business environment. By internally examining the organization's strengths and weaknesses, as well as externally assessing market opportunities and threats, we can gain a better understanding of the company's strategic position. This analysis will provide crucial insights that can guide strategic decisions, identify areas for improvement, and explore opportunities for sustainable growth. Let's delve into each dimension to obtain a comprehensive understanding of the landscape in which ABC, Inc. is situated.

SWOT ANALYSIS	
Strengths	- Well-known for its road safety systems and solutions. - Extensive experience and involvement in major projects. - Acquiring the leading player in signaling has strengthened the company's position.
Weaknesses	- Excessive reliance on domestic market can expose company to local economic fluctuations. - Vulnerability to unfavorable economic conditions. - Reliance on certifications and approvals can be challenging, especially with changing regulations.
Opportunities	- Involvement in projects shows ongoing opportunities. - Investing in innovation for a competitive edge. - Exploring global markets through strategic partnerships for sustained growth.
Threats	- Increased competition in the road safety sector. - Changes in the prices of raw materials have an impact on production costs. - Risks associated with entering new international markets.

Table 2: *SWOT Analysis*

Future Perspectives

Despite the substantial recovery of economic indicators in 2023, the reality is that uncertainty levels are still very high due to ongoing conflicts, inflation, and rising interest rates. However, confidence in the company's growth remains unchanged, thanks to secure contracts, as for example, one recent one worth 13 million euros or the recent acquisition of the competitor company. ABC, Inc. is on track for resilient and sustainable growth. Additionally, Portugal's Economic and Social Stabilization Program (PEES) and Recovery and Resilience Plan (PRR), along with EU support, will further strengthen prospects for the company's upward trajectory.

Historical Financial Information[9]

In 2022, ABC, Inc. experienced a decrease in revenue to 3.509K€ compared to 4.521K€ in 2021 (-22,4%). 1. The cost of goods sold decreased by 16,6% to 2.212K€ in 2022, resulting in a Gross Margin of 1.354K€, which was 22,6% lower than the previous year. After expenses, the EBITDA stood at 207K€, showing a reduction of 10,4% compared to 2021. The EBIT amounted to 67K€, less 28,7% than 2021. The year concluded with a net loss of 21K€, reversing the profit of 19K€ from 2021.

The adjusted financial Balance Sheet of the company for the fiscal year 2022 reveals an increase of 17,8% of the Adjusted Assets, which have experienced a notable surge from 3.744K€ in FY21 to 4.374K€ in FY22. This growth shows a rise in the company's overall asset base, potentially through acquisitions, investments, or capital expenditures. As we can see, this can be related to the

[9] For further information regarding the values, please refer to attachments 1 and 2.

substantial increase of the Working Capital, rising 35% from 2.140K€ in FY21 to 2.890K€ in FY22.

Total Debt has seen a moderate increase from 2.668K€ in FY21 to 3.318K€ in FY22, resulting in a percentage variation of approximately 24.4%. This elevation in debt could be indicative of strategic borrowing for expansion or investment initiatives.

Total equity has also experienced a slight decrease of 1,9%, mainly due to net losses in the FY22 period.

Chapter 4
Analysis and Discussion

The purpose of this document is to value the company ABC, Inc. using the Discounted Cash Flows (DCF) method and then, supplement it with the Multiples Method.

The DCF method analyzes the future cash flows generated by the company and discounts them to determine their present value. The value of a business is determined by the cash flows it can generate, rather than the assets it holds.

The Multiples Method utilizes comparisons with similar companies in the market, considering indicators such as the Enterprise Value to EBITDA ratio (EV/EBITDA) and the Enterprise Value to Sales ratio (EV/Sales), providing a relative perspective on the value of the company.

Discounted Cash Flow Method

(i) Determination of the discount rate (WACC)

Table 4 breaks down the determination of the discount rate, WACC, which is crucial for assessing investments and financial decisions. To establish the WACC, several reliable and well-known sources of information were considered.

The normative-target capital structure, represented by the proportion of equity and debt capital, was derived from Damodaran's data. For the cost of equity capital, risk-free rates of return and market risk premiums based on Bloomberg and Damodaran's information were utilized, respectively. Additionally, the unlevered asset's beta was obtained from Damodaran, while the leveraged beta was calculated using an AAA analysis (formula on the left

side). The premium for small company stocks was based on Ibbotson's data (Table 5). As for the cost of debt capital, the interest rate on debt and the tax rate were the main factors considered. Finally, by combining the weighted costs of equity and debt capital, the resulting WACC was calculated, providing a comprehensive view of the company's total cost of capital.

