



The size factor in valuation models

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Internship report

Master in Finance



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## **Biographical Note**

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After completing the bachelor degree, Diana enrolled in the Master in Finance program of the School of Economics and Management of the University of Porto, having finished the first year with a final grade of 15 out of 20, completing the final stage of the master's program with this internship report. The internship took place at Deloitte, in the department of Financial Advisory, from October 2019 to January 2020, having been invited to work at the firm at the end of the internship as analyst, function that currently performs.

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## **Abstract**

The theme of this internship report is the impact of the size factor on the valuation models. In sum, it aims to explore the differences between big and small firms and analyze if those differences influence the valuation model choice and how it should be managed. This report also includes a real-life case study of a small company in order to illustrate the differences described in the literature review, the adjustments suggested, and their impact. This is a crucial factor for the pertinence of this study since, most of the existent literature, is theoretical. The real-life example enabled the application of, at least, some of the knowledge that the internship at Deloitte gave me and, at the same time, it has improved my performance at the company by deepening my theoretical knowledge. The results of this work suggest that a careful analysis of a company and its singular nature can indeed affect its valuation.

**Key-words:** small and medium-sized enterprises, case-study, valuation, due diligence

**JEL-Codes:** G12, G31, M21

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## Introduction

Welsh and White (1981) introduce this internship report's theme, the size factor in valuation models, by saying, literally, that managers usually treat small companies as they treat big companies but in a smaller scale ("lower sales, smaller assets and fewer number of employees"). However, there are a set of unique characteristics of small companies that lead to a "special condition", which require a different approach. Thus, as Jesus et. al (2001) argues, the financial theory, which has its roots on big and public companies, must be adjusted to the context of Small-Medium Enterprises (SMEs), since the estimates of future cash-flows and the determination of the discount rate are subjective. There are several studies in the literature about this particular topic, which are discussed in the literature review section, but the majority are theoretical, that is, they do not present a real case, and this is a crucial factor for the pertinence of this study. Thus, the main research questions that should be answered in this report are:

1. There are significant differences between small and big companies that impact the valuation approach to be used?
2. If the answer to question 1 is positive, how can we deal with those differences?

Obviously, the subject addressed here is connected with the curricular internship, which occurred during the first semester of the master's in finance program at the financial advisory department of Deloitte. During the internship, I had the opportunity to work in some areas of this department, especially in M&A transaction services, which provides due diligence services that includes financial, fiscal and commercial due diligence. The internship gave the basis for the real-life case study that is developed in section III of this report since the adjustments suggested by Jesus et. al (2001) were identified and quantified by applying a due diligence work. This means that this study attempts to make a bridge between what is taught at university, the theory, and what is done in reality, the practice.

Regarding the real-life case study, it was possible to identify some of the unique characteristics described in the literature review. Additionally, it led to the conclusion that if a careful financial due diligence work takes place and the potential adjustments identified through that process are incorporated in the forecast maps used in the valuation procedure, it can have a significant impact in the enterprise value and in the value that someone has to pay in order to acquire 100% of the firm's equity.

This report is organized into three sections, in addition to the introduction, conclusions, and appendices. The first section includes a literature review being divided into two parts. The first part focus on the valuation models and the second part focus on the central theme, the small companies' uniqueness and in what manner the differences in the relation to big firms affect the valuation methods. Then, in section 2, it is explained the methodology to be applied in the case study and the adjustments that will be made. Finally, in section 3, it is presented a real-life example in order to illustrate how we can face the unique characteristics and how different the approaches are from the traditional ones.

# **I. Bibliographic Review**

## **1. Main valuation methods**

The company's valuation process is generally defined as crucial in the context of corporate finance and, according to Damodaran (2007), valuation can even be considered the heart of finance. This process is not only important in mergers and acquisitions but also in the identification of the sources of economic value creation and destruction (Fernández, 2007). For instance, in corporate finance, it allows the definition of the best investment, financing and dividend policies in order to increase the firm's value and, in portfolio management, it helps to spot firms that have been trading at a lower price than its true value, making profits as prices converge to the true value, (Damodaran, 2007).

In the literature, we can find several valuation methods, from the simplest one to the most sophisticated ones. Fernández (2007) divides the valuation methods into six groups: balance sheet, income statement, mixed (goodwill), cash flow discounting, value creation and options based models (Annex A, Table 1). Obviously, different models will use different assumptions regarding the fundamentals that will determine the value, but they share some common characteristics, which, according to Damodaran (2007), enables the aggregation of different models in only four categories. The first one is the discounted cash flow valuation, in which the value of an asset is the present value of its expected future cash flows. The second one is the liquidation and accounting valuation, where it's valued the existing assets of the company, often using the accounting or book values as a starting point. The third one is the relative valuation, which seeks to determine the company's value by looking to the price of "comparable" assets regarding a common indicator like the size of its earnings, sales or other indicators. The final category is the contingent claim valuation, which uses option-pricing models in order to find the value of assets that have option characteristics in common. In this report, it will be explained with more detail the methods that, in my opinion, are most widely used: Discounted Cash Flow valuation (DCF), relative valuation, contingent claim valuation, and economic profit method.

### **1.1. Discounted Cash Flow Model (DCF)**

The DCF valuation is an income approach where the value of an asset is based on its future expected cash flows, which means, on the present value of the expected cash flows, discounted at an appropriate rate that reflects its risk. In this sense, an asset with a higher

level of expected cash flows and more predictable ones should have a higher value than assets with lower and more volatile cash flows. According to Damodaran (2007), this method is the most used in academia world and it has the best theoretical credentials, the main reason is that it is the only conceptually correct valuation method, Fernández (2007). Koller et al. (1994) also argues that the intrinsic value is ultimately driven by the long-term ability of the company to generate cash flows, which means that DCF model can be used to evaluate an investment opportunity or even an entire company. The next topics will analyze the different phases of this model.

### 1.1.1. General basis for the different DCF methods

As it's shown on table 2, Annex A, the first steps on a DCF model are the forecast of the cash flows, analyzing the historic cash flow statements, looking to the peers and defining n, the appropriate explicit period for cash flow forecasting. After this, the cash flows' forecast it is based on several assumptions regarding the financial items related with the generation of cash flows. These items are the ones connected with the company's operations, both economic and financial operations, namely:

- Sales
- Cost of goods sold
- Operating costs including depreciation and amortization
- Taxes
- Business and cash cycle (working capital)
- Replacement and expansionary/growth CAPEX (total CAPEX)
- Capital structure policy
- Financial costs
- After n, that is, after the moment that the firm becomes stable, we must determine g, the sustainable growth rate, if it is appropriate for the case. This will allow us to estimate the terminal value at the end of the forecast horizon.

Taking as valid the perspective of Damodaran (2007), we can consider the three main DCF methods the FCFE, FCF and the APV. As Fernández (2007) refers, all these methods have the same starting point, given by equation 1.1:

$$V = \frac{CF_1}{1+k} + \frac{CF_2}{(1+k)^2} + \frac{CF_3}{(1+k)^3} + \dots + \frac{CF_n + VR_n}{(1+k)^n} \quad [1.1]$$

Where:

- $CF_i$  = cash flow generated by the company in period  $i$
- $V_n$  = residual value of the company in the year  $n = \frac{CF_n(1+g)}{(k-g)}$
- $K$  = appropriate discount rate for the cash flows' risk

Looking to this formula, we may think that it is assumed a finite duration of flows, which would be a problem since a company has an infinite number of cash flows although it would be impossible to calculate all of them. However, eventually, the company achieves a stable point, having a stable growth rate ( $g$ ), and that is the key element in this formula because it allows the calculation of the residual value. It can be considered acceptable to ignore the value of the flows after a certain period because their present value decreases progressively with longer time horizons and the competitive advantage of many businesses tends to disappear after a few years, Fernández (2007). In sum, this problem of having an infinite number of cash flows in a company is solved by dividing the value of the business in two periods, that is, during and after the explicit forecast period, Koller et al. (1994), which give us:

$$\begin{aligned} \text{Value} = & \text{Present value of cash flow during the explicit forecast period} & [1.2] \\ & + \text{Present value of cash flow after the explicit forecast period} \end{aligned}$$

Note that, the rate  $g$  typically ranges between the historical inflation rate (normally assumed at 2% because it is the inflation target of most central banks) and the long-term natural economy growth rate (3%) at this stage, which means that it cannot be higher than the growth rate of the economy (5%). Logically, the company cannot grow more than the economy because, in the long run, it would be bigger than the economy itself, which it's not possible. Also note that the capex implicit in the terminal FCF must be consistent with the growth rate that was assumed. Both should be compatible with sustainable long term growth and normal profit levels.

### **1.1.2. Defining the appropriate cash flow and respective discount rate**

According to Damodaran (2007), the most common approach of adjusting discounted cash flow valuations for risk is the risk adjusted discount rate approach. In this approach, the cash flows are discounted at a risk-adjusted discount rate, using a higher

discount rate to discount expected cash flows of riskier assets, and lower discount rates to value safer assets. The other three approaches are: risk-adjusted or certainty equivalent cash flows, where the expected cash flows are adjusted for risk and then discounted at the risk-free rate to estimate the value of a risky asset. The third approach is the adjusted present value, where the business is valued first, without the effects of debt, and then it is considered the impact on value of borrowing money. The fourth approach values a business as a function of the excess returns that its investments are expected to generate. The last approach, based on excess returns, will be developed further.

If the most common approach is, indeed, the risk adjusted discount rate, in order to explore the various models, it is now necessary to define the basic cash flows that can appear in a valuation and the appropriate discount rate that should be applied to each one:

*Table 3- Basic cash flows and appropriate discount rates. Fernández (2007).*

Cash flows	Appropriate discount rate
FCF (Free Cash Flow)	WACC (Weighted Average Cost of Capital)
ECF (Equity Cash Flow)	$K_e$ (Required return to equity)
DCF (Debt Cash Flow)	$K_d$ (Required return to debt)

Starting with the debt cash flow, it is equal to the sum of interest payments on the debt and the principal repayments. The present market value of debt is obtained by discounting the debt cash flow at the required rate of return of debt (cost of debt) but, since in most cases the market value of debt it is equal to the book value of debt, generally the book value is a good proxy for the market value of debt. Then, the FCF allow us to get the company's total value, that is, the sum of debt and equity, and this cash flow can be divided in FCFF and FCFE. The FCFF is the operating cash flow, that is, the cash flow generated by operations, without considering borrowing (financial debt), after tax. This means that, the FCFF is the money that would be available in the company after covering fixed asset investment and working capital requirements, but prior to any payment of interest and corresponding tax savings, and principal to debtholders. Finally, the ECF/FCFE enables the identification of the equity's value, it is the cash flow remaining available in the company after covering fixed asset investments and working capital requirements and after paying the financial charges **net of corresponding tax savings** and repaying the corresponding part of the debt's principal. Thus, the FCFF is the cash-flow available to remunerate all shareholders



and debtholders, through dividends and debt service, whereas the FCFE is the cash-flow available to remunerate the shareholders, through dividends or stock repurchases.

### 1.1.3. Three methods for the discounted cash flow valuation

#### 1.1.3.1. Free Cash Flow to Firm (FCFF) Model

In this first approach, the entire business is valued, with both assets in place and growth assets, Damodaran (2007). The enterprise value (EV) is the value of all assets of the company and, if it is assumed that the cash flows' projection already took place, it will be given by the present value of all future cash flows after  $n$ . According to the discounted cash flows model, the EV is given by equation 1.3:

$$EV_0 = \sum_{i=1}^n \frac{FCFF_i}{(1 + k_{wacc})^i} + \frac{FCFF_{n+1}}{(1 + k_{wacc})^n} \frac{(k_{wacc} - g_{FCFF})}{(1 + k_{wacc})^n} \quad [1.3]$$

Where:

<ul style="list-style-type: none"> <li>• Operational earnings (EBIT)</li> <li>• (-) Taxes over EBIT</li> <li>• (-) <math>\Delta</math> Inventory</li> <li>• (-) <math>\Delta</math> Accounts receivable</li> <li>• (+) <math>\Delta</math> Accounts payable</li> <li>• (+) Depreciation costs</li> <li>• (-) CAPEX</li> </ul>	}	EBIT x (1-T)
<ul style="list-style-type: none"> <li>• (-) <math>\Delta</math> Inventory</li> <li>• (-) <math>\Delta</math> Accounts receivable</li> <li>• (+) <math>\Delta</math> Accounts payable</li> </ul>	}	(-) $\Delta$ Working capital
<ul style="list-style-type: none"> <li>• (+) Depreciation costs</li> <li>• (-) CAPEX</li> </ul>	}	- (CAPEX-Depreciations) [NET CAPEX]
= FCFF		

[1.4]

$$\frac{FCFF_{n+1}}{(k_{WACC} - g_{FCFF})} = \text{Terminal or residual value} \quad [1.5]$$

Once again, it is important to notice that FCFF must be discounted using WACC since it considers both shareholders required rate of return and debtholders required rate of return and the FCFF represents the cash flow available to remunerate all who finance the firm, both shareholders and debtholders, through dividends and debt. The usual assumption regarding the behavior of debt on the FCF computation is that debt is a fixed percentage so, if capital increases, debt will also increase and, in the long run, we will have a mix of debt and equity.

### 1.1.3.2. Free Cash Flow to Equity (FCFE) Model

This approach focus on the equity investors position, valuing their stake by discounting their expected cash flows at a rate of return that is appropriate for the equity risk in the company, Damodaran (2007).

$$EqV_0 = \sum_{i=1}^n \frac{FCFE_i}{(1 + k_e)^i} + \frac{FCFE_{n+1}}{(k_e - g_{FCFE})(1 + k_e)^n} + R_0 \quad [1.6]$$

Where:

- FCFF (Free Cash Flow to Firm)
- (-) Interest x (1-T) [Interest net of tax gains]
- (+) Δ debt financing [= (+) new debt – repayment of debt]

$$= FCFE \quad [1.7]$$

- $\frac{FCFE_{n+1}}{(k_e - g_{FCFE})} =$  Terminal or residual value [1.8]
- $R_0 =$  Surplus assets, assets that do not affect the future cash flows.

Following the same logic as before, in the case of FCFE, the cost of equity ( $k_e$ ) is used as a discount rate, the required rate of return by shareholders. In the FCFE, and unlike what is assumed in the FCFF computation, the existent debt is used and a repayment schedule is defined so, over time, a point will be reached, if the company is sufficiently profitable, where the company is 100% equity-financed and is not taking any new debt. These differences in the computation, usually, lead to a higher value of FCFF than FCFE since, in the FCFF, leverage and its benefits are considered along the entire valuation horizon.

### 1.1.3.3. Adjusted Present Value (APV) model

The basic idea of this model is to separate the debt financing effects on value from the assets' company's value (Damodaran, 2007). So, in order to compute the enterprise value, a firm with no debt is assumed first, as if it was entirely equity-financed and, after that, tax benefits arising from debt financing are added, since interest expenses are tax-deductible, (Fernández, 2007). This model has its roots on Modigliani and Miller (M&M) theorem, which shows that, in a world without taxes and under a certain set of assumptions, the company's capital structure, the mix between debt and equity that is chosen, has no impact on its value.

Consequently, in a world without taxes, the financing and investment decisions should be independent. Myers (1974) expanded the M&M model by developing a model that does not have the restrictive set of assumptions and that explores the interrelationship between investment and financing decisions. Myers' model has then become generally known as the Adjusted Present Value Model. Thus, according to this model:

Value of firm = Value of firm if it was fully equity financed + value of tax benefits of debt

$$EV_0 = \underbrace{\sum_{i=1}^n \frac{FCFF_i}{(1+k_{ue})^i} + \left[ \frac{TV_n}{(1+k_{ue})^n} \right]}_{\text{Value of firm if it was fully equity financed}} + \underbrace{\sum_{i=1}^n \frac{Tax\ Benefit_i}{(1+k_d)^i} + \left[ \frac{TV_n^{TB}}{(1+k_d)^n} \right]}_{\text{value of tax benefits of debt}} \quad [1.9]$$

Where:

- $k_{ue}$  - Cost of unlevered equity.
- $Tax\ Benefit_i$  - Debt interests times the firm's tax rate at time  $i$ .
- $TV_n^{TB}$  - Terminal value of tax benefit at time  $n$ .

However, the model presented in this simple form does not make much more sense since it is possible to deduct from it that, as more debt is added to the company, its value increases, which means that, in this context, more debt is preferable to less debt, a result that is aligned with the simplistic assumptions of Miller and Modigliani (1961). Damodaran (2003) presents a more sophisticated alternative by including the bankruptcy costs, as shown in equation 1.10. In this improved perspective the basis is the same, it starts valuing the firm as if it was entirely equity financed, assuming an unlevered beta (known as asset beta), that is, the beta of a company without taking into account its debt, giving a measure of how much systematic risk a firm's equity has when compared to the market. Then, it considers the net effect on value of both the benefits and costs of borrowing by adding the present value of the interest tax savings and by evaluating the effect of borrowing on the probability that the firm will go bankrupt, and the expected cost of bankruptcy. The value of the levered firm can then be estimated at different levels of debt. The debt level that maximizes the firm's value is known as optimal debt ratio.

Value of levered firm =

$$\begin{aligned} &= \sum_{i=1}^{\infty} \frac{FCFF_i}{(1+k_e)^i} + PV(Tax\ Benefits) \\ &- PV(Expected\ Bankruptcy\ Costs) \end{aligned} \quad [1.10]$$

Where:

- $k_e = k_{WACC}$  (assuming unlevered beta when valuing the entirely equity financed company)
- $PV(\text{Tax Benefits}) = \frac{\text{debt} \times \text{tax rate} \times \text{cost of debt}}{\text{cost of debt}}$  (the tax rate is the firm's marginal tax rate and it is assumed to stay constant over time) [1.11]
- $PV(\text{Expected Bankruptcy Costs}) = \text{Probability of bankruptcy} \times PV(\text{bankruptcy costs})$  [1.12]

As Damodaran (2003) refers, we could expect that both WACC and APV approaches provided the same value, but that is not necessarily true and there are two reasons for this to happen. The first one is that bankruptcy costs are incorporated in different ways in these models, being that the APV method provides more flexibility to consider indirect bankruptcy costs. Second, on one hand, the APV approach usually bases the tax benefits on the existing debt; on the other hand, WACC approach bases the tax benefit on a debt ratio that may imply increasing amounts of debt in the future, being that those expected future tax benefits are incorporated into value today.

Probably, the most important advantage of APV approach over WACC is that it helps not only to value a company/asset but also shows where the value comes from. The APV separates the value of operations from value created or destroyed by how the company has been financed so, it's very transparent in the sense that it shows all the components of value, (Luehrman, 1997). Thus, unlike WACC that assumes a static debt to equity ratio, the APV method is able to deal with situations in which the level of debt to equity is expected to vary over time. However, the APV approach has also its pitfalls, the most relevant one appears in the cases in which the analysts do not include the expected bankruptcy costs, as Damodaran (2003) proposed, since it leads to the thought that more debt is preferable to less debt. The firm's value will be then overestimated, especially in cases with high debt ratios. It may also undervalue other firms where future tax savings from debt are under-estimated.

