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Equity Valuation: NOS, SGPS

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Master in Finance

Supervisor:
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Iscte-Iul

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BUSINESS
SCHOOL

Department of Finance

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Abstract

This project was developed with the intent of estimating the share value of NOS, SGPS at the end of 2022, in order to conclude if the shares were being traded at its fair value in the market. To do so, a comparison was performed between the actual value at which the shares were being traded, and the estimated value from a financial model. Only then, it is possible to deliver a final recommendation to potential investors on whether they should buy, sell, or hold these shares.

NOS, SGPS is a Portuguese group of communications and entertainment, resulting from the merger between Zon Multimédia and Optimus Telecomunicações in 2013 – which at the time were two companies among the biggest players in the sector.

The execution of the Equity valuation was carried out with the support of two methodologies: the Discounted Cash Flow approach, performing the Free Cash Flow to the Firm; and the Relative Valuation (multiples method). Additionally, data and information were extracted from the company's Annual Reports and from other sources to support the analysis.

The results obtained from the Equity valuation process suggest that the shares of NOS were undervalued at the period under analysis. Therefore, the final recommendation for potential investors is to buy the company's shares.

Resumo

Este relatório foi desenvolvido com o intuito de estimar o preço das ações da empresa NOS, SGPS a Dezembro de 2022, a fim de determinar se as mesmas estariam a ser transacionadas ao seu preço justo no mercado. Deste modo, uma comparação será feita entre o preço efetivo das ações no mercado a essa data, e um preço estimado pelos modelos financeiros escolhidos para este relatório. Só então será possível providenciar potenciais investidores com uma recomendação sobre se devem comprar, vender, ou manter as ações da empresa.

A NOS, SGPS é um grupo português de comunicações e entretinimento, fundado em 2013 a partir a fusão entre a Zon Multimédia e a Optimus Telecomunicações – que à data eram dois dos maiores concorrentes da indústria.

O processo de avaliação da empresa foi efetuado com o suporte de duas metodologias: Fluxos de Caixa Descontados (*DCF-FCFF*), e a Avaliação dos Múltiplos. Adicionalmente, dados e informação foram extraídos dos Relatórios Anuais da empresa e de outras fontes para suportar a análise do relatório.

Os resultados obtidos no processo de avaliação indicam que as ações da NOS estavam subvalorizadas no mercado no período sob análise. Consequentemente, a recomendação final para os potenciais investidores é de que devem comprar as ações da empresa.

General Index

General of Tables and Figures

Glossary

\# - Number

% - Percentage

€ - Euros

€'000 – Thousand Euros

β – Beta

β_d – Beta of Debt

β_L – Levered Beta

β_u – Unlevered Beta

20XXF – Forecasted Period

ADC – Autoridade da Concorrência

APV – Adjusted Present Value

B2B – Business to Business

B2C – Business to Consumer

c. - Circa

CAGR – Constant Annual Growth Rate

CAPEX – Capital Expenditures

CAPM – Capital Asset Pricing Model

CF – Cash Flow

CMVM – Comissão do Mercado de Valores Mobiliários

CNDP – Comissão Nacional da Proteção de Dados

CRP – Country Risk Premium

D – Debt

D/E – Debt-to-Equity ratio

D&A – Depreciation and Amortization

DCF – Discounted Cash Flow

Dec – December

E – Equity

$E(R_m)$ – Expected Market Return

EBIT – Earnings Before Interest and Taxes

EBITDA – Earnings Before Interest, Taxes, Depreciation and Amortization

ECB – European Central Bank

EQV – Equity Value

ERC – Entidade Reguladora para a Comunicação Social

ESG – Environmental, Social, and Governance

EU – European Union

EV – Enterprise Value

EVA – Economic Value Added

FCFE – Free Cash Flow to Equity

FCFF – Free Cash Flow to the Firm

FY – Fiscal Year

g – Growth Rate

GDP – Gross Domestic Product

GFCF – Gross Fixed Capital Formation

HICP – Harmonized Index of Consumer Prices

IMF – International Monetary Fund

INE – Instituto Nacional de Estatística

K_d – Cost of Debt

K_e – Cost of Equity

K – Thousands

KPI – Key Performance Indicators

M – Millions

M&A - Mergers and Acquisitions

M€ - Million Euros

x

MRP – Market Risk Premium

n – Period

NOA – Non-operating assets

p.p. – percentage points

P/E - Price to Earnings ratio

PV – Present Value

r – Discount Rate

rf – Risk-free rate

ROE – Return on Equity

ROIC – Return on Invested Capital

t – Corporate Tax Rate

TV – Terminal Value

VAT – Value Added Tax

VOD – Video-on-demand

VTS – Value of Tax Shields

WACC – Weighted Average Cost of Capital

WC – Working Capital

Introduction

The process of valuing a company and its business, as well as the market in which it is inserted, is key to help managers and investors in identifying the sources of economic value creation and destruction within the company. An Equity Valuation can be used for a broad range of purposes, such as M&A transactions, Public Offerings, strategic decisions, and strategic planning.