Determination of the discount rate (WACC - Weighted Average Cost of Capital)			*Information Source*
Normative-target capital structure:		WACC	
Equity Capital	E/(D+E)	74,42%	
Debt Capital	D/(D+E)	25,58%	Damodaran
Debt to Equity ratio	D/E	34,37%	
Cost of Equity Capital:			
Risk-free rate of return	Rf	2,38%	Bloomberg - German Bonds 10 Years
Country risk premium	Crp	0,8%	Bloomberg - Portuguese Bonds 10 Years
Market risk premium	Rm-Rf	6,35%	Damodaran - PT on DEZ 23
Asset Beta (Bu)	Beta (unlevered) (sector beta)	0,84	Damodaran
Beta levered (Bl)	(Bu)*(1+D/E*(1-tax rate))	1,06	AAA Analysis
Small-cap premium		3,47%	Ibbotson
Required rate of return on equity	**Re = Rf + B (Rm-Rf)**	**13,37%**	
Cost of Debt Capital:[10]			
Interest rate on debt	Kd	3,5%	
Corporate tax rate	t	22,50%	
Effective cost of debt capital	**Rd = Kd (1-t)**	**2,7%**	
Weighted Average Cost of Capital (WACC)	**WACC = Re*E/(E+D) + Rd*D/(E+D)**	**10,65%**	

Table 3: *Determination of the discount rate (WACC). Adapted from Triple A - Capital & Finance*

Size[11]	**Premium**
Large companies USD 3,322m <	0,00%
Mid-cap companies USD 774m-USD 3,321m	+1,04%
Low-cap companies USD 202m-USD 773m	+1,75%
Micro-cap USD 201m <	+3,47%

Table 4: *Small-cap premium. Source: Ibbotson*

[10] Other charges are not included in the cost of debt.
[11] There is no small cap premium for the euro, so it assumes a typical value for the North American markets (US bias).

(ii) Estimation and Projection of Free Cash Flow

Income Statement

Currency: Thousands of €	FY22	FY23	FY24E	FY25E	FY26E	FY27E	TV
Sales and Services	3 509	3 608	4 441	4 885	5 129	5 385	5 385
Cost of Goods Sold (COGS)	- 2 212	- 2 077	- 2 620	- 2 882	- 3 026	- 3 177	- 3 177
Gross Margin	**1 297**	**1 531**	**1 821**	**2 003**	**2 103**	**2 208**	**2 208**
Change in Production Inventories	57	116	116	116	116	116	116
External Supplies and Services	- 867	- 646	- 886	- 927	- 950	- 975	- 975
Personnel Expenses	- 606	- 598	- 720	- 742	- 794	- 801	- 801
Other Income and Expenses	762	- 74	-	-	-	-	
Impairment Losses	- 436	-	-	-	-	-	
Operating Expenses (Opex)	**- 1 090**	**- 1 202**	**- 1 490**	**- 1 553**	**- 1 628**	**- 1 660**	**- 1 660**
EBITDA	**207**	**329**	**331**	**450**	**475**	**548**	**548**
Depreciation and Amortization	- 140	- 156	- 144	- 137	- 132	- 127	- 127
EBIT	**67**	**173**	**187**	**313**	**343**	**421**	**421**
Tax EBIT *22,50%*	- 15	- 39	- 42	- 70	- 77	- 95	- 95
Net Operating Profit Less Adjusted Taxes (NOPLAT)	**52**	**134**	**145**	**243**	**266**	**326**	**326**

Table 5: *Estimation and Projection of FCF. Adapted from Triple A - Capital & Finance*