### **1.1.4. Computation of the appropriate discount rate**

#### **1.1.4.1. Cost of capital (WACC)**

The Weighted average cost of capital (WACC) is a calculation of a firm's cost of capital in which each category of capital is proportionately weighted, being a measure of the opportunity cost of all sources of capital, which includes debt and equity. According to Koller

et al. (1994), it represents the discount rate, or time value of money, used to convert expected future free cash flows into present value for all investors. The general formula to compute WACC is:

$$K_{WACC} = W_d * K_d(1 - T) + W_e * K_e \quad [1.13]$$

Where:

$K_e$  = Shareholders' required rate of return

$K_d$  = Debtholders' required rate of return

$T$  = Marginal Tax rate (nominal)

$W_e$  = Equity (market/book value) weight

$W_d$  = Debt (market/book value) weight

The weights ( $W_e$  and  $W_d$ ) are the fraction of each financing source in the company's capital structure. When they are equal, WACC increases as the beta and the rate of return on equity increases, and an increase in WACC denotes a decrease in valuation and a higher risk. The component marginal tax rate is also important because, in the way that it is presented on equation 1.13, it shows that the interests (remuneration of debtholders) and dividends (remuneration of shareholders) have different impacts in tax terms. This is simply explained by the fact that if the company pays interests, it will pay less taxes but, if the company pays dividends, it will have no impact on taxes.

#### 1.1.4.2. Cost of equity ( $K_e$ )

The cost of equity ( $K_e$ ) is the required rate of return by shareholders and the most commonly accepted method for calculating it is the capital asset pricing model (CAPM):

$$R_e = R_f + [E(R_m) - R_f] * \beta \quad [1.14]$$

Where:

- $R_f$  = Risk-free rate
- $[E(R_m) - R_f]$  = Market Risk Premium = difference between the expected return on the market portfolio and the riskless rate.
- $\beta$  = stock beta = measure of systematic risk (risk that cannot be taken out through diversification). It measures the sensitivity of a security's required return to the

expected return of the market portfolio, and it changes with the level of debt of the company. One way to calculate it is through the Hamada Model.

$$\beta_U = \frac{\beta_L}{1 + (1 - \text{Tax Rate}) * \frac{D}{E}} \quad [1.15]$$

Equation 1.15 represents the estimated unlevered or asset beta, that is, the beta for a zero-debt company.

$$\beta_L = \beta_U * \left[ 1 + (1 - \text{Tax Rate}) * \frac{D}{E} \right] \quad [1.16]$$

Equation 1.16 represents the levered or equity beta for each level of debt, including the impact of leverage and the company's capital structure. However, Hamada model will not be applicable if the company is not listed, in which case it is not possible to observe the company's beta. In that scenario, it is still feasible the estimation of the assets' beta because it tends to be constant when considering same assets, same industry, same sector, etc., using then the industry's beta. Usually, as Ross et al. (2008) refers, what may affect a firm's beta are changes in product line, changes in technology, or changes in the market.

### 1.1.4.3. Cost of debt ( $K_d$ )

The cost of debt ( $K_d$ ) is the required rate of return by debtholders. The cost of debt is usually much easier to calculate than the cost of equity. Since it is simply the cost of borrowing, it can be obtained by looking to the yield on publicly traded bonds or by talking with commercial and investment bankers, (Ross et al., 2008).

### 1.1.4.4. Computation of WACC in practice

Now that the different WACC components have already been explored, Koller et. al (2010) have a good summary of the methodology and data that we need for that purpose, presented on Annex A, Table 4.

Being the topic of this report the size effect on valuation models, it is important to refer the small cap premium, perhaps the most used add-on to the cost of equity, according to Damodaran (2016). The first studies about the phenomenon appeared in the 1970s and mainly in the 1980s, suggesting that small firms, measured by the market capitalization, have higher returns than larger firms with similar risk, defined by market beta. For example, Banz (1981) showed that, in the period between 1926 and 1975, with a sample including all

common stocks quoted on the NYSE for at least five years in that same period, the difference in returns between the largest fifty and smallest fifty stocks was 1.01 percent per month. In the literature there are some reasons for this phenomenon, the higher trading costs to invest in small stocks when compared to the ones incurred to invest in large stocks is one of them, being that the premiums do not include these costs. However, this argument does not explain all the premia observed in the literature and probably is not very significant in a long-term investment. Another potential explanation is the possibility of CAPM not being the best model to estimate the risk of small stocks, because the beta is not able to capture the true risk of small stocks, underestimating it. The higher risk of small stocks can come from the estimation errors of beta that are higher for small stocks than for large stocks or from the lack of information. Note that, the smallest firms are not even traded in stock exchanges so there are not comparable betas from traded firms that could be used.

As a consequence of these findings, a new model was developed for the purpose of the cost of equity estimation besides the CAPM model, the Three-Factor model. It was suggested by Fama and French (1992) who found, with their research and previous literature, a negative relationship between the average equity returns and the company's size (as measured by the market capitalization), and a positive relationship between the book-to-market equity ratio and the average return. The Three-Factor model is an expanded version of CAPM, that is, besides the market risk factor, it includes two additional risk factors to explain excess returns, size and the book-to-market ratio, leading to the following time series regression:

$$r_{it} - r_{ft} = \alpha_i + \beta_{1i}(r_{it} - r_{ft}) + \beta_{2i}SMB_t + \beta_{3i}HML_t + \varepsilon_{it}, \quad t = 1, \dots, t_0. \quad [1.17]$$

Where SMB is the return on a portfolio of small stocks minus the return on a portfolio of large stocks, which constitutes the size premium, and HML is the return on a portfolio of stocks with high book-to-market values minus the return on a portfolio of stocks with low book-to-market values, which constitutes the value premium, (Bartholdy and Peare, 2005). This means that, instead of receiving a premium for being small, a company receives a premium if its stock returns are correlated with those of small stocks or high book-to-market companies and so, the SMB and HML portfolios aim to replicate unobservable risk factors that make small companies to outperform their CAPM expected returns, (Copeland et. al, 1994). However, there are several studies and surveys showing that, empirically, the

Three-Factor model does not perform much better than CAPM, in terms of significance of the factors and explanatory power. For example, according to Bartholdy and Peare (2005), the Fama and French (1992) model has an average  $R^2$  of 5%, against 3% of CAPM model, questioning the benefits of using the Three-factor model instead of the CAPM model since the extra work that we have to collect the data needed for the two additional factors is probably not justified.

Additionally, there are other studies arguing that this anomaly is no longer a problem, like Damodaran (2016) that found that small cap stocks, between 1927 and 2015, have earned 3.82% more than expected, on a risk-adjusted basis but, since 1981, this trend disappeared and, in fact, small stocks have earned 0.33% less than expected, on a risk-adjusted basis. The same conclusion got Horowitz et. al (2000), in the three methodologies used there was no evidence that small firms had higher realized returns than large firms in the period between 1980 and 1996 and so, “it appears that the size effect is a typical academic discovery, strong in-sample evidence, weak out-of-sample results”. Damodaran (2016), introduces more arguments against the size effect, like the fact that the phenomenon is concentrated in January, which constitutes another anomaly existent in the literature known as the January effect, and the fact that the small cap premium seems to be smaller in non US markets than in US markets and even inexistent in some of them. Damodaran (2016) also points out the possibility of the small cap premium being a consequence of the lack of information, like was explained before, or illiquidity since smaller stocks often have fewer buyers and sellers than larger stocks thus, an investor may accept a discount on the price in order to move the stock quickly. This means that, if our decision is to apply a small cap premium, we should clarify if it reflects risks like illiquidity and lack of information, to guarantee that they are not double counted.

### **1.1.5. Advantages and disadvantages of DCF valuation**

Several studies show that DCF valuation is generally used by analysts when conducting a firm’s valuation, being considered by many the mainstream. AM Corporate Services Pte. Ltd. (2017) refers an important characteristic of this approach, its flexibility to deal with firms or assets in different stages of their life cycle and its importance for small private companies, for which there are no public market comparables. According to Farinha (2018), some other advantages of this method are: it is based on cash flows, real money, hoping to avoid some accounting distortions and arbitrariness in reported earnings, and it



captures the fundamental drivers of a business (for example  $K_e$ , WACC,  $g$ , etc.), being closer to the true intrinsic value. Additionally, it is a rich valuation method in analytical terms and it allows a detailed sensitivity analysis, among other advantages.

Thus, DCF valuations are important for strategic analysis and both managers and academics commonly adopt it, but it suffers from some drawbacks too. Probably, the most important pitfall of DCF valuation is the fact that NPV rule and other DCF approaches to capital budgeting do not incorporate perfectly the management's flexibility to adapt and revise later decisions as a response to unexpected market changes, (Trigeorgis, 1993). In other words, it does not take into account real options, for the traditional NPV rule, the manager is only needed to take the decision (accept or not the project) and, from that moment, the manager's role is completely ignored. However, in the real world, markets are competitive and uncertain, the actual cash flows will probably differ from what was projected and, as new information arrives, management may have flexibility to change the operating strategy according to it, being that this opportunity has value, for example, the option to defer, expand, abandon, etc. This expanded view of NPV analysis will be further developed in section 1.4.

Still regarding the fact that the traditional DCF model is based on deterministic assumptions and that does not consider uncertainty in the estimated cash flows, there is another criticism in relation to the terminal value, which is dependent on the last forecasted free cash flow, the perpetual rate of growth and on the discount rate. The terminal value frequently represents the largest component of the present value, usually representing between 60-80% of total present value calculation. Thus, even a minor change in the assumptions on terminal year can have a significant impact on the final valuation. Additionally, there are other criticisms like DCF values cannot be used to evaluate historical performance since they are based on projections, (Copeland et al., 1994; Stephen, 2016). These projections are also highly subjective, different analysts will get different projections. However, as Copeland et al. (1994) refers, DCF value can be linked to financial indicators, being the financial drivers of DCF value the growth in both revenues and profits and the return on invested capital.

## **1.2. Economic Profit Approach**

Firstly, and in order to avoid misunderstandings, it is relevant to notice that Economic Profit (EP) and Economic Value Added (EVA) represent the same concept.

According to Biddle et al. (1999), the only difference is that EVA is the registered trade name of Stern Stewart & Company, a consultancy group, for the variant that they have developed in the late 1980s of the well-known concept Residual Income. On the other hand, the differences between the Residual Income and the EP/EVA are found in the accounting adjustments made to the profits and capital, (Silverman, 2010), and the way that they deal with debt (and interests). In the literature, there are various perspectives of this approach and of the way it should be classified. For example, Fernández (2002) got to the conclusion that both the Residual Income models for equity valuation and the Discounted Cash Flow valuation models provide the same value, however, the author decided to treat Residual Income models in a separate way. Fernández (2002) does not consider RI models as a Discounted Cash flow model and it considers EP and EVA different concepts. From now on, it will be assumed here the perspective that the RI models are a kind of Discounted Cash Flow model, since they are mathematically equivalent when subject to some restrictions, and that EP and EVA represent the same thing.

Now, it is important to define these concepts in order to understand the mathematical expressions. Both notions are based on the idea that value is created by generating excess returns on investments (Damodaran, 2004). In other words, they are both a profitability measure that calculate the amount of revenues from the sale of certain products that exceeds the opportunity costs incurred in the resources allocation to produce and sell those products, however, they vary in how excess returns are computed. In EP, the excess return is defined from the perspective of equity holders and it is computed in the following way:

$$\begin{aligned} EP &= (\text{Return on Capital Invested} - \text{Cost of Capital}) * (\text{Capital Invested}) = \\ &= \text{Operating Profits After Taxes} - \text{Cost of Capital} * \text{Invested Capital} \end{aligned}$$

$$EP_t = EBIT(1 - T)_t - k * IC_{t-1} \quad [1.18]$$

Or, in relative terms, the “spread approach” is given by:

$$EP = [ROIC(1 - T) - k] * IC \quad [1.19]$$

Where:

- $ROIC(1 - T)$  = Return on Invested Capital (after taxes) =  $\left(\frac{EBIT}{IC}\right) * (1 - T)$  [1.20]
- $K$  = Cost of Capital, a weighted average of the required return for equity and debt (WACC).

So, knowing that EP measures the economic surplus created after all financing capital being remunerated, and that this surplus belongs to equity holders, if the EP has a positive value, it means that the company is creating value for shareholders, that is, they are receiving more than the required return. Logically, if the EP has a negative value, it means that the company is a net destroyer of value and the company's shareholders are receiving less than what they require in other investments with similar risk. Finally, if the EP has a null value, it means that all the investors, both equity and debt holders, are getting a normal return. In theory, in the long run, we should expect an EP of zero once the abnormal returns tend to disappear.

By looking to equation 1.18 and 1.19, it's possible to deduct that three basic inputs are needed: the return on invested capital, the cost of capital of the investments and the capital invested in them and, in order to measure them, many of the adjustments done in discounted cash flow valuation, will also be applied now, (Damodaran, 2004). In fact, Stern Stewart has reported over 160 proprietary adjustments but, obviously, only a few of them were applied to each client case, (Biddle et al., 1999). For example, on the case of invested capital in existing assets, we could use the market value of the firm but, it includes not only the capital invested on the assets in place but also in the expected future growth. Then, the book value of capital invested in assets in place can be a good alternative to the market value if, at least, the same adjustments needed in the DCF valuation are applied: convert operating leases into debt, capitalize R&D expenses and eliminate the effect of one-time charges, (Damodaran, 2004). The same adjustments are needed when computing the after-tax operating income in order to get the return on invested capital.

### **1.2.1. Relationship between the Economic Profit and the Firm's Value**

Several studies analyze this relationship and it was found that, through some restrictions, the EP approach is mathematically equivalent to the DCF model, namely, to the dividends model. In sum, and skipping here the demonstrations, we can start by defining the firm's equity value, according to the simple approach of future dividends discount, (Biddle et al., 1999):

$$\text{Intrinsic Firm's Equity Value (S)} = \sum_{t=1}^{+\infty} \frac{Div_t}{(1 + k_S)^t} \quad [1.21]$$

Where:

- $Div_t$  = Expected dividends for period t.
- $k_S$  = cost of equity.

Now, using the “clean surplus accounting” concept, that is, assuming that only earnings and dividends change the accounting book value of equity, and revaluation reserves do not have any impact, the Book Equity Value (BV) can be defined as:

$$BV_t = BV_{t-1} + NI_t - DIV_t \quad [1.22]$$

$$\text{Equivalently, } DIV_t = BV_{t-1} - BV_t + NI_t \quad [1.23]$$

If Residual Income (RI) is defined as:

$$RI_t = NI_t - k_S * BV_{t-1} \quad [1.24]$$

After doing the substitutions in the starting equation 1.22, the Firm’s Equity Value (S) can be described by the sum of the Firm’s Book Value of Equity and the discounted expected future abnormal profits:

$$S_0 = \frac{\sum_{t=1}^{\infty} [RI_t + (1 + k_S) * BV_{t-1} - BV_t]}{(1 + k_S)^t} \quad [1.25a]$$

If it is now assumed that  $\frac{BV_t}{(1+k_S)^t}$  tends to zero as t tends to infinite, then:

$$S_0 = BV_0 + \sum_{t=1}^{\infty} \frac{RI_t}{(1 + k_S)^t} \quad [1.25b]$$

Using equation 1.25b, the total firm’s value or Enterprise Value ( $V_0$ ) will be given by equation 1.26, that is, by the sum of the book value of invested assets ( $IC_0$ ) and the discounted expected future Economic Profits (Farinha, 2018).

$$V_0 = IC_0 + \sum_{t=1}^{\infty} \frac{EP_t}{(1 + k_S)^t} \quad [1.26]$$

### 1.2.2. Damodaran’s EP approach

In equation 1.26, the WACC necessary to compute EP is based on book values, which means, the weights of both equity and debt are based on accounting/book values:

$$WACC = \frac{BV}{IC} * k_S + \frac{D}{IC} * k_D * (1 - T) \quad [1.27]$$

However, Damodaran (1999b) introduces a new perspective of Economic Profit, assuming the following in its computation:

- Capital invested: book value of capital is not a perfect measure for this factor, since it incorporates accounting choices. On the other hand, the capital invested must reflect the investment already made and, if the market value is used, the future growth will be reflected. Thus, although it is not a good measure, it is better the use of book value.
- Operating Income: any financing or capital expenses must be removed from operating expenses.
- Tax rate: must be based on the taxes paid in the context of no debt.
- Cost of Capital: must be based on market values and given by a weighted average of the rate of return that equity investors require, cost of equity, and the rate at which the firm can borrow today, cost of debt. In other words, we should use WACC with weights based on market values rather than book values:

$$WACC' = \frac{S}{V} * k_S + \frac{D}{V} * k_D * (1 - T) \quad [1.28]$$

$$EP'_t = EBIT(1 - T)_t - WACC' * IC_{t-1} \quad [1.29]$$

$$V_0' = IC_0 + \sum_{t=1}^{\infty} \frac{EP'_t}{(1 + WACC')^t} \quad [1.30]$$

In principle, the Enterprise Value reached on equation 1.30 could be thought to be different from the one reached on equation 1.26, since different discount factors are used, WACC' and  $k_S$ , respectively. However, both formulas will be consistent if WACC' is based on market values. The comparison of these formulas leads to the conclusion that the simple approach (equation 1.26) is easier to compute since it is not necessary to estimate market values. Besides, Damodaran's approach has two complications, firstly, a valuation is needed to do another valuation and, secondly, there is an inconsistency by applying WACC' based on market values to book values, as is the case of Invested Capital.

### 1.2.3. Advantages and disadvantages of Economic Profit Approach

In my opinion, one of the main advantages of this approach, knowing that EP and DCF approach are equivalent, is the additional insight that it gives and that oblige us to have much more careful in the valuation process. Additionally, as Damodaran (2007) shows, in a

capital investment, the Net Present Value (NPV) is equivalent to the present value of future Economic Profits:

$$NPV = \sum_{t=1}^n \frac{EP_t}{(1 + WACC)^t} \quad [1.31]$$

This equality means that accepting a project with a positive NPV means accepting a project with a positive EP, leading to value creation. However, the truth is that NPV is not observed after the project's implementation but EP is, and that is one of the reasons for the potential use of EP as an incentive system. In fact, Biddle et al. (1999) found evidence that supports the idea that managers react to EVA and residual income-based incentives to increase shareholders' wealth, under certain conditions. Still in this context, Damodaran (1999b) also adds as advantages of this approach the fact that managers have much more control over this measure, like market price per share, since the return and the cost of capital are affected by their decisions, for example, investment and dividend decisions.

On the other hand, several studies point out the disadvantages of this approach. For example, in Damodaran (1999b) and Fernández (2002) there is an alert for the fact that the focus on year-to-year changes can be harmful since the value and shareholder value creation in each period cannot be based on accounting data because they depend on expectations, Fernández (2002). This problem becomes even more critical when there is expectation of high growth in the future, when the risk profile and leverage are not stable or when the current market value reflects expectations of significant excess returns, (Damodaran, 1999b). Biddle et al. (1999) that made a comparison between EP and accounting earnings give another failure of EP approach. These authors found that, on average, earnings and operating cash flows seem to be more closely associated with stock market returns than the economic profits. However, Francis et al. (2000) also studied this topic and found contradictory evidence. Unlike Biddle et al. (1999), they found that the residual income, which is basically EP, explains 71% of observed return variability, whereas the free cash-flow and the dividends explain only 51% and 35%, respectively, leading to the conclusion that EP approach has a superior performance. These ambiguous results show that this approach must be more studied, especially because its use as a tool to align shareholders' interests and corporate objectives is increasing within executives.