In the scope of this report, the main goal of the analysis will be to estimate the fair value of NOS, SGPS' shares at the end of 2022. By performing a comparison between the estimated value and the actual share value at close, a conclusion will be drawn depending on whether the shares were being traded at its fair value in the market, or not.

NOS, SGPS is a company of communications and entertainment founded in 2013, from a merger between Zon Multimédia and Optimus Telecomunicações, which at the time were two of the biggest players in the Portuguese communications sector. The company offers fixed and mobile solutions for Television, Internet, Voice, and Data, as well as Cinema and Audiovisual services to customers in all segments of the market – residential, private, business, and wholesale. Currently, NOS is the largest group of Communications, Entertainment & Media in Portugal, with a consolidated EBITDA of c. €651.1M in FY22 and 1,803 employees.

Excluding the Introduction, this report will be structured in five sections. Chapter one consists of a Literature Review, in which the most relevant valuation methods will be discussed. Next, chapter two will provide a global overview of the sector, while a more detailed analysis of NOS, SGPS and its activities will be tackled in chapter three. Finally, the fourth chapter will present an in-depth valuation of the company, derived from the Discounted Cash Flow approach (FCFF) and from the Relative Valuation methods.

In the final chapter, the main conclusions will be presented, and a final recommendation will be given to investors on whether they should sell, hold, or buy the shares of the company.

1. Literature Review

1.1 Valuation

According to Damodaran (2002), the key to investing and managing assets successfully lies not only in grasping the concept of valuation, but also in understanding the different sources of value. Fernández (2007) goes as far as stating that understanding the underlying mechanisms of a valuation process is a must-have requisite for any individual involved in the corporate finance field, given its extreme usefulness across a wide range of situations.

That said, valuation can be defined as the process in which a business is valued, according to the sources of economic value creation and destruction within the company (Fernández, 2007). There are several valuation models used in finance, which differ in sophistication and in some key basic assumptions that determine value. However, despite the differences across techniques, they are generally built under the same fundamental principles of valuation and share some common characteristics (Damodaran, 2002; Damodaran, 2006).

Nevertheless, this does not mean that all individuals will reach similar results by basing their exercises on a set of common ideologies. This is due to the fact that a valuation is not an objective exercise in which an analyst merely inputs values onto a pre-set model; conversely, all preconceptions and biases that are brought into the valuation process will find their way into value, and increase the likelihood of a biased result (Damodaran, 2002).

As aforementioned, Damodaran (2002) states that valuations can be used in a multitude of tasks such as mergers and acquisitions, corporate finance and portfolio management. Moreover, one can argue that valuing a company for the sole purpose of understanding the sources of income and expenses within the company can be of great benefit to managers, especially when it comes to strategic decisions and strategic planning (Fernández, 2007).

Based on Fernández (2007) and Damodaran (2002), a classification scheme of the main approaches to valuation has been compiled as follows:

Table 1. **Valuation methods classification.** Adapted from Fernández (2007) and Damodaran (2002).

Balance Sheet	Book Value Liquidation Value Substantial Value

Income Statement	Relative Valuation (Multiples):
	   o Price-to-Earning Ration (P/E)
	   o EV/EBITDA
	   o EV/Sales
	   o Other multiples

Discounted Cash Flow	Free Cash Flow to the Firm (FCFF) Free Cash Flow to Equity (FCFE) Adjusted Present Value (APV) Economic Value Added (EVA)
Contingent Claim Valuation (Options)	Black and Scholes Binomial Options

The following sections of the present chapter will mainly cover the Discounted Cash Flow method, with a special emphasis on the FCFF, and the Relative Valuation approach – which are the two methodologies in which the equity valuation carried out in this report will be based on.

1.2 Discounted Cash Flow

The Discounted Cash Flow (DCF) is one of the main methodologies used for valuing a business, and it lays the foundation on which all the other valuation methods are built. Consequently, in order to correctly value a company using other approaches, it is vital to understand the fundamentals of the DCF model (Damodaran, 2002). Additionally, Fernández (2007) goes as far as saying that the only conceptually correct valuation methods are those based on cash flow discounting, reinforcing the idea of having a good grasp on this approach.