Free Cash Flow to Firm

Currency: Thousands of €	FY22	FY23	FY24E	FY25E	FY26E	FY27E	TV
EBIT	**67**	**173**	**187**	**313**	**343**	**421**	**421**
Tax EBIT	- 15	- 39	- 42	- 70	- 77	- 95	- 95
NOPLAT	**52**	**134**	**145**	**243**	**266**	**326**	**326**
Amortization	140	156	144	137	132	127	127
Gross Cash flow	**192**	**290**	**289**	**380**	**398**	**453**	**453**
Working Capital Variation	179	959	90	- 117	- 64	- 74	- 74
Capital Expenditure	- 50	- 6	- 80	- 80	- 80	- 80	- 80
Gross Investment	**129**	**953**	**10**	**- 197**	**- 144**	**- 154**	**- 154**
FREE CASH FLOW TO FIRM	**321**	**1 243**	**299**	**183**	**254**	**299**	**299**

Table 6: *Estimation and Projection of FCFF. Adapted from Triple A - Capital & Finance*

Currency: Thousands of €	FY23E	FY24E	FY25E	FY26E	FY27E
WACC	10,65%	10,65%	10,65%	10,65%	10,65%
Discount factor	1,00	0,90	0,82	0,74	0,67
Discounted FCFF	1 243	270	149	187	199

Table 7: *Estimation as Projection of Discounted FCFF. Adapted from Triple A - Capital & Finance*

	Currency: Thousands of €	
Total Discounted FCFF	**2 048**	
EBIT Terminal Value		
Taxes on EBIT TV	-	
NOPLAT Steady state		
Growth Rate	- %	
Discounted Terminal Value	**1 871**	Perpetuity Model
Enterprise value (Operating Assets)	**3 919**	
Non-operational Assets		
Financial Investments	9	
Others		
Non-operational Liabilities		
Others	-	
Total enterprise value	**3 928**	
Borrowings	-1 992	
Financial Lease		
Shareholder Advances		
Cash and Cash Equivalents	51	
Cash Equivalents	-	
Net Debt (DEZ 2023)	- 1 941	
Equity Value	**1 987**	

Table 8: *Estimation of Enterprise Value and Equity Value. Adapted from Triple A - Capital & Finance.*

According to the described methodology, which best fits the current business, and based on the available financial data of the activity and sector, valued as of December 2023, we believe that the valuation of the Enterprise Value of the company ABC, Inc. will be around 3.500.000 EUR (three million and five hundred thousand euros). This value represents the future Cash Flow, discounted to the present moment, and adjusted for net debt.

(iii) Sensitivity Analysis[12]

Given the atypical situation of the ongoing war and its subsequent macroeconomic impacts, two distinct scenarios are presented for valuation based on the current assessment.

Regarding the Best-Case Scenario, the impact on the company's valuation is presented from a more optimistic perspective, where the expectations for 2023 surpass the baseline expectations. Consequently, the sales forecast for that period is assumed to increase by 5% compared to the expectations of the Base Case Scenario. On the other hand, the Worst-Case Scenario considers an adverse situation, with a sales impact in 2023 that will result in a 5% reduction compared to the forecast in the base scenario.