### **1.3. Relative valuation / valuation using multiples**

According to Damodaran (2007), relative valuation consists in valuing an asset based on how similar/comparable assets (in terms of cash flows, potential growth and risk) are valued/priced in the market. The main assumption of this valuation method is, therefore, that the market, on average, correctly values those similar assets and that value is linearly related to the factor in question, which means, the assumption that the market is efficient and makes a correct valuation of stock prices. Fernández (2001a) divides the multiples in three groups, equity, enterprise value and growth-referenced based multiples, like is shown in Annex A, table 5, presenting some examples of the most used multiples.

Damodaran (2007) identifies three essential steps in relative valuation: the first step is to identify comparable/ similar assets or firms, and get their market values. It is fundamental that these similar firms belong to the same sector and have similar sizes as the one that is being evaluated. The second step is to standardize the variables to make them comparable in cases where the comparable assets vary in size or units, which Damodaran (2007) calls “scaling market prices to a common variable”. This standardization can be done by using a common variable, for example, earnings, book values, cash flows or revenues. Damodaran (2002) denotes that the choice of multiples varies widely across sectors, for example, Enterprise Value/EBITDA multiples dominate valuations of heavy infrastructure businesses and price to book ratios are more common in financial service company’s valuations and the same is shown in Fernández (2001a). PER and EV/EBITDA are the most common used multiples. The third step is the adjustment for differences across the assets that could affect the multiple when comparing the standardized values, to see if the asset/firm is under or overvalued.

#### **1.3.1. Advantages and disadvantages of relative valuation**

The main advantages of this method are the fact of being market based, easier and quicker to compute than the income approach, (AM Corporate Services Pte. Ltd., 2017). However, there are several negative aspects of this market-based model. One of the main conclusions of Fernández (2001a) is that “multiples nearly always have broad dispersion”, in other words, makes it possible to get almost any source of value if the right ratio is picked from the huge number of possible ratios, and that is why the valuations got through this method are very debatable. But, Fernández (2001a) defends the usefulness that this approach

can have in a second stage, defending that a valuation using another method should be done first, for example, using an income approach as FCF. Then, the relative valuation may be used in order to assess if the projections are reasonable and seek to understand the differences between the firm under scope and its peers. For instance, analyse if the firm is under or over valued by comparing the valuation multiple with the average of its peers is one of the possibilities. The same conclusion was obtained by Mukherjee et al. (2004): in a M&A context and with a sample of 64 firms that reported acquiring closely held firms, 48.4% revealed that they would use DCF models and 37.6% the multiple approach. Additionally, from a sample of 75 responding firms, 49.3% revealed the use of DCF models to evaluate a target and 33.3% the use of both DCF model and multiple approach. Once again, these results show the dominance of DCF models and the idea that a multiple approach is not recommended as the basis for a valuation.

Other challenges faced with relative valuation are the choice of similar / comparable assets/firms, it is very subjective and it requires always the values' standardization and the necessary adjustments due to the possible differences on size, earnings, marketability and other risk and growth factors, (AM Corporate Services Pte. Ltd., 2017). Obviously, this affects the valuation of small and private firms, a multiple from a large listed firm probably is not very representative of a small private firm's multiple.

#### **1.4. Real Options Approach**

As it was already mentioned, in the traditional capital budgeting there is a superiority of NPV analysis but the problem is, NPV and other DCF approaches to capital budgeting do not incorporate perfectly the management's flexibility to adapt and revise later decisions as a response to unexpected market changes, (Trigeorgis, 1993). The adjustments that a firm can make after a project being accepted are a right but not an obligation to make a business decision and that is the definition of real options. This approach overcomes the NPV's problem of not taking into account the managers' role, that is, according to the conventional approach, managers are only needed to accept or reject a certain project, and, after the implementation, their role disappears. The fact is, the ability of taking decisions and making adjustments has an extra value that should be considered. Thus, according to this approach, the true value of a project is, at least, equal to NPV but, if there is flexibility, the projects' value will be higher than NPV and an expanded NPV analysis is more appropriate,



(Trigeorgis, 1993). In Annex A, Table 6, common examples of real options, their explanations and the sectors in which they are most relevant are presented.

There are three main models for valuing real options. The first one is the binomial option pricing model which assumes a discrete-time/discrete-value behavior.

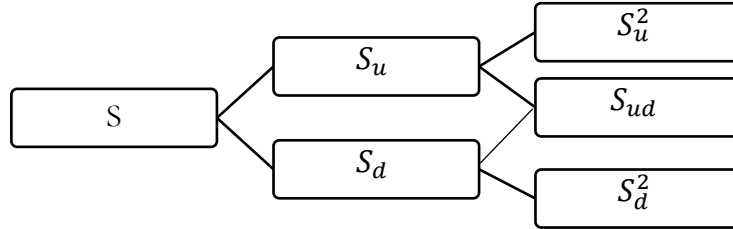


Figure 1- General Formulation for Binomial Price Path. Source: Damodaran (2005).

In Figure 1, S is the current stock price, which can move up to Su with probability p and down, to Sd, with a probability of 1-p, in any time period. This kind of valuation needs V, the gross project value, K, the investment cost, but also:

- Up:  $u = e^{\sigma\sqrt{\Delta t}}$  [1.32]

- Down:  $d = e^{-\sigma\sqrt{\Delta t}} = \frac{1}{u}$  [1.33]

- Probability up:  $p = \frac{e^{rf\Delta t} - d}{u - d}$  [1.34]

- Probability down:  $q = 1 - p$  [1.35]

Another possibility is the use of Black-Scholes model that applies when the limiting distribution, as the time interval approaches 0, is the normal distribution, when the price process is continuous and when there are no jumps in asset prices. Thus, the Black-Scholes model is not an alternative but a limiting case of the binomial model, Damodaran (2005). In this case, the value of the investment opportunity is computed as an European call option with dividends, being a function of S (current value of the underlying asset), K (strike price of the option), t (life to expiration of the option), r (the riskless interest rate corresponding to the life of the option),  $\sigma$  (standard deviation) and  $\delta$  (dividend-yield), as shown in equation 1.36.

$$C(S, X, r, \sigma, T, \delta) = Se^{-\delta T} N(d_1) - Xe^{-rT} N(d_2) \quad [1.36]$$

Where:

$$\bullet \quad d_1 = \frac{\ln\left(\frac{S}{X}\right) + (r - \delta + 0.5\sigma^2)T}{\sigma\sqrt{T}} \quad [1.37]$$

$$\bullet \quad d_2 = d_1 - \sigma\sqrt{T} \quad [1.38]$$

Finally, the third possibility is the Margrabe model, typically used for exchange options, that is, when the investment cost (k) is a stochastic variable rather than a deterministic variable. This happens when there is certainty regarding the investment cost today but there is uncertainty regarding the investment cost in the future, for example, if the project is deferred. Margrabe (1978) assumes that both the underlying asset (V) and exercise price (K) are random variables. The model has been adapted in order to include the dividend-yield on V, (Pereira, 2016):

$$dV = \alpha_v V dt + \sigma_v V dz_v \quad [1.39]$$

$$dK = \alpha_K K dt + \sigma_K K dz_K \quad [1.40]$$

Where  $\alpha_v = \mu V - \delta V$ ,  $\alpha_K = \mu K$ ;  $\mu V$  and  $\mu K$  represents the return on asset V and K, respectively, and  $\delta V$  is the dividend-yield of V. The value of an exchange option, that is, an investment opportunity with an investment cost that is not certain, is then given by:

$$\text{Investment Opportunity} = V e^{-\delta_v T} N(d_1) - K N(d_2) \quad [1.41]$$

$$d1 = \frac{\ln(V/K) + (-\delta_v + 0.5\sigma^2)T}{\sigma\sqrt{T}} \quad [1.42]$$

$$d2 = d1 - \sigma\sqrt{T} \quad [1.43]$$

Where:

- $\sigma^2 = \sigma_v^2 + \sigma_k^2 - 2\rho_{vk}\sigma_1\sigma_2$
- $\rho_{vk}$  = correlation between V and K

#### 1.4.1. Advantages and disadvantages of real options

Traditional methods are not able to capture real options that may be incorporated in many corporate actions, they do not consider the manager's role in a project, assuming that they are only needed to decide if the firm should or should not accept the project. This is the biggest advantage of real options valuation method, the capacity to explicitly incorporate and value real options, being that this factor can be substantial enough to justify an investment that otherwise would not be accepted.

However, several possible errors might happen through the application of this method. Fernández (2001b) provides a list of some of those errors, namely the “non-replicability

issue”. Both binomial and Black-Scholes models are built on the assumption that the option is replicable, in other words, it is assumed that a replicating portfolio can be created with the underlying asset and riskless lending or borrowing, (Damodaran, 2005). The problem is that this assumption is reasonable when talking about listed options on traded stocks but it may not be when the underlying asset is not traded and arbitrage is not feasible, and this leads to another possible error pointed out by Fernández (2001b), the valuation of contracts as they were real options when they are not. Still in the context of the assumptions made on Black-Scholes model, Damodaran (2005) adds other problems to this list. It is assumed that there are no “price jumps”, that is, the price process is continuous, which it is not true for many real options, which leads to the underestimation of deep out-of-the-money options’ value. Damodaran (2005) suggests as a solution the use of higher variance estimates to value deep out-of-the-money options and lower variance estimates for at-the-money or in-the-money options. This, in turn, constitutes another criticism made by Fernández (2001b), “playing with volatility”, assign a higher value to the option by assigning a high volatility, and the fact that the option’s volatility estimation is arbitrary and decisive on the option’s value.

Additionally, the assumption that establishes that the variance is known and does not change over the life of the option may be reasonable when talking about short-term options on traded stocks but it is probably unreasonable in the context of long-term real options, (Damodaran, 2005). Another dubious premise referred by Damodaran (2005) is the option’s instantaneous exercise, which may not be true with real options, for example, the exercise can involve the building of a plant. Finally, Fernández (2001b) argues that it is not correct to use as a discount rate for the expected value of the cash flows the risk-free rate. The uncertainty regarding the costs and sales in the exercise date may be greater or lower than the estimated today, therefore the cash flows must be discounted at a rate greater than the risk-free rate.

### **1.5. Most common used valuation techniques**

Finance books and the academics tend to highlight the importance of DCF valuation as the primary technique and relative valuation as a support to its results. However, some surveys show that financial professionals prefer the relative valuation because is more market-oriented and, most importantly, it is easier to implement and to understand. For example, in the case of financial advisory, probably the consultant will choose the valuation method according to the type of client that is leading with. For instance, if the client has no

experience or no knowledge in finance, it will be easier to show the results and the data with a relative valuation rather than with a DCF valuation that is more theoretical and academic and that requires the understanding of, at least, the two main inputs: the estimation of all future cash flows and the discount rate appropriate for the riskiness of the cash flows.

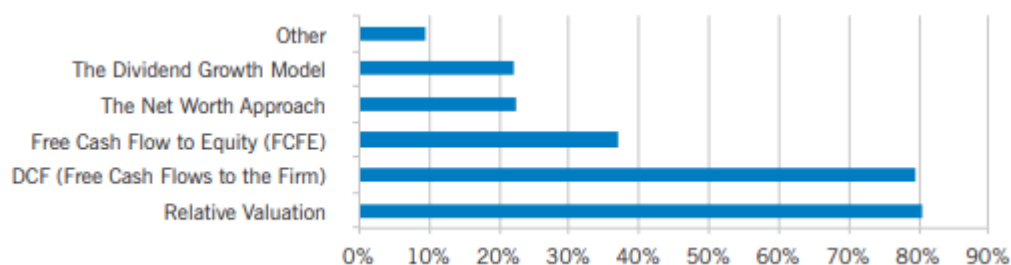


Figure 2- Popularity of different valuation methods (in percentage of respondents). Source: Bancel and Mittoo (2014).

According to a survey made by Bancel and Mittoo (2014) to 365 finance practitioners in various European countries with CFAs or equivalent professional degrees, the DCF and relative valuation seem to be equally popular, being that approximately 80% of the respondents use both techniques, as it is shown in Figure 2. Additionally, less than 40% of the respondents use the FCFE method and less than 22% use the Net Worth and the Dividend Growth Model. Models like EVA and option models are included in Others, which means that they are rarely used. These authors also provide results regarding how much valuation models professionals use, and they found that most respondents use more than one valuation method. The same results were found by Kantšukov & Sander (2016) on a survey made to Estonian financial professionals, most respondents use both multiples and DCF methods, but they implement DCF model in a way that almost turns it into a multiples model. The most popular multiple within the respondents is clearly the EV/EBITDA, 84% of the respondents use this multiple always or almost always when they decide to use a relative valuation.

An additional insight that Kantšukov & Sander (2016) provide is what they call “sociological hypothesis” which defines the different valuation cultures, that is, the differences regarding the choice of some valuation elements across professions, being that education apparently has no role on these differences. Demirakos et. al (2004) also analyzed the valuation methods used by 104 analysts from international investment banks in 26 UK listed companies and found another interesting result: the valuation techniques vary across industrial sectors, which means that the analysts apparently change their valuation methodologies according to the industry circumstances.

## 2. Small companies' uniqueness

### 2.1. Definition of SME

The second part of the literature review will focus on the central topic, the SMEs' uniqueness and its impact on the valuation. Thus, it is important to begin the section with two definitions: the definition of a company, in this case presented by Jensen and Meckling (1976), and small and midsized companies, being that there are no universal definitions.

*“The private corporation or firm is simply one form of legal fiction which serves as a nexus for contracting relationships and which is also characterized by the existence of divisible residual claims on the assets and cash flows of the organization which can generally be sold without permission of the other contracting individuals.”* Source: Jensen and Meckling (1976).

*“The category of micro, small and medium-sized enterprises (SMEs) is made up of enterprises which employ fewer than 250 persons and which have an annual turnover not exceeding EUR 50 million, and/or an annual balance sheet total not exceeding EUR 43 million.”* Source: Article 2 of the annex to EU Recommendation 2003/361/EC.

The definition of SMEs presented above is given by the EU Commission, for whom the main factors for the SMEs' definition are the staff headcount and the total turnover/balance sheet:

*Table 7- Main factors for the SMEs' definition. Source: European Commission (2016).*

<b>Company category</b>	<b>Staff headcount</b>	<b>Turnover or Balance Sheet total</b>
Medium-sized	<250	≤ € 50m or ≤ € 43m
Small	<50	≤ € 10m or ≤ € 10m
Micro	<10	≤ € 2m or ≤ € 2m

This definition is relevant since the case study presented in the next section is a Portuguese small company and, according to European Commission (2016), *“Nine out of every 10 enterprises is an SME, and SMEs generate two out of every three jobs”* so, given the importance of SMEs to the European economy, they're a major focus of EU policy. As it is shown in Figure 3, the trend of increasing importance of SMEs is also notorious in the particular case of Portugal. An example that shows that SMEs are a main focus of EU policy is the loan of 100 million euros from European Investment Bank (EIB) to the Development Financial Institution (DFI) in the context of the program "Restart and Modernize" of 2018. This program aims to provide tools to the SMEs who need funds to invest in innovation in order to become more competitive in the form of credit lines with favorable conditions, Negócios (2018).

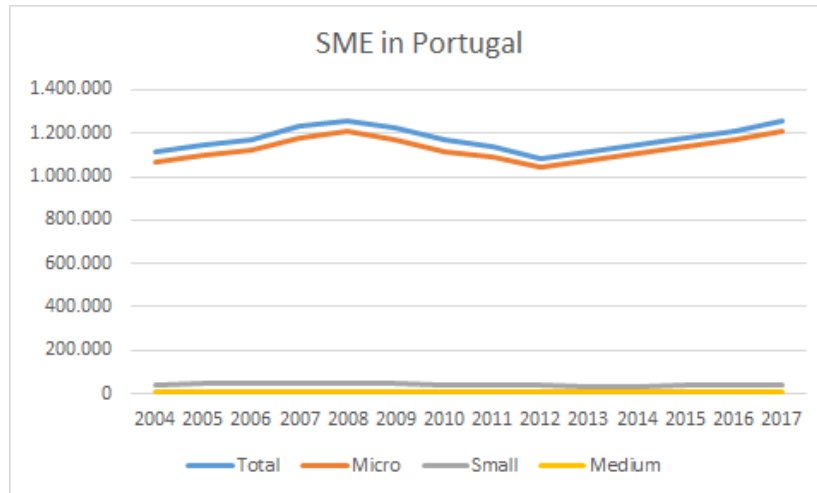


Figure 3- SME in Portugal: total and for size. Source: Pordata (2019).

## 2.2. Main differences between SMEs and big enterprises

Welsh and White (1981) introduce this problematic by saying, literally, that managers usually treat small companies as they treat big companies but in a smaller scale (“lower sales, smaller assets and fewer number of employees”). However, there are a set of unique characteristics of small companies that lead to a “special condition”, which require a different approach. Thus, as Jesus et. al (2001) argues, the financial theory, which has its roots on big and public companies, must be adjusted to the context of SMEs since the estimates of future cash-flows and the determination of the discount rate are subjective. Some of those unique characteristics that are possible to find in the literature are:

- Interdependence between the personal sphere of the entrepreneur and the corporate sphere, (Jesus et. al., 2001), freedom in accounting, and high degree of flexibility in the definition of the compensation system, (Ang, 1991). In this context, Damodaran (1999a) enumerates some issues that may appear in the cash flow estimation of private companies, namely, accounting statements based on accounting standards different from the ones used by public companies, as referred by Ang (1991). Other potential issues are the fact that some personal expenses may be reported as business expenses, the difficulty in separating salaries from dividends since they both end up with the owner and, finally, less historical data available.
- Still related with the above characteristic, the limited liability is absent or ineffective and this happens because banks and small companies have opposite interests. In other words, banks usually require as collateral for the loans personal guarantees or noncorporate

personal assets, while the businesses' owners want to protect their personal wealth from the corporate risk, preferring to pledge only business assets for corporate debt. Typically, in this situation, the banks' interests prevail so, it's ineffective to protect owners against personal losses from their businesses, (Levin and Travis, 1987; Ang, 1991).