Having that said, the DCF approach seeks "to determine the company's value by estimating the cash flows it will generate in the future and discounting them at a discount rate matched to the flow's risk" (Fernández, 2007). In this framework, the company is seen as a generator of risky cash flows that stretch into the future, and its value is a function of the expected earnings growth rate minus any reinvestment that is put back into the business (Luehrman, 1997; Damodaran 2008a).

For each period, these cash flows need to be carefully forecasted by the analyst, in accordance with the financial items that create and destroy value within the business. Since these are

determined by applying an expected growth rate to the current earnings of the company, it is very important to define this rate with a high degree of accuracy and pragmatism. Another thing to consider is that the free cash flow is the one that is available to all investors, namely debt holders and equity holders, and as such it is independent on the way the company is financed (Koller, Goedhart, & Wessels, 2020).

After having determined the free cash flows, we must discount them back at a rate that reflects their riskiness (uncertainty), with a basic rule of thumb: higher discount rates for riskier assets, and lower discount rates for safer assets (Damodaran, 2006). As per Fernández (2007), determining a suitable discount rate is one of the most important tasks, as it will highly impact the final valuation.

When using this model, a general method for cash flow discounting can be applied under different approaches, that starts with the following expression:

$$V = \sum_{t=0}^{n} \frac{CF_t}{(1+r)^t} + \frac{CF_n + TV_n}{(1+r)^n} \tag{1}$$

Where,

- CF_t = Cash Flow generated by the company at period t
- r = appropriate discount rate for cash flow's risk
- TV = Terminal Value, considering a perpetual duration of cash flows and a constant growth rate after year n
- t = period of the respective cash flow
- n = period corresponding to the last forecasted cash flow

There are two main variants in which we can approach a DCF valuation, depending on the nature of the cash flows that are being discounted: the Free Cash Flow to the Firm (FCFF), and the Free Cash Flow to Equity (FCFE). The FCFF starts by valuing the business as a whole, with both assets in place and growth assets – Enterprise Value (EV) – and then adjusts for net debt and the value of non-operating assets – Equity Value (EQV). By contrast, the FCFE values solely the equity stake in the business, in a way that the cash flows already reflect the debt payments and reinvestment needs of the business, meaning that the EQV is computed in one single step.

Furthermore, while the FCFF applies a discount rate that reflects the proportion of equity and debt financing (WACC), the under the FCFE it should only reflect the cost of equity financing (K_e).

Despite these differences, we can always switch from the Firm to the Equity approach by simply "netting out the value of all non-equity claims from firm value" (Damodaran, 2006). This means that, if applied correctly, the value of equity should remain the same regardless of how the valuation is performed (directly or indirectly).

1.2.1 Free Cash Flow to the Firm

As aforementioned, the FCFF approach values the entire business, including not only the equity stake but also all other claimholders in the firm (i.e., bondholders, preferred stockholders). Within this value are included the tax benefits of debt, and any expected risk that might be associated with it. Under this model, the value of the business is computed by discounting the Free Cash Flows to the Firm at the Weighted Average Cost of Capital (WACC), allowing for the cost of the different financing components to be proportionally weighed in accordance with their market value (Damodaran, 2002).

According to Damodaran (2002), there are two ways of computing the FCFF. The simplest one is the following:

$$\text{FCFF} = \text{EBIT} * (1 - t) + \text{D\&A} - \text{CAPEX} \pm \Delta\text{WC} \qquad (2)$$

Where,

- o EBIT = Earnings Before Interest and Taxes
- o t = Corporate Tax Rate
- o D&A = Depreciation and Amortization
- o CAPEX = Capital Expenditures
- o ΔWC = Changes in Working Capital

Under this formula, the Free Cash Flow to the Firm is estimated prior to any claims from lenders and preferred stockholders. Thus, we simply net out taxes and reinvestment needs from the Earnings Before Interest and Taxes, and reach an estimate for the FCFF – often termed as the unlevered cash flow.

It is also important to note that the FCFF does not include the tax benefits resulting from interest payments, as the cost of capital (WACC) already includes the inherent value from tax shields in its computation (Damodaran, 2006).