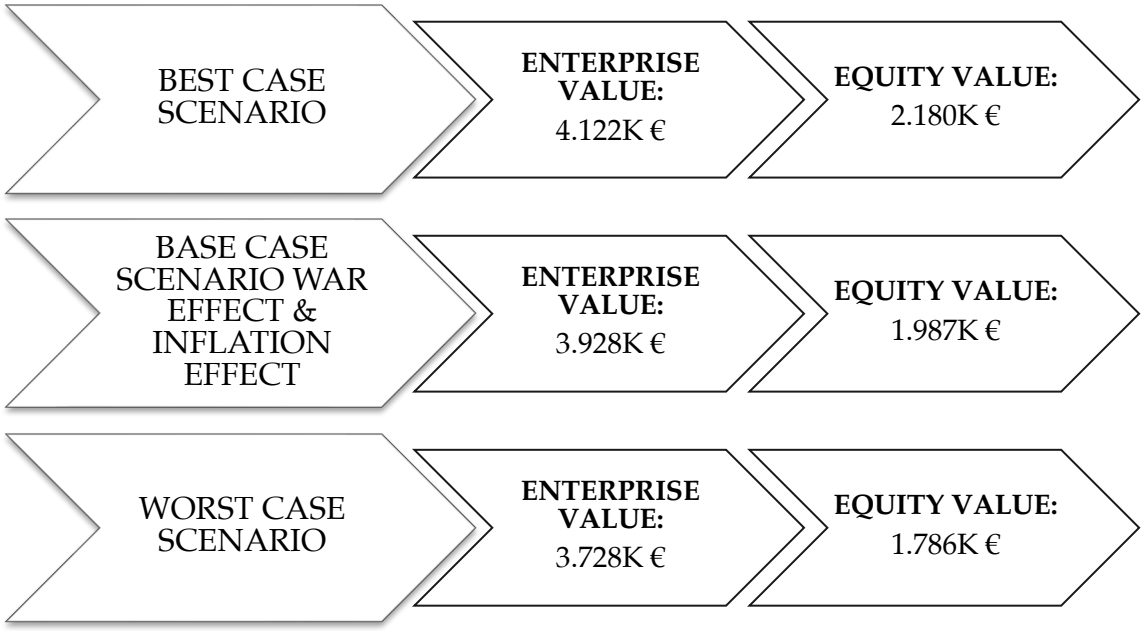

Figure 3: *Sensitivity Analysis of Company ABC, Inc.*

[12] A scenario analysis was carried instead of a simulation analysis, which could have provided a more thorough examination.

Multiples Method

The aim of this chapter is to assess the value of the company using different methodologies that are most suitable for the specific company.

The complementary method to the DCF method is the market multiples, which is a relative valuation approach. It assumes that similar assets will have similar prices. By using specific multiples, such as EV/EBITDA or EV/Sales multiples, values for Enterprise Value and Equity Value can be calculated. This methodology relies on comparing market values, so there is less uncertainty about the results if they fall within the range.

Trading multiples valuation is the method which is within this methodology but focuses on tradable market multiples. In this case, since the company operates in 3 industries, it uses data from 89 companies in Building Materials, 231 companies in Engineering/Construction and 120 in Metal & Mining, which were traded in Europe in 2023.

These valuations are based on companies with higher levels of liquidity compared to the private market. Therefore, an illiquidity discount of around 30% needs to be included.

Industry Name	Number of firms	EV/EBITDA	EV/Sales
Building Materials	89	12,34	1,84
Engineering/Construction	231	8,76	0,85
Metals & Mining	120	5,58	0,88
	Average	8,89	1,19

Table 9: *Calculation of Multiples EV/EBITDA & EV/Sales. Source: Damodaran (January 5, 2024)*

EBITDA 2023	329K €
Multiple EV/EBITDA (Damodaran)	8,89
ENTERPRISE VALUE	2.925K €

Table 10: *Enterprise Value based on EV/EBITDA multiple.*

Sales 2023	3.608K €
Multiple EV/Sales (Damodaran)	1,19
ENTERPRISE VALUE	4.305K €

Table 11: *Enterprise Value based on EV/Sales multiple.*

Average ENTERPRISE VALUE	3.615K €
Net Debt	- 1.941K €
EQUITY VALUE	1.674K €
WITH ILIQUIDITY DISCOUNT (30%)	1.172K €

Table 12: *Enterprise Value and Equity Value with the Multiples Method.*

Taking into consideration that it is not given any specific considerations regarding the operational weight of the operations of each industry in the company, we assume that each of the three industries has an equal distribution. As a result, we calculate the average enterprise value of 3.615K€ by taking the weighted average of the multiples of each industry related to the corresponding multiple and multiplying them by their related value. After subtracting the Net Debt and accounting for a 30% illiquidity rate, we determine that the Equity Value of ABC, Inc. is 1.172K€.

Chapter 5
Conclusions and Personal Reflection

	DCF	Multiples
ENTERPRISE VALUE	3.928K €	3.615K €
EQUITY VALUE	1.987K €	1.172K €

Table 13: *Enterprise Value and Equity Value of ABC, Inc. based on DCF method and Multiples method.*

The results presented in Table 16 are obtained after using the two methodologies to value the company ABC, Inc.. As we can notice, there is a difference between the values obtained by the DCF method and the multiples method, as expected. The multiples are showing lower values of around 8% for Enterprise Value and 41% for Equity Value compared to DCF.

The sensitivity analysis performed, which involved a 5% fluctuation in sales, given the current economic situation, demonstrated significant effects on the financial results. Under the initial conditions, with the Enterprise Value at 3.928K€ and Equity Value at 1.987K€, a 5% rise in sales generated an optimistic scenario with an Enterprise Value of 4.122K€ and Equity Value of 2.180K€. Conversely, a 5% decline in sales led to a pessimistic scenario, lowering the Enterprise Value to 3.728K€ and the Equity Value to 1.786K€.