- The above factor leads to another: the traditional concepts of equity and debt do not apply in private corporations since it is the owners' risk tolerance and not the company's capital structure policies that determine the amount of equity and debt. As it was explained before, the level of debt it is frequently determined by the owner's willingness to assume personal financial risk, being that more leverage means more personal risk. The same happens with the company's growth, it is also determined, at least in part, by the owner's willingness to assume personal financial risk, its intentions regarding the dividends, and the supply of additional equity or loans, (Levin and Travis, 1987).
- Normally, small companies' owners have undiversified personal portfolios, that is, what they invest in the company constitutes the major part of their personal wealth, (Ang, 1991). According to Damodaran (1999a), the owners of private companies who fully invest in their own businesses are holding on to these businesses at a discount, particularly if they are considering going public or selling to a publicly traded company.
- The company has no publicly traded securities, that is, it has neither debt nor stock traded in organized exchanges. This leads to other special characteristics, namely: lack of information, since it has low requirements for reporting information, low quality and asymmetric information, where the insiders are expected to be more well informed than the outsiders, no immediate market valuation for its shares and, the most important one, fewer sources of financing available for these companies. Additionally, small companies often face higher costs in their activity, for example, they're "likely to pay proportionally more in bankruptcy/failure costs, costs of compliance with regulations, transaction costs of financing, negotiation costs, and litigation costs", (Ang, 1991).
- Resource poverty, a concept introduced by Welsh and White (1981) to characterize the special condition that small companies have because of their size and unique characteristics, namely, "small businesses tend to be clustered in highly fragmented industries", like is the case of retail or services. In those cases, there is a lot of competition, which leads to price-cutting as a way of building revenues, even knowing that it can destroy profits. Additionally, a larger fraction of revenues is used to pay the owner-manager's salary than in a big company and, normally, a very small fraction is left

over to pay additional managers or to reward investors. In the same sense, usually, this kind of companies cannot afford accounting and bookkeeping services and training/testing for the new employees. Ang (1991) also points these aspects: usually the management team in small businesses is incomplete and with a low level of versatility, which can lead to the dependency to some key workers and to the inability to deal with different stages of the firm's development or with changes in external factors. Because of that, small companies are more affected by external forces like taxes, interest rates, policies changes, government regulations, among others, and, probably, there will be no "plan b" for succession in order to ensure the continuity of the business.

- Informal relationship between the small businesses' owners and outside stockholders and other stakeholders, being more implicit than contractual, and the inexistence of external auditors, (Jesus et. al., 2001; Ang, 1991). This leads to another problem that small companies may face: agency problems. Jensen and Meckling (1976) perceive the agency theory as involving a "contract under which one or more individuals, the principle, engage another individual, the agent, to perform some service on their behalf, which includes delegating some decision-making authority to that agent". If both parties on this relationship are utility maximizers, there is a good reason to believe that the agent will not always act in the best interest of the principle. On one hand, the combination of manager and owner's function on the same person solves the agency problem related with this relationship. On the other hand, all the characteristics that were mentioned above, for example, inexistence of publicly traded shares and consequent lack of prompt market valuation, lack of management diversity, ineffective limited liability, high monitoring costs and others, may create serious agency problems between the owners/managers and other stakeholders, (Ang, 1991).

### **2.3. Choice of the valuation method for SMEs**

After analyzing the SMEs unique characteristics, we now discuss which valuation method is the more adequate and, after deciding this, what are the required adjustments for that particular valuation method, in order to make it more suitable. Starting with the more adequate method for SMEs' case and going back to Table 1, Annex A, the problems or advantages of each method are the following:

- Balance sheet-based methods: according to Levin and Travis (1987), the balance sheet numbers may be distorted when the owners' lifestyle is taken into account, for example,



when the assets are inflated by including automobiles, airplanes or holiday houses. On the other hand, the bookkeeping may not include plants and warehouses that are held separately but are used for operations' purposes. Jesus et. al (2001) adds the possibility of not having tangible assets, as very often the SMEs' value is based on intangible assets like the owner's personal characteristics.

- Income statement-based methods: as it happens with the balance sheet, income statement's numbers can also be distorted in private companies, (Levin and Travis, 1987). The use of net income to evaluate how the business is developing has to be done carefully since some special items may be included on the after-tax profit like, for example, hiring someone from the family that may be serving more some personal interests rather than the profit margin's goals. Additionally, paying above the market rates for things like salaries, benefits, recreation and others, may increase artificially the costs that, in turn, decrease the capital productivity but, at the same time, achieves the owner's objective: "spendable income with the least painful tax consequences". For Levin and Travis (1987), relative valuation is still valid even with these special characteristics if the identification of which assets and equity are really part of the business is possible but, in the perspective of Jesus et. al (2001), this method is invalid due to the special condition of SMEs and the differences induced by size.
- Cash-flow discounting methods: regarding the dividends discount models, as is the case of Gordon's model, these may be invalid for SMEs since, in most cases, dividends are not distributed for the purpose of self-financing of their activities, (Jesus et. al., 2001). In relation to Discounted Cash-Flow (DCF) models, due to all the difficulties that may be found in the other models, Jesus et. al (2001) defend that this valuation method seems to be more suitable to the context of SMEs. Although some issues in the discount rate determination and in the cash flow estimation may be subject to discussion in this approach, namely, financial statements may not be an accurate source of information, reference values may be hard to find and, in the case of the discount rate, the measurement of non-systematic risks' effects may be difficult. These aspects will be discussed now with more detail, approaching the several adjustments needed in SMEs' valuation.

## II. Methodology

There are various studies in the literature about the differences that may be found between small firms and big firms, which were already discussed in the literature review. However, most of them are theoretical studies, that is, they do not present necessarily a real case to describe what happens in the business world. So, now that the differences between small and big firms were presented and the manner by which those differences affect the valuation methods was also discussed, in chapter 3, a case study will be presented from real-life, a Portuguese small company from plastic transformation sector being that, upon request, anonymity will be maintained in this study regarding the company identification. The idea of presenting an example of a SME is to apply, in practice, what is suggested by Jesus et. al (2001), which was the basis for this study and, at the same time, apply what I have learned in the internship, especially the procedures of a financial Due Diligence in the context of M&A, the area in which I worked the most during my internship. In this particular case, it will be a buyer DD, which means, the valuation will be done from a buyer's perspective. In order to make it clear the differences between the traditional methods and the method suggested by Jesus et. al (2001), in the next chapter, we will be present the valuation results obtained with the traditional methods and the valuation results reached from the valuation method that takes into account the company's unique characteristics, with all the necessary adjustments.

As it was mentioned before, the valuation method that will be used in the case study is the Discounted Cash-Flow (DCF) method since is the one that seems to be more suitable to the SMEs context. The adjustments and its explanation suggested by Jesus et. al (2001), which will be applied in the second part of Chapter 3, are now summarized.

- **Fixed assets:** it may be overstated or understated. As it was already explained, the SMEs can be the “formal” owners of some assets for personal use, like automobiles, airplanes, holiday houses, among others. Alternatively, the company may be using some assets that are included in the owners' personal patrimony for free, for example, buildings, warehouses, etc. In these cases, the amortizations should be adjusted or should be “created” a rent.
- **Inventories:** connected to Cost of Goods Sold and Consumed, these items must be verified due to their fiscal impact and ease of manipulation in companies like SMEs, who have more freedom in the annual reports' formulation. There are two possibilities, physical inventory count or, when that solution is not feasible, compare with the sector

averages or analyze the volatility of indicators like gross margin or inventories' average lifetime and make the consequent adjustments.

- **Cash and Cash Equivalents and Accounts Receivable:** in accounts receivable, it should be checked the existence of bad debts, the ones that probably will never be paid, which can be done with the ageing of clients. Regarding the cash and cash equivalents, it should be checked if there are no mistakes due to a confusion between the company's and the owners' accounts.
- **Liabilities' undervaluation:** liabilities can be understated in terms of market value due to the lower financing costs that, in turn, can be a consequence of personal guarantees or privileged relationship between the company and the banking system. Thus, it should be verified if these conditions are sustainable in the future. Jesus et. al (2001) also noticed the fact that, when it is difficult to get capital from third parties, high amounts of liabilities can be a sign of financial struggle instead of debt capacity, which should be noticed.
- **Relationship with shareholders and other close individuals:** care must be taken with accounts that are connected to the relationship between the firm with its shareholders or close people. Another consequence of the confusion between the company's patrimony and the owners' personal patrimony is the consideration of credits for personal use, for example, credits for personal consume or for the payment of individual income taxes, and this kind of credits can be everlasting. Additionally, it can be registered in Accounts Payable what Ang (1992) denominates "quasi-equity", which leads to the overestimation of liabilities and underestimation of equity. "Quasi-equity" refers to debts held by individuals or institutions that have an agreement with the company to not force bankruptcy in case of default payments and to share residual claims when the business is profitable again. Usually, this vehicle is used by the company's owners to put money in the company for fiscal reasons, to avoid transaction costs from the equity issue or for other reasons. In both cases, the possibility of uncollectability or the need of substitution of shareholder loans by remunerated equity or debt should be checked.
- **Sales and services rendered:** these accounts may be underestimated, for tax reasons or because some costs are pegged to turnover, for example, or overestimated, for instance, companies with accumulated tax losses may be overcharging.
- **Personnel costs:** this account may be also overstated, like is the case of paying salaries for individuals that do not work at the company (owner's family) or excessive compensations. Alternatively, it may be underestimated like it happens when the owner's

family members work at the company for salaries that are under the market values, which is frequent in SMEs, or when it is common practice unpaid overtime work. In these cases, this account should be adjusted for the market values.

- **External supplies and services:** once again, it should be done the separation between business and personal expenses and due attention should be given to what deviates from standards, for example, sector averages.
- **Intangible assets:** Ang (1992) argues about the intangible assets' effects in the company's future saying that, usually, SMEs especially family-owned businesses, have an intergenerational transfer issue. As it was explained before, very often, SMEs' value is based on intangible assets like personal characteristics of the owner, personal relationships, reputation, etc., thus, if the existent management is removed, probably there will be an elimination of company's value. On the other hand, if the existent management is retained in an acquisition, some of the firm's intangibles can be transferred. Thus, the intangible assets' effect on the company's future should be quantified.
- **Cost of debt:** unlike what happens with a big company, in the case of SMEs, the market interest rate or the peers' cost of debt are not a good proxy for the cost of debt. SMEs, usually, face financing difficulties and have particular factors, for example, personal guarantees, relationships with banks, etc. In this context, Jesus et. al (2001) suggest for the illiquidity premium computation the comparison between the company's historical cost of financing and the current market rate for loans with the same maturity. An additional adjustment should be made if most of the company's funding has a short term since, normally, the valuation period is long being that, the correction is equivalent to the differential between short-term and long-term rates identifiable through a yield curve.
- **Cost of equity:** as it was already mentioned, usually, small companies' owners have undiversified personal portfolios and so, CAPM it's not appropriate for the case of SMEs since one of the model assumptions is the investors' diversification. Alternatively, Jesus et. al. (2001) refers the Generalized CAPM (GCAPM) as suggested by Levy (1990), where investors hold portfolios with a small number of securities (undiversified portfolios) and which composition varies widely across investors, a phenomenon explained by the differential transaction costs that investors face. In this model, it is considered a segmented market, taking into account a biased portfolio by the lack of diversification of each investor and by the segment return. The problem of GCAPM is the segment return

calculation, the values of similar public companies cannot be used and applied to SMEs that are not public and SMEs' book values are also not an accurate source of information. In this context, Jesus et. al suggests the application of a "size premium" to CAPM, being determined, on one hand, by all the unique characteristics that were explained before, for example, dependency in relation to the owner, sector of activity, competitive position in the market, or its own size and, on the other hand, by the lack of liquidity. The discussion regarding the size premium was already made in 1.1.4.4.

### III. Case study

#### a. Macroeconomic context

Table 8- Macroeconomic data for Portugal and EU28. Source: Economist Intelligence Unit (2020).

Portugal	Actual numbers				Estimate		Forecast			
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Unit: % change										
Real GDP	1.8	2.0	3.5	2.4	1.9	1.6	1.8	1.8	1.7	1.9
Private consumption	2.0	2.6	2.1	3.1	2.2	2.1	1.9	1.6	1.6	1.7
Government consumption	0.8	0.8	0.2	0.9	0.5	0.7	0.6	0.6	0.6	0.6
Gross fixed investment	5.9	2.5	11.5	5.8	8.1	3.5	3.9	3.8	3.4	3.3
Exports of G&S	6.3	4.4	8.4	3.8	2.6	1.8	3.6	4.1	4.2	4.3
Imports of G&S	8.1	5.0	8.1	5.8	5.2	2.3	3.7	4.1	4.3	4.1
Domestic demand	2.4	2.2	3.3	3.2	3.0	1.8	1.9	1.9	1.8	1.8
Unemployment rate	12.4	11.1	8.9	7.0	6.3	6.2	6.1	5.7	5.8	5.3
EU28	Actual numbers				Estimate		Forecast			
Unit: % change	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
GDP	2.3	2.0	2.7	2.0	1.4	1.4	1.7	1.7	1.6	1.8
Private consumption	2.2	2.4	2.2	1.6	1.3	1.6	1.7	1.5	1.5	1.5
Government consumption	1.4	1.8	1.2	1.2	1.5	1.7	1.4	1.5	1.3	1.3
Gross investment	4.6	2.7	4.4	3.3	1.1	1.8	2.7	2.6	2.5	2.5
Exports of G&S	6.1	3.3	6.0	3.1	2.5	2.1	2.9	2.8	2.6	3.4
Imports of G&S	7.0	4.4	5.3	3.0	2.7	2.6	3.3	3.1	2.8	3.3
Domestic demand	2.5	2.3	2.4	1.9	1.3	1.7	1.9	1.8	1.7	1.7

As it is shown in table 8, the economic growth in European Union was robust in the period between 2015 and 2017 but, between 2018 and 2019, this growth has slowed down because of the less supportive external environment. Within the external factors that may explain this behavior, there is the slower growth in China, the US-China trade war, weakness in the major trading partners like UK and Turkey, and the negative impact of the new EU emissions regulations in the automotive sector, (EIU Global Forecasting Service, 2020a). In the short-term, it is expected maintenance of this subdued growth. The economic sentiment indicators have also decreased, which it is explained, mainly, by the global trade situation characterized by uncertainty, having as examples the Brexit process, which is already concluded, a potential greater slowdown in China and the increase in protectionism globally.

On the other hand, there is a sustainable wage growth, house prices are increasing, which leads to positive wealth effects, inflation is low and the low-interest rate, mainly in the construction sector, is improving investment, (EIU Global Forecasting Service, 2020a). Looking ahead the short-term, it's expected a recovery in growth resulting from the combination of the factors now mentioned with favorable financing conditions, advocated by the bold package of stimulus measures announced in September 2019 by the European Central Bank, at least some dissipation of the global uncertainties, the recovery of foreign demand and fiscal easing, (EIU Global Forecasting Service, 2020b). Globally, the trend is the same as the one described for the EU: after 2019's slowdown, it is expected an increase

in the world real GDP growth from 2020 onward, sustained by the emerging markets, which are expected to have stronger growth.

A disclaimer has to be made regarding the macroeconomic analysis and forecasts shown in this report. The data presented in this section does not take into account the effects of the new coronavirus (Covid-19) epidemic, which represents a serious threat to the global growth since it is impossible at this moment to predict the future, it will depend on several factors, namely on the virus spread and on the policymakers' decisions. The Economist Intelligence Unit forecasted global Real GDP growth for this year of around 2.3% at market exchange rates and now, with the epidemic, it expects global growth of 1% at market exchange rates. This forecast mentioned has as closing date March 16 and now, due to the high uncertainty that we are living, the forecast can be very different. The only certainty is that growth will be negatively affected by demand because the quarantine measures and the negative business and consumer sentiment will depress demand and, at the same time, by supply, since the factories closures and the supply chain disruptions will create supply constraints.

## **b. Industry Overview**

The valuation that will be presented next focus on a company from the plastic transformation sector, offering diverse plastic articles for food, pharmaceutical and furniture and garden, using injection molding processes. According to management information, in Portugal, there are more than a hundred plastic injection companies, some more specialized than others in a specific sector or industry. There are several companies specialized in the automotive sector, in which the target company has no production being that, so far, has been strongly focusing on two sectors: food and pharmaceuticals.

It is important, at this point, to make a brief overview of the plastic transformation sector and, more precisely, about rigid plastic packaging market. In this sector, only plastic material is used and the products have a relatively inflexible shape or form, for example, bowls and plastic plates in the case of food industry, or tubes and flasks in the case of pharmaceutical industry. It is possible to segment the rigid plastic packaging market by material type and by end-use industry, like is shown in table 9.

Table 9- Rigid plastic packaging market segments and sub-segments. Source: AMR (2019).

Segment	Sub-Segment	Revenue 2018 (\$Million)	Forecast 2026 (\$Million)	CAGR (2019-2026)
<b>Material</b>	PET	151,791.9	243,263.9	5.9%
	PP	24,989.4	40,888.0	6.1%
	HDPE	21,544.6	29,334.5	3.7%
	Other	18,524.0	26,948.3	4.6%
<b>End-use Industry</b>	Food and Beverage	123,522.0	183,584.0	4.9%
	Personal Care	23,745.1	39,755.9	6.4%
	Household	28,389.3	43,722.6	5.3%
	Healthcare	20,498.5	36,825.8	7.4%
	Others	20,695.1	36,546.4	7.1%

According to Allied Market Research (AMR) (2019), globally, the rigid plastic packaging market was valued in 2018 at \$216,850 million and it is expected to reach \$340,434.7 million in 2026, which represents a CAGR of 5.6%. Interestingly though, the market is expected to be driven by the growth in the plastic adoption in the two major sectors of the company that is evaluated in this report, that is, food and beverage industry and healthcare industry. The main drivers of this market are the following:

- Rise in the global consumption of consumer goods: according to AMR (2019), food and beverages industry presents the highest share in the rigid plastics packaging market in 2018, being one of the prominent end users of this kind of products. Some of the factors that contributes to this increase are the consumer expenditure growth, mainly in developing countries, the changes on the consumers' habits opting, for example, for packaged foods, and the usage of packaging as a way of differentiation in the highly fragmented consumer goods sector.
- The growth in reuse and recycle packaging: it was observed that the non-biodegradable properties of rigid plastic packaging could represent a serious threat to environment so, various players and governments have defined plans to reduce plastic waste by recycling. Additionally, some manufacturers are now using natural raw materials instead of synthetic materials in order to avoid the environmental issues.
- Rigid plastics' characteristics: besides the cost-effectiveness, it offers advantages like durability, light weight, cleanliness and good performance at low temperatures.

Regarding the industry's threats, there is the competition from flexible plastic packaging, which may have a negative impact on the rigid plastic packaging growth, being that, some companies are shifting their activity towards flexible packaging, in order to better respond to the consumer needs and sustainability, especially in the personal care market.



Another threat is the uncertainty regarding raw materials prices and the bargaining power of key material suppliers that are typically large companies. Finally, regarding the industry's opportunities, according to AMR (2019), between 2017 and 2018, e-commerce sales grew by 18%, which, in turn, offers a high potential future growth for retail and, consequently, increases the growth of rigid plastic packaging sector that has been trying to adapt itself to e-commerce industry.