1.2.1.1 Enterprise Value

The concept of Enterprise Value (EV) corresponds to the first step of the DCF-FCFF approach, and it is computed by discounting the free cash flows to the firm at the weighted average cost of capital, as follows:

$$EV = \sum_{t=1}^{n} \frac{FCFF_t}{(1 + WACC)^t} + \frac{TV_n}{(1 + WACC)^n} \tag{3}$$

Where,

- o EV = Enterprise Value
- o $FCFF_t$ = Free Cash to the Firm at period t
- o WACC = Weighted Average Cost of Capital
- o TV_n = Terminal Value at the end of the time period

Simply put, the Enterprise Value is the present value of all the estimated cash flows generated by the company in the future. It is also important to note that the formula above divides the cash flows into two sections. The first section corresponds to all periods to be forecasted by the analyst, whether using annual specific estimates and/or using several growth rates defined for a medium-term period. The second section comprises of the Terminal Value discounted at the WACC, and it refers to a period in which we assume a constant annual growth rate, which is to be applied in perpetuity starting from the last forecasted period.

There are some aspects to keep in mind when choosing the perpetual growth rate. As defined by Damodaran (2002), a stable growth model such as the DCF-FCFF can only be used to value a company that is growing at a rate it can sustain in perpetuity. As such, there are some rules to follow: the first one is that the growth rate cannot be higher than the growth rate in the economy; secondly, the firm's characteristics also need to be consistent with the assumptions of stable growth (Damodaran, 2002).

With this in mind, it is also important to consider that the second parcel of the EV formula is the most crucial for the valuation process, as it accounts for a large portion of the estimated firm value.

The Terminal Value can be broken down as follows:

$$TV_n = \frac{FCFF_n}{(WACC - g)} \tag{4}$$

Where,

- o TV = Terminal Value
- o FCFF_n = Free Cash flow to the Firm at the end of the time period
- o WACC = Weighted Average Cost of Capital
- o g = Growth Rate in perpetuity

As defined in the formula above, the rate at which the company's financial items will grow in perpetuity has a major impact in the Terminal Value, which consequently affects, significantly, the final valuation of the firm. This item will be discussed in a separate section later in the chapter.

1.2.1.2 Weighted Average Cost of Capital (WACC)

In the DCF-FCFF approach, the discount rate should account for the cost of financing with debt and equity in accordance with their proportional use, hence reflecting the riskiness of the firm's financial items (Damodaran, 2006).

The Weighted Average Cost of Capital (WACC) is a "tax-adjusted discount rate, intended to pick up the value of interest tax shields that come from using an operation's debt capacity" (Luehrman, 1997). Moreover, it is a representation of the returns that all investors within a company expect to earn with their investment in that business, in opposition to endowing other investment opportunities with similar risk (Koller et al., 2020).

As per Koller et al. (2020), it can also be termed as the company's opportunity cost of funds, given that it blends the required rates of return from both debt (K_d) and equity holders (K_e). Looking at the WACC through these lenses, the cost of debt and cost of equity are both opportunity costs with a foundation on time value, each carrying their own risk premium.

The WACC may be computed under the following equation:

$$\text{WACC} = \frac{\text{E}}{\text{E} + \text{D}} * \text{K}_e + \frac{\text{D}}{\text{E} + \text{D}} * \text{K}_d * (1 - \text{t}) \tag{5}$$

Where,

- o E = Market Value of Equity
- o $\frac{\text{E}}{\text{E}+\text{D}}$ = Target level of Equity to Value
- o D = Market Value of Debt
- o $\frac{\text{D}}{\text{E}+\text{D}}$ = Target level of Debt to Value
- o K_e = Cost of Equity

- K_d = Cost of Debt
- t = Corporate Tax Rate

It is possible to breakdown the WACC into three main components: the firm's capital structure, the cost of equity, and the after-tax cost of debt (Koller et al., 2020). The latter can be further expressed into a tax component and the cost of debt, which forms what is called the tax shield of the WACC:

$$VTS = K_d * (1 - t) \tag{6}$$

The value of tax shields (VTS) can be defined as the increase in the company's value due to the tax savings obtained from the payment of interests (Fernández, 2013). As mentioned previously, this reduction in the cost of debt is only accounted for in the WACC. This allows for the FCFF to be computed as if the company was entirely financed by equity, which in turn allows analysts to compare the operational performance of several companies without concerns for their financial structure.

Although there is no consensus amongst all literature when it comes to the correct way of computing the VTS, Modigliani and Miller (1963), Myers (1974), Luehrman (1997), Brealy and Myers (2000), and Damodaran (2006) propose to discount these tax savings at the cost of debt (K_d) – which is in fact the adopted method to account for this effect in the DCF model (Fernández, 2011).