The DCF value is better grounded in the economic fundamentals but the multiples method with value below the reasonable worst-case scenario should act as a warning sign about a possible overvaluation of the company in relation to its peers. The macroeconomic and sectoral analysis highlights a period of high price instability and uncertainty due to conflicts in Ukraine and the Middle East, inflation, and interest rate increases. These factors have influenced the obtained values and should be considered as another warning sign of the DCF valuation.

These factors may have influenced the obtained values and that is the reason why conducting a sensitivity analysis is important. However, as we can see, the obtained values represent a range of values that are close to each other, indicating that these two methodologies indeed complement each other, in this specific case.

The study case led to several different conclusions. The widely used DCF method required a meticulous and careful analysis due to the significant impact of the aforementioned factors. Any slight alteration had a significant impact on the final valuation, making the DCF method complex and time-consuming. However, it is more reliable and reflects the company's specificities with better fine-tuning of assumptions.

On the other hand, when using the multiples methodology, one example of its limitations includes, in this specific case, not having information on the operational weight of the company in each industry type. This leads to a margin of error. It is also important to highlight the fact that the multiple valuation worked in this specific case because the EBITDA value is positive. If this value was negative, the valuation of the company based on multiples would show a significant discrepancy compared to the results presented in the valuation done with DCF. Therefore, this method is sensitive to comparative errors and market fluctuations and fails to incorporate some particularities of the company. However, it is easier and quicker to use.

Options Analysis, a well-known approach, may have limitations when valuing companies due to its sensitivity to changes in market conditions and the inherent complexity in option pricing, making it less suitable for determining intrinsic value in certain business contexts.

In summary, admittedly, DCF and multiples are the most used approaches for company valuation. However, each company valuation has a unique approach as there is no universal methodology. It is crucial to conduct a thorough pre-analysis of the data and peculiarities of the company to determine the most

appropriate methodology for the specific context. It is also important to recognize that there are limitations to these methodologies and adjustments may be needed in real-world scenarios. This study highlighted the complexity of valuing a company operating in multiple sectors and the impact of current events such as wars and economic factors like interest rates and inflation. Understanding these challenges is crucial for effective valuation and a comprehensive perspective in the business context.

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Appendices

Company ABC, Inc. **Income Statement**

Currency: *thousands of €*	**FY22**	**FY21**
Sales and Services	**3 509**	**4 521**
Changes in production inventories	57	(121)
Cost of goods sold	(2 212)	(2 651)
Gross Margin	**1 354**	**1 749**
Supplies and external services	(867)	(880)
Personnel expenses	(606)	(630)
Other expenses and losses	(42)	(19)
Other income and gains	804	11
Impairment of trade receivables (losses/reversals)	(436)	-
EBITDA	**207**	**231**
Depreciation and amortization	(140)	(137)
EBIT	**67**	**94**
Financial result	(71)	(52)
EBT	**(4)**	**42**
Taxes	(17)	(23)
Net income	**(21)**	**19**

Table 14: *Income Statement of Company ABC*

Company ABC, Inc. **Balance Sheet**

Currency: *thousands of €*	**FY22**	**FY21**
Fixed Tangible Assets	1 272	1 372
Intangible Assets	7	11
Goodwill	195	210
Economic Fixed Assets	**1 474**	**1 593**
Inventories	405	215
Accounts Receivable	2021	1 364
Other Receivables	684	577
Suppliers	158	250
Other Payables	464	129
Cash and Bank Deposits	402	363
Working Capital	**2890**	**2140**
Other Financial Investments	9	10
Other Financial Instruments	1	1
Total Financial Assets	**10**	**11**
Adjusted Assets	**4 374**	**3 744**
Non Current Borrowings	1120	1675
Current Borrowings	2198	993
Total Debt	**3318**	**2668**
Share Capital	1 500	1 500
Reserves and Retained Earnings	(423)	(443)
Net Income	(21)	19
Total Equity	**1 056**	**1 076**
Invested Capital	**4 374**	**3 744**

Table 15: *Balance Sheet of Company ABC*