### c. Financial Overview

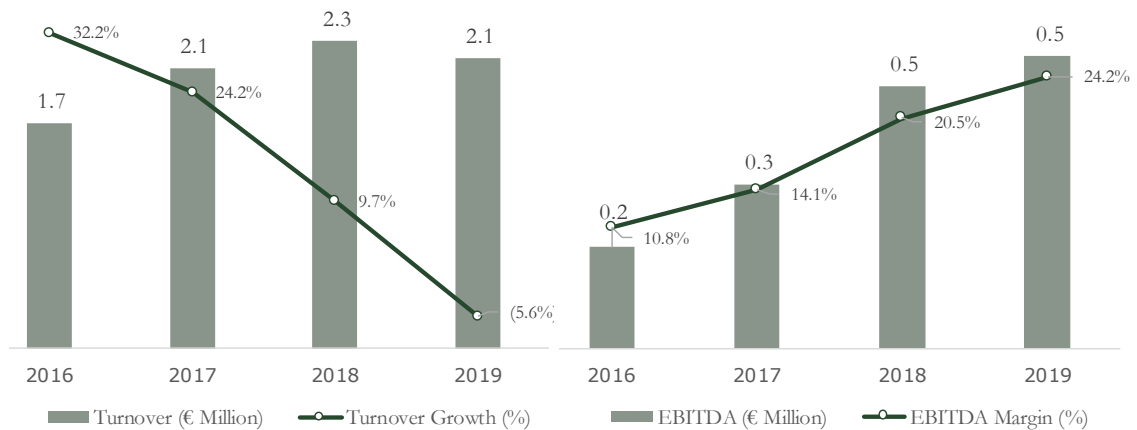


Figure 4- Turnover and turnover growth (2016-2019). Source: Management Information.

Figure 5- EBITDA and EBITDA Margin (2016-2019). Source: Management Information.

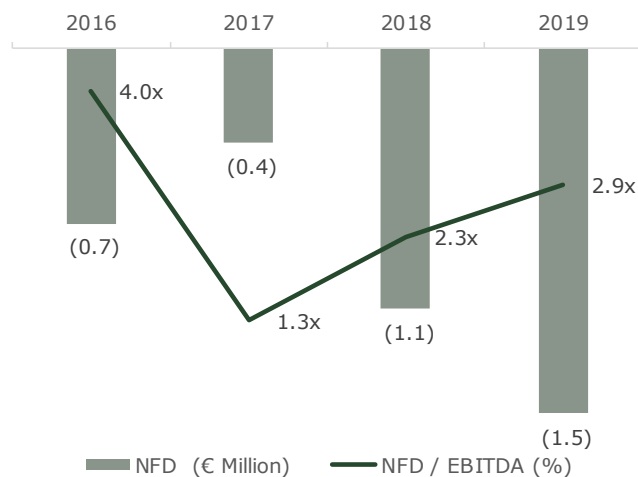


Figure 6- Net Debt and Net Debt / EBITDA (2016-2019). Source: Management Information.

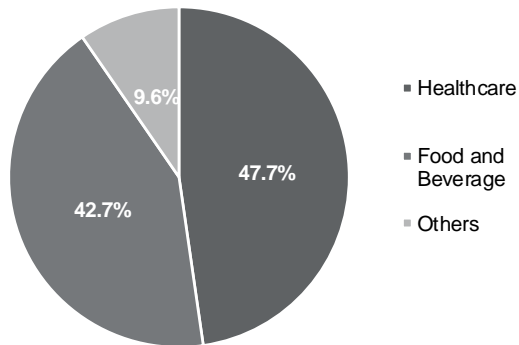


Figure 7- Sales per segment as of December 2019.

Source: Management Information.

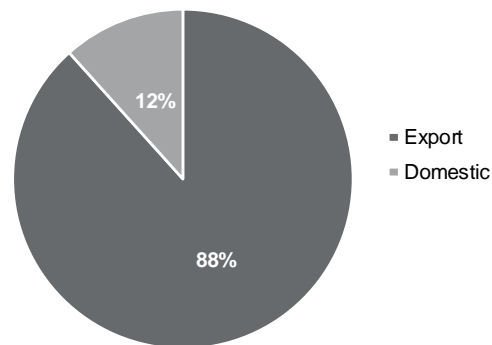


Figure 8- Sales per market as of December 2019.

Source: Management Information.

The company's under scope financial statements are presented in Annex B, Table 10 and 11. Regarding the figures 3, 4 and 5, the positive evolution of the key performance indicators are illustrative of the events occurred in the target company through this period. The company started its activity in 2009, right after the 2007-2008 financial crisis, only with 2 machines and 2 workers. Then, it started to hire more employees and invest in machines and other assets indispensable for their activity. In 2015, the company got a quality management certificate from ISO (International Organization for Standardization) and this was a crucial factor for their growth, as it is possible to see in figure 4, turnover growth from 2015 to 2016 was 32.3%. In 2017 and 2018, the firm got more certificates from ISO being, this time, more specific ones: medical devices (one of their major sectors), environmental management, and safety and health at work. According to International Organization for Standardization (ISO) (2020), one of the world's biggest and most recognized standards councils, these international standards provide international quality, efficiency and safety standards for products, services and systems. This gives consumers and other stakeholders more confidence, a competitive edge to the company and it helps regulators ensure that certain conditions are met, among other advantages like the risk reduction and relationship improvement with suppliers and investors, and the improvement of the company's brand.

Finally, in 2019, there was a rebranding in the company, and the launch of the new website with a corporate video, which shows the effort of innovation and attraction of new clients and business opportunities. All these improvements in the target company were reflected in the numbers. As it is observed in figure 5, EBITDA Margin grew from 10.8% to 24.2% and the total value of EBITDA grew from approximately 0.2 to 0.5 million euros, between 2016 and 2019, respectively. Turnover also had a positive evolution, even though

its growth had slowed down between 2018 and 2019, it still registered values above the ones registered in 2017. Still about turnover, figure 7 shows what was mentioned before, that is, the two major company's segments are healthcare, which represented 47.7% of sales, and food and beverage, which represented 42.7% of sales, being that the external market represented over 88% of the total sales in 2019. Finally, regarding net debt, according to Banco de Portugal, the ratio Net Debt/EBITDA for small companies included in CAE 2229 (outros artigos de plástico) was 2.8x, 3x and 3.2x for 2016, 2017 and 2018, respectively. This means that the target company has only recorded a higher value for this ratio in 2016 and, since that year, it has been below the sector average. In other words, since 2016 the company presents a favorable financial liquidity situation when compared to the sector averages.

#### d. Valuation

As it was explained in the methodology chapter, we will now present the valuation results obtained with the traditional methods and the valuation results reached using the valuation method that takes into account the company's unique characteristics, with all the necessary adjustments that were cleared through a financial due diligence and based on the analysis of 31 December of 2019. The main valuation models' assumptions are described in Annex C and the financial forecasts maps are presented in Annex D.

Starting with the valuation model without taking into account any adjustments, the results obtained were the following:

*Table 27- Discounted FCFF valuation results without taking into consideration the potential due diligence*

€000	Forecasts					Perpetuity	Perpetuity	
	2020	2021	2022	2023	2024	2025 Standard	Alternative	
EBIT	241	240	226	182	451	435		
Corporate income tax	(54)	(54)	(51)	(41)	(101)	(98)		
Depreciation and amortisation	335	402	466	554	328	388		
Changes in Working Capital	(138)	(114)	(81)	(70)	(68)	(66)		
Capex	(351)	(414)	(471)	(554)	(328)	(388)		
<b>FCFF</b>	<b>32</b>	<b>60</b>	<b>89</b>	<b>71</b>	<b>281</b>	<b>271</b>	<b>4,998</b>	<b>4,560</b>
Discount Factor	1	1	1	1	1	2	2	2
Disc FCFF	<b>30</b>	<b>52</b>	<b>72</b>	<b>53</b>	<b>196</b>	<b>175</b>	<b>3,233</b>	<b>2,950</b>
PV of FCFF 2020 to 2025	578							
PV of TV @ 2025	2,950							
<b>PV FCFF (Enterprise Value)</b>	<b>3,527</b>							
(-) Net Debt	1,511							
<b>Value of Firm's Equity</b>	<b>2,016</b>							
Implicit Ronic [(1) / (2)]							11.9%	7.5%
(1) Perpetuity growth rate							2%	2%
(2) Reinvestment rate							17%	27%

Then, the potential adjustments presented in table 28 and 29 were identified through a financial due diligence process and considering the literature suggestions, being then incorporated in the last historical year, 2019, affecting the forecasted maps presented in annex D and, consequently, the DCF valuation results presented in table 30.

Table 28- Potential adjustments identified with the due diligence process. Source: Management information and own analysis.

Adjustment	Area	Type of adjustment	Analysis
1	Tangible fixed assets	Due diligence adjustment.	<p>It was found a difference of €12k in terms of tangible fixed assets' gross value and €58k in terms of accumulated depreciation between the accounting and the amortization and reintegration map provided by management, being the accounting values lower.</p> <p>Regarding to what is suggested in the literature of checking if there is a confusion between the owners and the company's patrimony, with the information provided, that problem was not identified.</p>
2	Trade Receivables	Adjustment suggested in literature: it should be checked the existence of bad debts through the ageing of clients.	<p>Management has provided the ageing of trade receivables as of April 2020 and not as of December 2019 due to management software limitations, since the company has a dynamic system. An invoice of over €3k with an ageing of more than 92 days was adjusted. However, it has to be noticed that it is a client that continues to buy from the company and the continuous relationship may mean that the invoice can still be recovered. It was adopted a conservative strategy.</p>
3	Trade Payables	Due diligence adjustment.	<p>Management has provided the ageing of trade payables as of April 2020 and not as of December 2019 since, as it happens with trade receivables, the company has a dynamic system. Trade receivables' balances invoiced for more than 100 days were adjusted (over €92k), once again adopting a conservative strategy not having more information available.</p>
4 and 5	Other operating income	Due diligence adjustment.	<p>"Gains on other financial instruments" and "term deposits' interest" are being recorded within the Other operating income caption. Given its financial nature, it should be excluded from the normalized EBITDA.</p>
6 and 7	Other operating income	Due diligence adjustment.	<p>Income recorded in 2019 relating to "insurance gains" and "benefits of contractual penalties" should be excluded from normalized EBITDA due to its non-recurring nature.</p>
8	Operating subsidies	Due diligence adjustment.	<p>Income recorded in 2019 relating to operating subsidies should also be excluded from normalized EBITDA due to its non-recurring nature.</p>

Adjustment	Area	Type of adjustment	Analysis
9 and 10	Other receivables	Due diligence adjustment.	It was adjusted €153k to be received from an investment supplier and €20k from a land. Due to their nature, they should be excluded from NWC and considered as debt-like items for transaction purposes.
11	Other receivables	Due diligence adjustment.	It was found a stationary balance, since 2016, registered in other receivables that should be excluded from NWC.
12	Other payables	Due diligence adjustment.	As it happens with trade receivables, the €2k registered in other payables regarding investment suppliers should be excluded from normalized NWC due to their investment nature and be considered as debt-like items.
13	Net Financial Debt	Due diligence adjustment.	It was found a debit balance from a client on loans. This receivable must be withdrawn from the normalized NWC since, in the post-transaction context, there is no guarantee of payment.
14	Other equity instruments	Due diligence adjustment.	The supplementary capital that totalized €150k on December 2019 should be considered as a debt-like item. Alternatively, it could be included in the transaction price.
15	Sales and services rendered	Due diligence adjustment.	. It was found a difference of €55k in terms of total turnover's value between the accounting and the internal sales summary provided by management, registering the last a higher value. However, since it is an internal file, it can only be questioned the information quality. . Additionally, about 48% of the company's turnover concerns the health sector, with only one customer in this sector. It is recommended to include guarantees and protections in the SPA (Share Purchase Agreement) on this topic.
16	Intangible assets	Adjustment suggested in literature: very often, SMEs' value is based on intangible assets like personal characteristics of the owner, personal relationships, reputation, etc., thus, if the existent management is removed, probably there will be an elimination of company's value.	The company's owner is simultaneously partner, manager, maintenance technician and administrator, which shows clearly its importance for the company's activity. A permanence agreement could be established with the owner so that he can transmit the know-how to the new management and maintain the company's sales and profitability.

Adjustment	Area	Type of adjustment	Analysis
17	Liabilities	Adjustment suggested in literature: it may be overestimated due to lower financing costs, which can be a result of personal guarantees or privileged relationship between the banking system and the company. Thus, it should be checked the sustainability of those conditions.	According to management, there are personal guarantees ("aval") from the partners in the financing contracts. It is recommended the discussion of this topic with a legal advisor. It could be included in the transaction price since, probably, after the transaction shareholders will get rid of those guarantees so, in that case, they may accept a reduction in the transaction price.
n.a.	Personnel costs	Adjustment suggested in literature: it may be overestimated by paying for workers that do not work at the company, for example, owner's family members, or underestimated by not paying or paying under the market values to family members or close individuals. In those cases, it should be adjusted for the market values.	The owner's wife is a partner and since 2019 company's director, and it had no remuneration between August 2016 and November 2019 but, according to management, this partner had no previous role. If instead, she had played any role during that period, a gross-up adjustment over its remuneration would be recommended.
n.a.	Inventories	Adjustment suggested in literature: in companies like SMEs it is relatively easy to manipulate and, since it is connected with COGS and has a fiscal impact, it should be done a physical count or it should be compared with the sector averages or analyse its volatility.	Management provided a physical count of its inventories by typology and reference and no difference was found in relation to the total value registered in accounting.
n.a.	Cash and Cash Equivalents	Adjustment suggested in literature: it should be checked if there are no mistakes due to a confusion between the company's and the owners' accounts.	Management provided the company's bank statements and they were all on behalf of the company.
n.a.	Relationship with shareholders and other close individuals	Adjustment suggested in literature: for example, it can be considered credits for personal use or it can be registered in accounts payable "quasi-equity".	. Regarding the credit, management provided the CRC (Central de Responsabilidades de Crédito) from Banco de Portugal and the company's bank statements, and it was not found any credit for personal use. . In relation to accounts payable, it was not found registered "quasi-equity".
n.a.	External supplies and services	Adjustment suggested in literature: it should be done the separation between business and personal expenses and due attention should be given to what deviates from standards.	The external supplies and services detail was not provided so, no conclusions were reached on this topic. However, it has to be noticed that the ESS presented a lower total value in relation to the sector average, with the exception of 2017.

Table 29- Proposed due diligence adjustments summary. Source: Management information and own analysis.

€000	FY19 / Dec19				
	EBITDA	NWC	NFD	NA	NC
<b>Reported figures</b>	520	887	(1,511)	762	1,386
<b>Adjustments</b>					
1 Tangible Fixed Assets	-	-	-	(70)	(70)
2 Trade receivables with ageing	-	(3)	-	(3)	-
3 Trade payables with ageing	-	92	(92)	-	-
4 Gains on other financial instruments	(76)	-	-	(76)	-
5 Term deposits' interest	(0)	-	-	(0)	-
6 Insurance gains	(1)	-	-	(1)	-
7 Benefits of contractual penalties	(24)	-	-	(24)	-
8 Operating subsidies	(9)	-	-	(9)	-
9 Investment supplier in other receivables	-	(153)	153	-	-
10 Land in other receivables	-	(20)	20	-	-
11 Standstill balance in other receivables	-	(38)	38	-	-
12 Investment supplier in other payables	-	2	(2)	-	-
13 Positive balance in NFD	-	-	(48)	-	48
14 Other equity instruments	-	-	(150)	(150)	-
<b>Total adjustments</b>	<b>(109)</b>	<b>(119)</b>	<b>(82)</b>	<b>(332)</b>	<b>(22)</b>
<b>Reported figures after adjustments</b>	<b>411</b>	<b>768</b>	<b>(1,593)</b>	<b>430</b>	<b>1,364</b>
<b>Other matters</b>					
15 Supplier dependency					
16 Owner's permanence agreement					
17 Personal guarantees referent to loans					
<b>Reported EBITDA / Turnover %</b>	24.2%				
<b>Normalised EBITDA / Turnover %</b>	19.1%				

Table 30- Discounted FCFF valuation results taking into consideration the potential due diligence adjustments. Source: Management information and own analysis.

€000	Forecasts					Perpetuity Standard	Perpetuity Alternative
	2020	2021	2022	2023	2024		
EBIT	128	120	96	44	303	277	
Corporate income tax	(29)	(27)	(22)	(10)	(68)	(62)	
Depreciation and amortisation	335	402	466	554	328	388	
Changes in Working Capital	(119)	(99)	(70)	(60)	(59)	(57)	
Capex	(304)	(414)	(471)	(554)	(328)	(388)	
<b>FCFF</b>	<b>12</b>	<b>(18)</b>	<b>(0)</b>	<b>(26)</b>	<b>176</b>	<b>158</b>	<b>2,681</b>
Discount Factor	1	1	1	1	1	2	2
Disc FCFF	11	(15)	(0)	(19)	120	99	1,689
PV of FCFF 2020 to 2025	196						
PV of TV @ 2025	1,723						
<b>PV FCFF (Enterprise Value)</b>	<b>1,919</b>						
(-) Net Debt	1,593						
<b>Value of Firm's Equity</b>	<b>326</b>						
Implicit Ronic [(1) / (2)]						8.4%	8.0%
(1) Perpetuity growth rate						2%	2%
(2) Reinvestment rate						24%	25%

As was mentioned in Annex C, section C.7., in table 28 and 30 the standard and the alternative way of calculating the terminal value are presented. In both valuation models, with and without adjustments, the implicit RONIC is higher than WACC in the standard approach, whereas in the alternative way it is equal to WACC, which was the model assumption. In these cases, if the standard approach was the one chosen, which would imply the use of the net working capital and CAPEX of the last projection year as the basis for the terminal value, there would be an underestimation of the investment needs when compared to the situation of WACC equal to RONIC. This had an impact on the terminal value of -4.4% and -0.4% in the valuation models, without and with adjustments, respectively.

Regarding the valuation results, as it is shown in table 29, the proposed adjustments had a negative effect in EBITDA as at FY19 (it represented 24.2% of total revenues before and now it represents 19.1%), and in Net Working Capital, Net Assets, Non-Current Assets, and Net Financial Debt as at Dec19. Obviously, this also had a significant negative effect on the valuation results, the firm's equity value had decreased from 2,016 thousand euros to 326 thousand euros (decrease of 1,690 thousand euros). This shows that, if the unique characteristics of a firm are taken into account during the valuation process and a careful due diligence work is carried out, the value that the bidder needs to pay in order to get 100% of the target firm's equity can change drastically.

As a complement to the DCF valuation, an Economic Profit-based valuation was also developed since, as it was mentioned in chapter 1, section 1.2, it is equivalent to the DCF valuation and it highlights when and how the company creates value, giving an additional insight about the valuation. The following results were obtained:

*Table 31- Economic profit-based valuation results taking into consideration the potential due diligence adjustments. Source: Management information and own analysis.*

€000	Forecasts						Perpetuity
	2020	2021	2022	2023	2024	2025	
EBIT (1-T)	99	93	75	34	235	215	
Wacc	8%	8%	8%	8%	8%	8%	
Capital Employed (CE)	2,199	2,310	2,385	2,445	2,504	2,561	
Economic Profit (EP) = EBITt (1-T) - Wacc x CET-1	(70)	(83)	(110)	(157)	39	14	139
EPt as % of CET-1	(3.3%)	(3.8%)	(4.8%)	(6.6%)	1.6%	0.6%	0.3%
Discount Factor	1	1	1	1	1	2	2
Discounted EP	(65)	(71)	(87)	(115)	27	9	88
Present Value of future EPs	(215)						
Capital Employed	2,134						
<b>PV FCFF (Enterprise Value)</b>	<b>1,919</b>						
(-) Net Debt	1,593						
<b>Value of Firm's Equity</b>	<b>326</b>						

In order to support the above valuation and to see the evolution of some key performance indicators during the projection period, some main ratios were computed:

*Table 32- Main ratios analysis during the projection period. Source: Management information and own analysis.*

	Forecasts					
	2020	2021	2022	2023	2024	2025
Fixed Assets	1,313	1,325	1,330	1,330	1,330	1,330
FA/Sales	53.1%	48.2%	45.1%	42.7%	40.5%	38.7%
Net Working Capital	886	985	1,055	1,116	1,175	1,231
NWC (days)/Sales	130.7	130.7	130.7	130.7	130.7	130.7
NOPLAT	99	93	75	34	235	215
<b>ROIC</b>	<b>4.5%</b>	<b>4.0%</b>	<b>3.1%</b>	<b>1.4%</b>	<b>9.4%</b>	<b>8.4%</b>
NFD	(1,915)	(1,969)	(2,006)	(2,070)	(1,930)	(1,806)
EBITDA	463	522	563	597	632	665
<b>NFD/EBITDA</b>	<b>4.1x</b>	<b>3.8x</b>	<b>3.6x</b>	<b>3.5x</b>	<b>3.1x</b>	<b>2.7x</b>
Equity	304	361	399	395	594	775
Assets	2,819	2,996	3,119	3,220	3,319	3,414
<b>Financial Autonomy</b>	<b>10.8%</b>	<b>12.0%</b>	<b>12.8%</b>	<b>12.3%</b>	<b>17.9%</b>	<b>22.7%</b>



Knowing that the economic profit (EP) measures the economic surplus created after all financing capital being remunerated, it is reasonable to say that, until 2023, the company will be a net destroyer of value and shareholders will receive less than what they would require in other investments of similar risk. But, in 2024, and according to the projections, ROIC will become higher than WACC and so, the EP in that year will become positive, marking the point where the company starts to create value to its shareholders. Additionally, it is also important to notice that, in perpetuity, the value of EP as a percentage of the capital employed is 0.3%, value that is within the range -5% and 5% that typically is found in the literature as being the interval in which the majority of the firms are. Finally, regarding the two other ratios, it is observed that the financial autonomy will improve each year, which means that the company will become more financially stable; and, regarding NFD/EBITDA, it will decrease which means that the company will be able to repay its debt in a lower period.

### e. Sensitivity Analysis

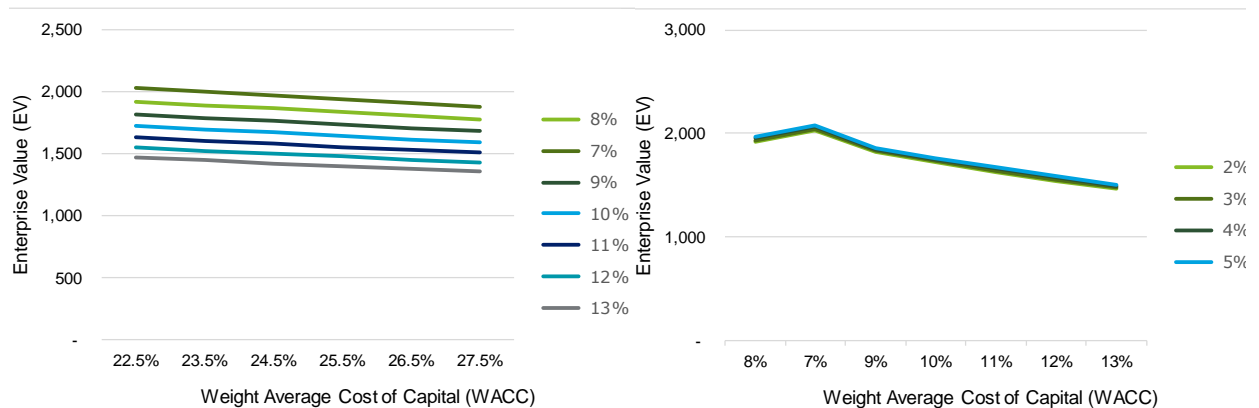


Figure 9- Impact on the Enterprise Value of changes on corporate tax rate (based on WACC). Source: own analysis. Figure 10- Impact on the Enterprise Value of changes on perpetual growth rate (based on WACC). Source: own analysis.

Table 33- Impact on the Enterprise Value of changes on WACC and g. Source: own analysis.

		WACC						
		8%	7%	9%	10%	11%	12%	13%
Perpetual growth rate	2%	1,919	2,028	1,816	1,720	1,630	1,545	1,465
	3%	1,936	2,046	1,832	1,735	1,644	1,558	1,478
	4%	1,953	2,064	1,848	1,751	1,658	1,572	1,491
	5%	1,970	2,082	1,864	1,766	1,673	1,586	1,504

Due to the uncertainty of some parameters that are assumed in the valuation process, a sensitivity analysis may be an interesting exercise to test how the Enterprise Value can vary and to test the robustness of the model. It is important to notice that the sensitivity analysis represented in Figure 10 and Table 33 are possible to perform since the alternative formula of calculating the terminal value was adopted and, consequently, the cash flows are directly linked to growth and ROIC, otherwise it would not make sense.

## Conclusion

This report started with the contribution of Welsh and White (1981), which argues that managers usually treat small companies as they treat big companies but on a smaller scale. If an M&A perspective is adopted, since the case study presented includes a transaction context, perhaps it should be added to this argument that common bidders like private equities, investment banks, investment funds, and other entities, usually do the same: they do not take into account the special condition of small firms. Some surveys show that financial professionals prefer the relative valuation for being more market-oriented and, most importantly, for being easier to implement and to understand. However, as Jesus et. al. (2001) defends, the relative valuation is not suitable to the case of Small-Medium Enterprises since it doesn't incorporate their special characteristics, and because of the differences induced by size.

Thus, through this report, one finds the answers to the two main research questions. The first question is if there are, in fact, significant differences between small and big firms, for which the answer found was positive and an extensive list of differences was presented. The second question is: if those differences exist, how could these be managed or taken into account, and what are the best procedures to adopt. Regarding the last question, the Discounted-Cash Flow valuation was the method found to be more suitable for the case of SMEs but a set of adjustments should be applied, according to the literature, in order to include in the valuation method the unique and value-relevant characteristics of this kind of firms.

In order to clear out the process just described and its impact, a real-life case study was presented in the last chapter of this report as well as the DCF valuation results in the two case scenarios. In other words, in one case it was not taken into account the special condition of the target company and, in the other case, a financial due diligence work, and a check for the existence of potential adjustments in a transaction context was made. The results suggest that a careful analysis of a company and its singular nature can indeed affect its valuation. Finally, it has to be noticed that there was some information limitations, this being the reason why not all the adjustments suggested in the literature were analyzed.

For future research, it could be interesting to apply the same process to a company that has recently gone through a transaction, in order to compare the valuation results to the transaction value, and to a company where access to information was in any way restricted.

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## Annex A

Table 1- Main valuation methods. Source: Fernández (2007).

Main valuation methods					
Balance Sheet	Income Statement	Mixed (Goodwill)	Cash Flow Discounting	Value creation	Options
. Book value . Adjusted book value . Liquidation value . Substantial value	. Multiples . PER . Sales . P/EBITDA . Other multiples	. Classic . Union of European Accounting Experts . Abbreviated income . Others	. Equity cash flow . Dividends . Free cash flow . Capital cash flow . APV	. EVA . Economic profit . Cash value added . CFROI	. Black and Scholes . Investment option . Expand the project . Delay the investment . Alternative uses

Table 5- Examples of the most used multiples. Source: Fernández (2001a).

Equity multiples (based on the company's capitalization)	Enterprise Value multiples (based on the company's value)	Growth-referenced multiples
<b>PER</b> (Price Earnings Ratio) = market capitalization/total net income= share price / EPS (earnings per share)	<b>EV/EBITDA</b> = Enterprise Value / Earnings before interest, tax, depreciation and amortization.	<b>P/EG</b> or <b>PEG</b> = PER / growth of earnings per share in the next few years
<b>P/BV</b> (Price to Book Value) = market capitalization / book value of shareholder's equity	<b>EV/Sales</b> = Enterprise value / Sales	<b>EV/EG</b> = EV / EBITDA (historic) / growth of EBITDA in the next few years
<b>P/S</b> (Price to Sales) = market capitalization / sales= share price / sales per share	<b>EV/FCF</b> = Enterprise Values / (EBITDA-increased working capital requirements-capital investments)	



Table 2- Cash flow discounting basic stages in the performance of valuation. Source: Fernández (2007).

<b>1. Historic and strategic analysis of the company and the industry</b>	
<b>A. Financial analysis</b>	<b>B. Strategic and competitive analysis</b>
Evolution of income statements and balance sheets Evolution of cash flows generated by the company Evolution of the company's investments Evolution of the company's financing Analysis of the financial health Analysis of the business risk	Evolution of the industry Evolution of the company's competitive position Identification of the value chain Competitive position of the main competitors Identification of the value drivers
<b>2. Projections of future flows</b>	
<b>A. Financial forecasts</b>	<b>B. Strategic and competitive forecasts</b>
Income statements and balance sheets Cash flows generated by the company Investments Financing Terminal value Forecast of various scenarios	Forecast of industry's evolution Evolution of the company's competitive position Identification of the value chain Competitive position of the main competitors
	<b>C. Consistency of the cash flow forecasts</b>
	Financial consistency between forecasts Comparison of forecasts with historic figures Consistency of cash flows with the strategic analysis
<b>3. Determination of the cost (required return) of capital</b>	
For each business unit and for the company as a whole Cost of debt, required return to equity and weighted cost of capital	
<b>4. Net present value of future flows</b>	
Net present value of the flows at their corresponding rate. Present value of the terminal value Value of the equity	
<b>5. Interpretation of the results</b>	
Benchmarking of the value obtained: comparison with similar companies Identification of the value creation. Sustainability of the value creation (time horizon) Analysis of the value's sensitivity to changes in the fundamental parameters Strategic and competitive justification of the value creation	

Table 4- WACC methodology and data requirements. Source: Koller et. al (2010).

Component	Methodology	Data requirements	Considerations
<b>Cost of equity</b>	Capital asset pricing model (CAPM)	<ul style="list-style-type: none"> <li>• Risk-free rate</li> <li>• Market risk premium</li> <li>• Company beta</li> </ul>	<p>Use a long-term government rate denominated in same currency as cash flows.</p> <p>The market risk premium is difficult to measure. Various models point to a risk premium between 4.5% and 5.5%.</p> <p>To estimate beta, lever the company's industry beta to company's target debt-to-equity ratio.</p>
<b>After-tax cost of debt</b>	Expected return proxied by yield to maturity on long-term debt	<ul style="list-style-type: none"> <li>• Risk-free rate</li> <li>• Default spread</li> <li>• Marginal tax rate</li> </ul>	<p>Use a long-term government rate denominated in same currency as cash flows.</p> <p>Default spread is determined by company's bond rating and amount of physical collateral.</p> <p>In most situations, use company's statutory tax rate. The marginal tax rate should match marginal tax rate used to forecast net operating profit less adjusted taxes (NOPLAT).</p>
<b>Capital structure</b>	Proportion of debt and equity to enterprise value		Measure debt and equity on market, not book, basis. Use a forward-looking target capital structure.

Table 6- Examples of common real options. Source: Chevalier-Roignant & Trigeorgis (2011).

Real option type	Description	Relevant industries
<b>Deferral or waiting option</b>	Management can wait before making the investment to see how the market unfolds.	Resource extraction industries, real-estate development, capital-intensive industries.
<b>Staging or time-to-build option</b>	When a managerial decision takes time or is done in stages, management can default if market prospects prove worse than expected.	Technology-based firms (R&D), long-development capital intensive industries (e.g., electrical utilities), startup ventures.
<b>Expand or extend option</b>	If the project turns out better than expected, management can spend more to expand the project scale or it can extend the project's useful life.	Natura-resource industries (e.g., mining), real-estate development.
<b>Contract or abandon option</b>	If the market prospects are worse than expected, managers can contract or abandon it for salvage.	Capital-intensive industries (e.g., airplane manufacturers), new product introductions.
<b>Switching option</b>	Management can select among the best of several alternatives, e.g., inputs, outputs or locations, under the prevalent market conditions.	Multinational firms with production facilities in different currencies, platform strategy in the automotive sector.
<b>Compound option</b>	If investment takes place, the first project can be valued in view of the future growth options it creates.	High-tech, R&D, industries with multiple product generations, strategic acquisitions.

## Annex B

Table 10- Company's under scope balance sheet. Source: Management information and own analysis.

<b>Balance Sheet</b>					
€000	Dec15	Dec16	Dec17	Dec18	Dec19
Property, plant and equipment	428	549	748	1,389	1,349
Intangible assets	0	0	0	17	17
Other financial assets	20	17	16	17	20
<b>Non-current assets</b>	<b>448</b>	<b>566</b>	<b>764</b>	<b>1,423</b>	<b>1,386</b>
Inventories	192	52	83	23	194
Trade receivables	530	1,141	1,707	1,067	992
State and other public entities (assets)	75	53	107	123	64
Shareholders / Partners	-	93	-	-	-
Other receivables	37	38	39	119	212
<b>Working capital - needs</b>	<b>834</b>	<b>1,376</b>	<b>1,936</b>	<b>1,331</b>	<b>1,462</b>
Trade payables	(196)	(428)	(732)	(606)	(293)
State and other public entities (liabilities)	(7)	(9)	(17)	(5)	(61)
Other payables	(253)	(452)	(1,142)	(455)	(221)
Deferrals	(0)	(0)	(0)	(0)	(0)
<b>Working capital - funds</b>	<b>(456)</b>	<b>(890)</b>	<b>(1,891)</b>	<b>(1,066)</b>	<b>(575)</b>
<b>Net working capital</b>	<b>378</b>	<b>486</b>	<b>45</b>	<b>265</b>	<b>887</b>
Cash and cash equivalents	21	71	118	36	105
Loans	(701)	(795)	(509)	(1,115)	(1,617)
<b>Net financial debt</b>	<b>(679)</b>	<b>(724)</b>	<b>(391)</b>	<b>(1,079)</b>	<b>(1,511)</b>
<b>Net assets</b>	<b>146</b>	<b>328</b>	<b>417</b>	<b>609</b>	<b>762</b>
Share capital	55	115	115	115	115
Legal reserves	1	1	4	94	286
Retained earnings	26	33	58	58	58
Other equity instruments	57	150	150	150	150
Net profit / (loss) of the period	8	28	90	192	153
<b>Equity</b>	<b>146</b>	<b>328</b>	<b>417</b>	<b>609</b>	<b>762</b>
<b>KPI</b>					
<i>NWC / Turnover</i>	29.9%	29.1%	2.2%	11.6%	41.3%
<i>NFD / EBITDA</i>	4.7x	4.0x	1.3x	2.3x	2.9x
<i>DIO</i>	101	18	28	8	75
<i>DSO</i>	153	249	300	171	168
<i>DPO</i>	74	121	181	147	78

Source: Statutory and Management information

Table 11- Company's under scope income statement. Source: Management information and own analysis.

<b>Income statement</b>					
<b>€000</b>	<b>FY15</b>	<b>FY16</b>	<b>FY17</b>	<b>FY18</b>	<b>FY19</b>
Sales and services rendered	1,264	1,671	2,076	2,278	2,149
Cost of goods sold	(692)	(1,019)	(1,083)	(1,081)	(947)
<b>Gross margin</b>	<b>572</b>	<b>652</b>	<b>992</b>	<b>1,196</b>	<b>1,202</b>
External supplies and services	(277)	(274)	(394)	(426)	(426)
Personnel costs	(156)	(189)	(350)	(344)	(388)
Other operating income	7	15	63	112	127
Other operating expenses	(7)	(14)	(21)	(10)	(4)
Impairment losses	-	(12)	-	(62)	(0)
Operating Subsidies	7	3	1	0	9
<b>EBITDA</b>	<b>145</b>	<b>181</b>	<b>292</b>	<b>467</b>	<b>520</b>
Depreciation and amortisation	(82)	(108)	(156)	(233)	(316)
<b>EBIT</b>	<b>63</b>	<b>73</b>	<b>137</b>	<b>234</b>	<b>204</b>
Financial income	-	-	-	-	-
Financial expenses	(54)	(42)	(42)	(24)	(11)
<b>Financial result</b>	<b>(54)</b>	<b>(42)</b>	<b>(42)</b>	<b>(24)</b>	<b>(11)</b>
<b>EBT</b>	<b>9</b>	<b>31</b>	<b>95</b>	<b>210</b>	<b>193</b>
Corporate income tax	(2)	(2)	(5)	(18)	(41)
<b>Net profit / (loss) of the period</b>	<b>8</b>	<b>28</b>	<b>90</b>	<b>192</b>	<b>153</b>
<b>KPI</b>					
Gross margin (% Turnover)	45.2%	39.0%	47.8%	52.5%	55.9%
External supplies and services (% Turnover)	21.9%	16.4%	19.0%	18.7%	19.8%
Personnel costs (% Turnover)	12.3%	11.3%	16.8%	15.1%	18.1%
EBITDA (% Turnover)	11.5%	10.8%	14.1%	20.5%	24.2%

Source: Statutory and Management information

## Annex C – Valuation’s key assumptions

### C.1. Fiscal assumption

The computation of the corporate income tax was carried out in accordance with the legislation currently in force. The legislation provides for a rate of 21%, plus the municipal surcharge, which in this case, according to Autoridade Tributária e Aduaneira (AT) (2020) is 1.5%, as it is the municipal surcharge practiced in Vila Nova de Cerveira, the municipality where the company's headquarters are established, resulting in an aggregate tax of 22.5%. In relation to the inflation rate, it was used the estimates from the Economist Intelligence Unit (2020) presented in table 12.

Table 12- Inflation rate forecast. Source: Economist Intelligence Unit (2020).

%	Forecasts					
	FY20	FY21	FY22	FY23	FY24	FY25
Inflation rate	1.2	1.5	1.6	1.7	1.1	1.3

### C.2. Operational Costs and Revenues Assumption

Table 13- Sales and services rendered predictions. Source: AMR (2019) and own analysis.

€000	Forecasts					
	FY20	FY21	FY22	FY23	FY24	FY25
Sales and services rendered	2,475	2,750	2,946	3,115	3,279	3,438
Healthcare growth (%)	n.a.	n.a.	n.a.	6.9%	6.4%	6.0%
Food and Beverage growth (%)	n.a.	n.a.	n.a.	4.2%	3.8%	3.4%
Others growth (%)	n.a.	n.a.	n.a.	6.4%	5.9%	5.5%
Total	15.1%	11.1%	7.1%	5.7%	5.3%	4.8%

Table 14- Rest of Europe rigid plastic packaging market revenue estimates by end-user industry. Source: AMR (2019).

End-user industry	2020	2021	2022	2023	2024	2025
Food & Beverage	18,420.7	19,351.4	20,248.0	21,101.2	21,902.0	22,641.3
Personal Care	3,810.4	4,064.4	4,318.0	4,568.8	4,814.7	5,053.3
Household	4,439.9	4,677.6	4,908.5	5,130.3	5,340.8	5,537.6
Healthcare	3,321.5	3,581.0	3,844.2	4,108.9	4,372.9	4,633.8
Others	3,113.4	3,339.2	3,566.6	3,793.7	4,018.5	4,238.9

Starting with sales and services rendered, the growth rate for the first year of projection was calculated as the average of the historical years, decreasing 4 percentage points in the following 2 years of projection until reaching the rigid plastic packaging market growth rate estimates for the “Rest of Europe”, as predicted by AMR (2019) in table 14. This strategy was adopted since it would not make sense to make the revenues’ growth rates converge to the sector estimates right from the start taking into account the historical growth. As it was

already mentioned, the main target company's segments are healthcare, which represented 47.7% of their total sales in FY19, food and beverage, which represented 42.7% of their total sales in FY19, and others that represented only 10%, and these percentages were used to predict the total turnover's growth.

Then, the cost of goods sold (COGS) as a percentage of turnover has presented a decrease tendency in the last three historical years, FY17, FY18 and FY19 and the forecasted COGS were computed based on the FY19 ratio (44.1%). The External Supplies and Services (ESS) did not present a constant weight in terms of revenues so, the forecasted weight was set equal to the average of the historical years (19.2%).

For the forecast of personnel costs, the following data presented in table 15 and 16 were analyzed:

Table 15- Historical personnel costs. Source: Management information and own analysis.

€000	Historical				
	FY15	FY16	FY17	FY18	FY19
Board of directors	18	30	33	64	69
Growth (%)	n.a.	65.9%	7.6%	95.8%	8.7%
Personnel	109	125	258	201	245
Growth (%)	n.a.	14.6%	106.6%	(21.9%)	21.6%
<b>Remuneration</b>	<b>127</b>	<b>156</b>	<b>290</b>	<b>266</b>	<b>314</b>
Board of directors	4	4	4	4	7
Personnel	22	27	47	53	59
Trainees	-	-	-	-	0
<b>Social security contributions</b>	<b>26</b>	<b>31</b>	<b>51</b>	<b>58</b>	<b>67</b>
% Remuneration	20.3%	19.8%	17.7%	21.8%	21.2%
Insurance	2	3	8	10	7
% Remuneration	1.6%	1.9%	2.7%	3.8%	2.3%
Other costs	1	0	0	11	0
% Remuneration	0.7%	0.0%	0.1%	4.0%	0.0%
Indemnities	-	0	0	-	0
<b>Total</b>	<b>156</b>	<b>190</b>	<b>350</b>	<b>345</b>	<b>389</b>
<b>KPI</b>					
Personnel costs (% Turnover)	12.3%	11.3%	16.8%	15.1%	18.1%
Average nr. employees	12	16	19	20	23
Average cost per employee	13.0	11.9	18.4	17.2	16.9

Table 16- Personnel costs' forecasts. Source: Management information and own analysis.

€000	Forecasts					
	FY20	FY21	FY22	FY23	FY24	FY25
Board of directors	70	71	72	74	74	75
Growth (%)	1.2%	1.5%	1.6%	1.7%	1.1%	1.3%
Personnel	282	313	336	355	374	392
Growth (%)	15.1%	11.1%	7.1%	5.7%	5.3%	4.8%
<b>Remuneration</b>	<b>352</b>	<b>385</b>	<b>408</b>	<b>429</b>	<b>448</b>	<b>467</b>
Board of directors	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Personnel	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Trainees	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
<b>Social security contributions</b>	<b>74.79</b>	<b>82</b>	<b>87</b>	<b>91</b>	<b>95</b>	<b>99</b>
% Remuneration	21.2%	21.2%	21.2%	21.2%	21.2%	21.2%
Insurance	9	10	10	11	11	12
% Remuneration	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Other costs	3	4	4	4	4	5
% Remuneration	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Indemnities	0	0	0	0	0	0
<b>Total</b>	<b>439</b>	<b>480</b>	<b>509</b>	<b>535</b>	<b>559</b>	<b>583</b>

As it is shown in table 16, the board of directors' remuneration growth rate was set equal to the inflation rate and the personnel's remuneration growth rate equal to turnover's growth rate, which was already discussed. The social security rate was set equal to the one observed in FY19, the insurance weight in terms of total remuneration was assumed equal to the average historical weight, and the same was assumed for indemnities.

Regarding the other operating income, it presented an increasing tendency in the historical years and, for the forecasted years, it was assumed that it would have the same weight in terms of sales like the one presented between FY18 and FY19 (14% and 1% in the models without and with adjustments, respectively). The same does not happen with other operating expenses, it increased until FY17 and, between FY17 and FY19, it decreased until the lowest historical value. In this case, it was assumed that the decreasing tendency would remain in the future and the estimated growth rate was computed as the average of the last two historical year's growth rates (-56%). Then, both impairment losses and operating subsidies' weights in terms of turnover, since they did not present a stable tendency, were computed as the average of the last two historical years, which led to 1.4% and 0.2% of turnover, respectively. When taking into account the due diligence adjustments, the operating subsidies were set equal to zero, as it is explained in the adjustments section. Finally, the financial expenses had a special condition since, according to management information, the target company's loans had personal guarantees from the partners and, in a post-transaction context, those guarantees would cease and, consequently, the financial expenses would increase, as it was discussed in the literature review. Thus, the financial expenses as a percentage of loans were computed based on the last two historical years, which gave an



implicit interest rate of only 0.78% and, then, it was summed a spread associated to the personal guarantees (1.5%), spread that it is explained in table 18, in WACC assumptions. This spread was applied to both valuation models, that is, with and without adjustments, since in a post-transaction context it is assumed that there will be no longer personal guarantees and the financing cost will consequently increase.

### C.3. CAPEX Assumptions

CAPEX was first analyzed in historical terms, according to the following formula:

$$CAPEX = (Net\ fixed\ assets_n - Net\ fixed\ assets_{n-1}) + Depreciation_n \quad [1.44]$$

For the forecasted years, and since the target company showed no intention of expansion investment or, at least, do not have a CAPEX budget or commitment for the next years, the CAPEX levels were kept slightly above depreciation for the first three years of projection. More precisely, 5%, 3% and 1% above depreciation for 2020, 2021 and 2022, respectively, decreasing gradually to the stable growth where it was assumed that CAPEX would offset depreciation.

Additionally, the depreciation for each period was computed according to the information presented in table 17. Finally, the net fixed assets were calculated according to formula 1.45:

$$Net\ fixed\ assets_n = Fixed\ assets'\ gross\ value_n - Fixed\ assets'\ accumulated\ depreciation_n \quad [1.45]$$

Table 17- Depreciation rates. Source: Management information and own analysis.

€000	Historical Fixed Assets		Future Fixed Assets	
	Useful Life	Dep. Rate	Useful Life	Dep. Rate
<b>Property, plant and equipment</b>				
Buildings	114	0.9%	20	5.0%
Basic equipment	7	14.2%	6	15.5%
Transport equipment	3	28.7%	4	25.0%
Administrative equipment	1	106.1%	5	18.4%
Other fixed tangible assets	8	12.3%	8	12.5%
<b>Intangible Assets</b>				
Intangible Assets	n.a.	n.a.	3	33.3%
<b>Other financial assets</b>				
Other financial assets	n.a.	n.a.	n.a.	n.a.
<b>Property, plant and equipment</b>	<b>7</b>	<b>13.5%</b>		
<b>Intangible Assets</b>	<b>n.a.</b>	<b>n.a.</b>		
<b>Other financial assets</b>	<b>n.a.</b>	<b>n.a.</b>		
<b>Total</b>	<b>8</b>	<b>13.3%</b>		

## C.4. Net Working Capital Assumptions

The Net Working Capital is the difference between the needs and the financial resources of exploration or, in other words, is the difference between current assets and current liabilities, being a measure of a company's liquidity. Thus, the valuation model's assumption regarding the NWC will also be divided in needs and resources.

### C.4.1. Net Working Capital Needs

Starting with inventories and trade receivables, their future values were computed using the Days of Inventory Outstanding (DIO), according to formula 1.46, and the Days Sales Outstanding (DSO), according to formulas 1.47, having as reference Dec19.

$$DIO = \frac{\text{Inventories}}{\text{Cost of Goods Sold}} * 365 \quad [1.46]$$

$$DSO = \frac{\text{Trade Receivables}}{\text{Sales and services rendered}} * 365 \quad [1.47]$$

Regarding the other rubrics included in the net working capital needs, state and other public entities (assets) were set equal to 3% of total sales. Other receivables were set equal to 9.9% and 0.1% of total turnover of each year in the models without and with adjustments, respectively, being that those percentages were based on Dec19 values. Finally, shareholders/partners were set equal to zero since they only had value in 2016.

### C.4.2. Net Working Capital Funds

Regarding trade payables, its forecast followed the same logic as the one used with trade receivables and inventories, that is, using the Days Payables Outstanding (DPO) as it is shown in formula 1.48:

$$DPO = \frac{\text{Trade Payables}}{\text{COGS} + \text{ESS}} * 365 \quad [1.48]$$

The other 3 rubrics' forecasts, state and other public entities (liabilities), other payables, and deferrals were based on the weight that each represented in terms of sales and services rendered in 2019, which led to 2.8%, 10.3%, and 0.02% of sales and services rendered each year, respectively.

## C.5. Net Debt and Equity Assumptions

Regarding net debt, it was used the “primary accounting identity” (assets equal to liabilities plus equity) as presented by Koller et. al (2010). In order to do that, first it was set a minimum value for cash and cash equivalents (2% of each year sales and services rendered). Secondly, it was computed the value for total assets excluding excess cash, which is equal to total assets minus the difference between the total and the minimum value for cash and cash equivalents. Finally, it was calculated the value of equity plus liabilities excluding debt, and it was applied the following reasoning: if total assets excluding excess cash are bigger than equity plus liabilities excluding debt, then excess cash is zero and the difference goes to newly issued debt, and vice versa.

In the case of equity, both share capital and other equity instruments were set equal to the values presented in 2019, as there were no variations on those rubrics since 2016. In the case of the valuation model with adjustments, other equity instruments were set equal to zero due to the adjustment described in table 28. Legal reserves were computed as being 20% of share capital, as established by law as the minimum value, and the retained earnings were computed according to the following formula:

$$Retained\ earnings_n = Retained\ earnings_{n-1} + Net\ Profit/Loss_{n-1} \quad [1.49]$$

## C.6. WACC and Perpetual Growth Rate Assumptions

Since the WACC computation was already explained in chapter 1, section 1.1.4., in table 26 there are presented the main assumptions for its calculation. It is important to notice that in the first valuation model, that is, without any adjustments made to the financial statements, it is applied all the assumptions presented below with the exception of the personal guarantees premium (which is shaded green in table 18), which leads to a WACC of 7.5%. The second valuation model, which takes into account the adjustments made in the Due Diligence context, the WACC computation incorporates all the assumptions presented in table 26, which leads to a WACC of 8%.

Table 18- WACC computation and assumptions.

WACC (Weighted Average Cost of Capital)	Method
D/E	65.9% Damodaran D/E target ratio for packaging & container sector. Damodaran (2020a).
D/(D+E) target ratio	39.7% $1/(1+(1/(D/E)))$
Corporate Tax Rate	22.5% Fiscal assumption.
<b>Cost of equity (CAPM)</b>	<b>12.0%</b>
Risk Free	(0.0%) Required return on the secondary market, in 2019, for German Bunds with maturities equal to 10 years. Source: Investing.com (2020).
Country Risk Premium	2.2% Damodaran's country risk premium for Portugal. Source: Damodaran (2020b).
Market risk premium	6.0% Deloitte methodology.
Leverage Beta	1.0 For further detail, please refer to chapter 1, cost of equity computation.
Unleverage Beta	0.7 Damodaran's unlevered beta for packaging & container sector. Source: Damodaran (2020a).
Size Premium	3.9% Deloitte methodology.
<b>Cost of debt</b>	<b>1.9%</b>
Indexante	(0.2%) Euribor 6M, monthly average for 2019. Source: Bloomberg.
Spread	1.1% Information provided by management and extracted from the last loan contract.
Spread (personal guarantees)	1.5% Information provided by management and extracted from the last issue of autonomous guarantee.

In relation to the perpetual growth rate ( $g$ ), it was assumed equal to the target inflation rate of most central banks, which is 2%.

## C.7. Terminal Value Assumptions

As it is mentioned in section 1.1.5., regarding the disadvantages of DCF valuation, with the standard formula for calculating the terminal value (equation 1.5), the continuing value is dependent on the last forecasted free cash flow, on the perpetual growth rate and on the discount rate. Since, usually, the terminal value represents 60% to 80% of total present value, even a small change in the assumptions of these inputs can significantly affect the final valuation. In order to avoid this, Koller et. al (2010) presents what they call the “key value driver formula”, which lies behind the economic profit approach presented in section 1.2. The intuition behind it is the following: knowing that the company’s projected growth in NOPLAT is given by:

$$g = RONIC * Reinvestment Rate \quad [1.50]$$

Where the reinvestment rate is the percentage of NOPLAT that is invested in CAPEX and working capital and, solving equation 1.50:

$$\text{Reinvestment Rate} = \frac{g}{\text{RONIC}} \quad [1.51]$$

Then, the alternative formula can be easily deduced by using the cash flow perpetuity formula presented in equation 1.52:

$$\text{Value} = \frac{FCF_{t-1}}{WACC - g} \quad [1.52]$$

$$\text{Value} = \frac{\text{NOPLAT}_{t-1} \left(1 - \frac{g}{\text{RONIC}}\right)}{WACC - g} \quad [1.53]$$

Thus, with this alternative, the terminal value will be dependent on the net operating profit less taxes (NOPLAT) of the last year of the explicit forecast, on the long-run forecast for return on new capital (RONIC), on the Weighted Average Cost of Capital (WACC) and on the long-run growth in NOPLAT (g). This means that the terminal value is now based on cash flow and it links the cash flow directly to growth and ROIC. The investment is now based on the relation between ROIC and g and it is no longer needed the explicit calculation of the investment on net working capital and CAPEX, not risking to assume levels of investment that are too high or too low. Additionally, it has the advantage of allowing the definition of the expected return from the new projects in perpetuity being that, for most companies, it is assumed that RONIC will be equal to WACC, which means, all the new projects will have an NPV of zero (no value-added) since the economic theory suggests that competition eventually eliminates abnormal returns. An exception is made when the company has a competitive advantage, in which case RONIC should be set equal to the expected return forecasted for the years after the explicit period. In this case study, RONIC was set equal to WACC. Both alternatives for calculating the terminal value will be presented in the valuation section, being that the “key value driver formula” will be the one used for the Enterprise Value computation.

## Annex D – Forecast Maps

### D.1. Forecast maps without adjustments

Table 19- Balance sheet for the target company without taking into account adjustments. Source: Management information and own analysis.

€000	Historical					Forecasts					
	Dec15	Dec16	Dec17	Dec18	Dec19	Dec20	Dec21	Dec22	Dec23	Dec24	Dec25
Property, plant and equipment	428	549	748	1,389	1,349	1,366	1,378	1,383	1,383	1,383	1,383
Intangible assets	0	0	0	17	17	17	17	17	17	17	17
Other financial assets	20	17	16	17	20	20	20	20	20	20	20
<b>Non-current assets</b>	<b>448</b>	<b>566</b>	<b>764</b>	<b>1,423</b>	<b>1,386</b>	<b>1,403</b>	<b>1,415</b>	<b>1,419</b>	<b>1,419</b>	<b>1,419</b>	<b>1,419</b>
Inventories	192	52	83	23	194	223	248	266	281	296	310
Trade receivables	530	1,141	1,707	1,067	992	1,142	1,269	1,360	1,437	1,513	1,586
State and other public entities (as	75	53	107	123	64	74	82	88	93	98	103
Shareholders / Partners	-	93	-	-	-	-	-	-	-	-	-
Other receivables	37	38	39	119	212	244	271	291	307	323	339
<b>Working capital - needs</b>	<b>834</b>	<b>1,376</b>	<b>1,936</b>	<b>1,331</b>	<b>1,462</b>	<b>1,683</b>	<b>1,871</b>	<b>2,004</b>	<b>2,119</b>	<b>2,231</b>	<b>2,339</b>
Trade payables	(196)	(428)	(732)	(606)	(293)	(334)	(371)	(397)	(420)	(442)	(463)
State and other public entities (lie	(7)	(9)	(17)	(5)	(61)	(70)	(78)	(83)	(88)	(93)	(97)
Other payables	(253)	(452)	(1,142)	(455)	(221)	(255)	(283)	(303)	(321)	(337)	(354)
Deferrals	(0)	(0)	(0)	(0)	(0)	(0)	(1)	(1)	(1)	(1)	(1)
<b>Working capital - funds</b>	<b>(456)</b>	<b>(890)</b>	<b>(1,891)</b>	<b>(1,066)</b>	<b>(575)</b>	<b>(659)</b>	<b>(732)</b>	<b>(784)</b>	<b>(829)</b>	<b>(873)</b>	<b>(915)</b>
<b>Net working capital</b>	<b>378</b>	<b>486</b>	<b>45</b>	<b>265</b>	<b>887</b>	<b>1,025</b>	<b>1,139</b>	<b>1,220</b>	<b>1,290</b>	<b>1,358</b>	<b>1,424</b>
Cash and cash equivalents	21	71	118	36	105	49	55	59	62	66	69
Loans	(701)	(795)	(509)	(1,115)	(1,617)	(1,824)	(1,802)	(1,748)	(1,711)	(1,459)	(1,212)
<b>Net financial debt</b>	<b>(679)</b>	<b>(724)</b>	<b>(391)</b>	<b>(1,079)</b>	<b>(1,511)</b>	<b>(1,775)</b>	<b>(1,747)</b>	<b>(1,689)</b>	<b>(1,648)</b>	<b>(1,393)</b>	<b>(1,144)</b>
<b>Net assets</b>	<b>146</b>	<b>328</b>	<b>417</b>	<b>609</b>	<b>762</b>	<b>653</b>	<b>807</b>	<b>951</b>	<b>1,061</b>	<b>1,384</b>	<b>1,699</b>
Share capital	55	115	115	115	115	115	115	115	115	115	115
Legal reserves	1	1	4	94	286	23	23	23	23	23	23
Retained earnings	26	33	58	58	58	211	365	519	663	773	1,096
Other equity instruments	57	150	150	150	150	150	150	150	150	150	150
Net profit / (loss) of the period	8	28	90	192	153	154	154	144	110	323	315
<b>Equity</b>	<b>146</b>	<b>328</b>	<b>417</b>	<b>609</b>	<b>762</b>	<b>653</b>	<b>807</b>	<b>951</b>	<b>1,061</b>	<b>1,384</b>	<b>1,699</b>

Table 20- Income statement for the target company without taking into account adjustments. Source: Management information and own analysis.

Income statement	Historical					Forecasts					
	€000	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24
Sales and services rendered	1,264	1,671	2,076	2,278	2,149	2,475	2,750	2,946	3,115	3,279	3,438
Cost of goods sold	(692)	(1,019)	(1,083)	(1,081)	(947)	(1,090)	(1,212)	(1,298)	(1,372)	(1,445)	(1,515)
<b>Gross margin</b>	<b>572</b>	<b>652</b>	<b>992</b>	<b>1,196</b>	<b>1,202</b>	<b>1,384</b>	<b>1,539</b>	<b>1,648</b>	<b>1,743</b>	<b>1,835</b>	<b>1,923</b>
External supplies and services	(277)	(274)	(394)	(426)	(426)	(474)	(527)	(565)	(597)	(628)	(659)
Personnel costs	(156)	(189)	(350)	(344)	(388)	(439)	(480)	(509)	(535)	(559)	(583)
Other operating income	7	15	63	112	127	135	143	151	160	170	180
Other operating expenses	(7)	(14)	(21)	(10)	(4)	(2)	(1)	(0)	(0)	(0)	(0)
Impairment losses	-	(12)	-	(62)	(0)	(34)	(37)	(40)	(42)	(45)	(47)
Operating Subsidies	7	3	1	0	9	5	6	6	6	7	7
<b>EBITDA</b>	<b>145</b>	<b>181</b>	<b>292</b>	<b>467</b>	<b>520</b>	<b>576</b>	<b>642</b>	<b>692</b>	<b>735</b>	<b>779</b>	<b>822</b>
Depreciation and amortisation	(82)	(108)	(156)	(233)	(316)	(335)	(402)	(466)	(554)	(328)	(388)
<b>EBIT</b>	<b>63</b>	<b>73</b>	<b>137</b>	<b>234</b>	<b>204</b>	<b>241</b>	<b>240</b>	<b>226</b>	<b>182</b>	<b>451</b>	<b>435</b>
Financial income	-	-	-	-	-	-	-	-	-	-	-
Financial expenses	(54)	(42)	(42)	(24)	(11)	(42)	(42)	(40)	(39)	(34)	(28)
<b>Financial result</b>	<b>(54)</b>	<b>(42)</b>	<b>(42)</b>	<b>(24)</b>	<b>(11)</b>	<b>(42)</b>	<b>(42)</b>	<b>(40)</b>	<b>(39)</b>	<b>(34)</b>	<b>(28)</b>
<b>EBT</b>	<b>9</b>	<b>31</b>	<b>95</b>	<b>210</b>	<b>193</b>	<b>198</b>	<b>199</b>	<b>185</b>	<b>142</b>	<b>417</b>	<b>407</b>
Corporate income tax	(2)	(2)	(5)	(18)	(41)	(45)	(45)	(42)	(32)	(94)	(91)
<b>Net profit / (loss) of the period</b>	<b>8</b>	<b>28</b>	<b>90</b>	<b>192</b>	<b>153</b>	<b>154</b>	<b>154</b>	<b>144</b>	<b>110</b>	<b>323</b>	<b>315</b>

Table 21- Cash-flow statement for the target company without taking into account adjustments. Source: Management information and own analysis.

**Cash-flow statement**

€000	Historical					Forecasts					
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
<b>EBITDA</b>	<b>145</b>	<b>181</b>	<b>292</b>	<b>467</b>	<b>520</b>	<b>576</b>	<b>642</b>	<b>692</b>	<b>735</b>	<b>779</b>	<b>822</b>
Depreciation	(82)	(108)	(156)	(233)	(316)	(335)	(402)	(466)	(554)	(328)	(388)
Corporate Income Tax	(14)	(16)	(31)	(53)	(46)	(54)	(54)	(51)	(41)	(101)	(98)
<b>NOPLAT</b>	<b>49</b>	<b>57</b>	<b>106</b>	<b>181</b>	<b>158</b>	<b>186</b>	<b>186</b>	<b>175</b>	<b>141</b>	<b>349</b>	<b>337</b>
Depreciation	82	108	156	233	316	335	402	466	554	328	388
CAPEX	n.a.	(226)	(354)	(892)	(279)	(351)	(414)	(471)	(554)	(328)	(388)
WC Invest.	n.a.	(15)	348	(221)	(622)	(138)	(114)	(81)	(70)	(68)	(66)
<b>FCFF</b>	<b>n.a.</b>	<b>(76)</b>	<b>256</b>	<b>(699)</b>	<b>(427)</b>	<b>32</b>	<b>60</b>	<b>89</b>	<b>71</b>	<b>281</b>	<b>271</b>
Interest	n.a.	(42)	(42)	(24)	(11)	(42)	(42)	(40)	(39)	(34)	(28)
Tax shield	n.a.	14	26	34	5	9	9	9	9	8	6
Changes in debt	n.a.	94	(286)	606	501	208	(22)	(54)	(37)	(252)	(246)
<b>FCFE</b>	<b>n.a.</b>	<b>(10)</b>	<b>(46)</b>	<b>(82)</b>	<b>69</b>	<b>207</b>	<b>6</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>3</b>
Other changes in equity	n.a.	153	0	0	0	(263)	-	-	-	-	-
Changes in NOAL	n.a.	(93)	93	-	-	-	-	-	-	-	-
<b>Change in cash</b>	<b>n.a.</b>	<b>50</b>	<b>47</b>	<b>(82)</b>	<b>69</b>	<b>(56)</b>	<b>6</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>Cash</b>	<b>21</b>	<b>71</b>	<b>118</b>	<b>36</b>	<b>105</b>	<b>49</b>	<b>55</b>	<b>59</b>	<b>62</b>	<b>66</b>	<b>69</b>

Table 22- FCFF sources and applications for the target company without taking into account adjustments. Source: Management information and analysis.

**FCFF - Sources and Applications**

€000	Historical					Forecasts					
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
EBIT	63	73	137	234	204	241	240	226	182	451	435
Corporate income tax	(14)	(16)	(31)	(53)	(46)	(54)	(54)	(51)	(41)	(101)	(98)
Depreciation and amortisation	82	108	156	233	316	335	402	466	554	328	388
Total change in Working Capital	n.a.	(15)	348	(221)	(622)	(138)	(114)	(81)	(70)	(68)	(66)
CAPEX	n.a.	(226)	(354)	(892)	(279)	(351)	(414)	(471)	(554)	(328)	(388)
<b>Total FCFF (sources)</b>	<b>131</b>	<b>(76)</b>	<b>256</b>	<b>(699)</b>	<b>(427)</b>	<b>32</b>	<b>60</b>	<b>89</b>	<b>71</b>	<b>281</b>	<b>271</b>
Interest expense	n.a.	42	42	24	11	42	42	40	39	34	28
Tax Shield	n.a.	(14)	(26)	(34)	(5)	(9)	(9)	(9)	(9)	(8)	(6)
Debt Repayment	n.a.	(94)	286	(606)	(501)	(208)	22	54	37	252	246
Dividends	-	-	-	-	-	-	-	-	-	-	-
Other changes in equity	n.a.	(153)	(0)	(0)	(0)	263	-	-	-	-	-
Other changes in NOAL	n.a.	93	(93)	-	-	-	-	-	-	-	-
Changes in cash	n.a.	50	47	(82)	69	(56)	6	4	3	3	3
<b>Total FCFF (applications)</b>	<b>n.a.</b>	<b>(76)</b>	<b>256</b>	<b>(699)</b>	<b>(427)</b>	<b>32</b>	<b>60</b>	<b>89</b>	<b>71</b>	<b>281</b>	<b>271</b>



## D.2. Forecast maps with adjustments

Table 23- Balance sheet for the target company with adjustments. Source: Management information and own analysis.

€000	Historical					Forecasts					
	Dec15	Dec16	Dec17	Dec18	Dec19	Dec20	Dec21	Dec22	Dec23	Dec24	Dec25
Property, plant and equipment	428	549	748	1,389	1,349	1,366	1,378	1,383	1,383	1,383	1,383
Intangible assets	0	0	0	17	17	17	17	17	17	17	17
Other financial assets	20	17	16	17	20	20	20	20	20	20	20
<b>Adjustments</b>	-	-	-	-	(22)	(70)	(70)	(70)	(70)	(70)	(70)
<b>Non-current assets</b>	<b>448</b>	<b>566</b>	<b>764</b>	<b>1,423</b>	<b>1,364</b>	<b>1,333</b>	<b>1,345</b>	<b>1,349</b>	<b>1,349</b>	<b>1,349</b>	<b>1,349</b>
Inventories	192	52	83	23	194	223	248	266	281	296	310
Trade receivables	530	1,141	1,707	1,067	988	1,138	1,265	1,355	1,432	1,508	1,581
State and other public entities (as	75	53	107	123	64	74	82	88	93	98	103
Shareholders / Partners	-	93	-	-	-	-	-	-	-	-	-
Other receivables	37	38	39	119	1	1	1	2	2	2	2
<b>Working capital - needs</b>	<b>834</b>	<b>1,376</b>	<b>1,936</b>	<b>1,331</b>	<b>1,248</b>	<b>1,437</b>	<b>1,597</b>	<b>1,711</b>	<b>1,808</b>	<b>1,904</b>	<b>1,996</b>
Trade payables	(196)	(428)	(732)	(606)	(200)	(228)	(254)	(272)	(287)	(302)	(317)
State and other public entities (lia	(7)	(9)	(17)	(5)	(61)	(70)	(78)	(83)	(88)	(93)	(97)
Other payables	(253)	(452)	(1,142)	(455)	(219)	(252)	(280)	(300)	(317)	(334)	(350)
Deferrals	(0)	(0)	(0)	(0)	(0)	(0)	(1)	(1)	(1)	(1)	(1)
<b>Working capital - funds</b>	<b>(456)</b>	<b>(890)</b>	<b>(1,891)</b>	<b>(1,066)</b>	<b>(480)</b>	<b>(550)</b>	<b>(612)</b>	<b>(655)</b>	<b>(693)</b>	<b>(729)</b>	<b>(765)</b>
<b>Net working capital</b>	<b>378</b>	<b>486</b>	<b>45</b>	<b>265</b>	<b>768</b>	<b>886</b>	<b>985</b>	<b>1,055</b>	<b>1,116</b>	<b>1,175</b>	<b>1,231</b>
Cash and cash equivalents	21	71	118	36	105	49	55	59	62	66	69
Loans	(701)	(795)	(509)	(1,115)	(1,617)	(1,964)	(2,024)	(2,065)	(2,133)	(1,995)	(1,874)
<b>Adjustment</b>	-	-	-	-	(82)	-	-	-	-	-	-
<b>Net financial debt</b>	<b>(679)</b>	<b>(724)</b>	<b>(391)</b>	<b>(1,079)</b>	<b>(1,593)</b>	<b>(1,915)</b>	<b>(1,969)</b>	<b>(2,006)</b>	<b>(2,070)</b>	<b>(1,930)</b>	<b>(1,806)</b>
<b>Normalizations</b>	-	-	-	-	(109)	-	-	-	-	-	-
<b>Net assets</b>	<b>146</b>	<b>328</b>	<b>417</b>	<b>609</b>	<b>430</b>	<b>304</b>	<b>361</b>	<b>399</b>	<b>395</b>	<b>594</b>	<b>775</b>
Share capital	55	115	115	115	115	115	115	115	115	115	115
Legal reserves	1	1	4	94	286	23	23	23	23	23	23
Retained earnings	26	33	58	58	58	102	166	223	261	257	456
Other equity instruments	57	150	150	150	-	-	-	-	-	-	-
Net profit / (loss) of the period	8	28	90	192	44	64	57	38	(4)	199	181
<b>Adjustments</b>	-	-	-	-	(73)	-	-	-	-	-	-
<b>Equity</b>	<b>146</b>	<b>328</b>	<b>417</b>	<b>609</b>	<b>430</b>	<b>304</b>	<b>361</b>	<b>399</b>	<b>395</b>	<b>594</b>	<b>775</b>

Table 24- Income statement for the target company with adjustments. Source: Management information and own analysis.

€000	Historical					Forecasts					
	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
Sales and services rendered	1,264	1,671	2,076	2,278	2,149	2,475	2,750	2,946	3,115	3,279	3,438
Cost of goods sold	(692)	(1,019)	(1,083)	(1,081)	(947)	(1,090)	(1,212)	(1,298)	(1,372)	(1,445)	(1,515)
<b>Gross margin</b>	<b>572</b>	<b>652</b>	<b>992</b>	<b>1,196</b>	<b>1,202</b>	<b>1,384</b>	<b>1,539</b>	<b>1,648</b>	<b>1,743</b>	<b>1,835</b>	<b>1,923</b>
External supplies and services	(277)	(274)	(394)	(426)	(426)	(474)	(527)	(565)	(597)	(628)	(659)
Personnel costs	(156)	(189)	(350)	(344)	(388)	(439)	(480)	(509)	(535)	(559)	(583)
Other operating income	7	15	63	112	27	28	28	28	29	29	29
Other operating expenses	(7)	(14)	(21)	(10)	(4)	(2)	(1)	(0)	(0)	(0)	(0)
Impairment losses	-	(12)	-	(62)	(0)	(34)	(37)	(40)	(42)	(45)	(47)
Operating Subsidies	7	3	1	0	-	-	-	-	-	-	-
<b>EBITDA</b>	<b>145</b>	<b>181</b>	<b>292</b>	<b>467</b>	<b>411</b>	<b>463</b>	<b>522</b>	<b>563</b>	<b>597</b>	<b>632</b>	<b>665</b>
Depreciation and amortisation	(82)	(108)	(156)	(233)	(316)	(335)	(402)	(466)	(554)	(328)	(388)
<b>EBIT</b>	<b>63</b>	<b>73</b>	<b>137</b>	<b>234</b>	<b>95</b>	<b>128</b>	<b>120</b>	<b>96</b>	<b>44</b>	<b>303</b>	<b>277</b>
Financial income	-	-	-	-	-	-	-	-	-	-	-
Financial expenses	(54)	(42)	(42)	(24)	(11)	(45)	(47)	(48)	(49)	(46)	(43)
<b>Financial result</b>	<b>(54)</b>	<b>(42)</b>	<b>(42)</b>	<b>(24)</b>	<b>(11)</b>	<b>(45)</b>	<b>(47)</b>	<b>(48)</b>	<b>(49)</b>	<b>(46)</b>	<b>(43)</b>
<b>EBT</b>	<b>9</b>	<b>31</b>	<b>95</b>	<b>210</b>	<b>84</b>	<b>83</b>	<b>73</b>	<b>49</b>	<b>(5)</b>	<b>257</b>	<b>234</b>
Corporate income tax	(2)	(2)	(5)	(18)	(41)	(19)	(16)	(11)	1	(58)	(53)
<b>Net profit / (loss) of the period</b>	<b>8</b>	<b>28</b>	<b>90</b>	<b>192</b>	<b>44</b>	<b>64</b>	<b>57</b>	<b>38</b>	<b>(4)</b>	<b>199</b>	<b>181</b>

Table 25- Cash-flow statement for the target company with adjustments. Source: Management information and own analysis.

**Cash-flow statement**

€000	Historical					Forecasts					
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
<b>EBITDA</b>	<b>145</b>	<b>181</b>	<b>292</b>	<b>467</b>	<b>411</b>	<b>463</b>	<b>522</b>	<b>563</b>	<b>597</b>	<b>632</b>	<b>665</b>
Depreciation	(82)	(108)	(156)	(233)	(316)	(335)	(402)	(466)	(554)	(328)	(388)
Corporate Income Tax	(14)	(16)	(31)	(53)	(21)	(29)	(27)	(22)	(10)	(68)	(62)
<b>NOPLAT</b>	<b>49</b>	<b>57</b>	<b>106</b>	<b>181</b>	<b>74</b>	<b>99</b>	<b>93</b>	<b>75</b>	<b>34</b>	<b>235</b>	<b>215</b>
Depreciation	82	108	156	233	316	335	402	466	554	328	388
CAPEX	n.a.	(226)	(354)	(892)	(257)	(304)	(414)	(471)	(554)	(328)	(388)
WC Invest.	n.a.	(15)	348	(221)	(503)	(119)	(99)	(70)	(60)	(59)	(57)
<b>FCFF</b>	<b>n.a.</b>	<b>(76)</b>	<b>256</b>	<b>(699)</b>	<b>(370)</b>	<b>12</b>	<b>(18)</b>	<b>(0)</b>	<b>(26)</b>	<b>176</b>	<b>158</b>
Interest	n.a.	(42)	(42)	(24)	(11)	(45)	(47)	(48)	(49)	(46)	(43)
Tax shield	n.a.	14	26	34	(19)	10	10	11	11	10	10
Changes in debt	n.a.	94	(286)	606	501	348	60	41	68	(137)	(121)
<b>FCFE</b>	<b>n.a.</b>	<b>(10)</b>	<b>(46)</b>	<b>(82)</b>	<b>102</b>	<b>325</b>	<b>6</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>3</b>
Other changes in equity	n.a.	153	0	0	(223)	(190)	-	-	-	-	-
Changes in NOAL	n.a.	(93)	93	-	-	-	-	-	-	-	-
<b>Change in cash</b>	<b>n.a.</b>	<b>50</b>	<b>47</b>	<b>(82)</b>	<b>(121)</b>	<b>135</b>	<b>6</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>Cash</b>	<b>21</b>	<b>71</b>	<b>118</b>	<b>36</b>	<b>(85)</b>	<b>49</b>	<b>55</b>	<b>59</b>	<b>62</b>	<b>66</b>	<b>69</b>

Table 26- FCFF sources and applications for the target company with adjustments. Source: Management information and own analysis.

**FCFF - Sources and Applications**

€000	Historical					Forecasts					
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
EBIT	63	73	137	234	95	128	120	96	44	303	277
Corporate income tax	(14)	(16)	(31)	(53)	(21)	(29)	(27)	(22)	(10)	(68)	(62)
Depreciation and amortisation	82	108	156	233	316	335	402	466	554	328	388
Total change in Working Capital	n.a.	(15)	348	(221)	(503)	(119)	(99)	(70)	(60)	(59)	(57)
CAPEX	n.a.	(226)	(354)	(892)	(257)	(304)	(414)	(471)	(554)	(328)	(388)
<b>Total FCFF (sources)</b>	<b>n.a.</b>	<b>(76)</b>	<b>256</b>	<b>(699)</b>	<b>(370)</b>	<b>12</b>	<b>(18)</b>	<b>(0)</b>	<b>(26)</b>	<b>176</b>	<b>158</b>
Interest expense	n.a.	42	42	24	11	45	47	48	49	46	43
Tax Shield	n.a.	(14)	(26)	(34)	19	(10)	(10)	(11)	(11)	(10)	(10)
Debt Repayment	n.a.	(94)	286	(606)	(501)	(348)	(60)	(41)	(68)	137	121
Dividends	n.a.	-	-	-	-	-	-	-	-	-	-
Other changes in equity	n.a.	(153)	(0)	(0)	223	190	-	-	-	-	-
Other changes in NOAL	n.a.	93	(93)	-	-	-	-	-	-	-	-
Changes in cash	n.a.	50	47	(82)	(121)	135	6	4	3	3	3
<b>Total FCFF (applications)</b>	<b>n.a.</b>	<b>(76)</b>	<b>256</b>	<b>(699)</b>	<b>(370)</b>	<b>12</b>	<b>(18)</b>	<b>(0)</b>	<b>(26)</b>	<b>176</b>	<b>158</b>