The biggest advantage of the WACC lies in its practicality, since it is intuitive, straightforward, and keeps calculations used in discounting to a minimum (Luehrman, 1997). However, it certainly has its drawbacks. When applying the WACC, we are making the implicit assumption that the firm's target debt-to-equity ratio will remain constant throughout the period under analysis – which is, in most real-world scenarios, unrealistic. Consequently, applying a static WACC works best for companies with a relatively stable capital structure, with the fault of becoming easier to misestimate as its complexity increases (Luehrman, 1997; Koller et al., 2020).

1.2.1.3 Cost of Equity

The cost of equity is one of the key parameters to estimate, not only due to its relevance in the model, but also because it can be difficult to measure. This computation can be divided into two building blocks: estimating the market return; and adjusting for risk – entailing both the risk-free rate and the company's specific risk (Koller et al., 2020).

Two well-known models can be used to estimate the cost of equity: the Fama-French three-factor model; and the Capital Asset Pricing Model (CAPM).

The CAPM is a single-factor model that quantifies the relationship between the Beta of a given asset, and its expected return. As such, as long as the Beta factor of an asset is measurable, we can quantify its expected return (Womack & Zhang, 2003). This model for risk and return is the most used amongst practitioners, due to its intuitive predictions between the two concepts, and its ultimate ability to measure risk (Fama & French, 2004).

The CAPM equation can be written as follows:

$$K_e = r_f + \beta_L * [E(R_m) - r_f] \tag{7}$$

Where,

- K_e = Cost of Equity
- r_f = Risk-free rate
- β_L = Beta Levered
- $E(R_m)$ = Expected Market Return

1.2.1.4 Risk-free rate

Damodaran (2008c) states that risk in finance is measured as "the variance in actual returns around the expected return". Consequently, for an investment to be considered risk-free, the return must always be equal to the expected return. In other words, a risk-free investment is one that is uncorrelated with any type of risky investments in the market, given that there shouldn't be any variance around its expected return.

For an investment to be risk-free, two key conditions must be met: there can be no default-risk; and there can be no reinvestment risk. Thus, a risk-free investment is one that is issued by an entity with no default-risk, and the instrument used to determine the risk-free rate will differ depending on the desired length of the investment period (Damodaran, 2008c; Koller et al., 2020).

That said, most authors agree that in mature markets, a 10-year government bond should be used. In Europe, the most common practice is to use the 10-year German Eurobond, given its investment grade classification as an AAA country.

1.2.1.5 Market risk premium

The market risk premium can be defined as the extra return investors demand for investing on the market portfolio, instead of investing on a risk-free asset (Damodaran, 2002). As per Koller et al. (2020), despite the fact that a particular company will not necessarily have the same cost of capital as the market, it provides a critical benchmark when assessing the reasonability of their cost of equity estimates.

It is an integral part of the CAPM, and it corresponds to the following difference:

$$\text{MRP} = \ E(R_m) - r_f \tag{8}$$

Although there is no consensus among authors in regard to estimating the market risk premium, there are two common methodologies accepted in the field: the first and most standard practise is to use an historical estimate of returns, and combine it with the present long-term government bond rate – hence incorporating today's expected inflation rates; the second method provides an estimation based on the implied relationship between a stock's current share price, and its financial performance in the future (Koller et al., 2020).

1.2.1.6 Beta

The Beta (β) parameter is a representation of a stock's incremental risk, in which its volatility is measured in relation to the aggregate stock market.

According to Damodaran (1999) and to Koller et al. (2020), the most common method of estimating the Beta is through a regression against a return that represents the market portfolio, over a given period of time. However, it is an imprecise process and Damodaran (1999) points out several limitations. To begin with, there is not a clear-cut way of doing the beta regression, and as such all estimations regarding time period, return interval, and choice of index will alter the results ("*The Index Problem*"). Additionally, the standard error of such estimates is rather high, creating "*The Noise Problem*". Finally, this regression merely reflects the company's characteristics over the chosen period of time, and not how it exists today - or even how it might exist in the future. Given that firms do change throughout their existence due to a variety of reasons, this creates "*The Problem of Firms Changing over Time*".

Upon the referred limitations, Damodaran (1999; 2002) and Koller et al. (2020) suggest using Bottom-up Betas. In this approach, the firm's beta reflects the type of industry it operates in, its degree of operating leverage, and how financially leveraged it is. This way, rather than using company specific betas or past prices to determine the beta, the method relies on companies

within the same industry that face similar operational risks – ultimately reducing the imprecisions around beta estimations.

To use the Bottom-up approach, one should follow the following steps:

1. Identify a benchmark in terms of levered beta (β_L), using either an industry average or a peer group with similar characteristics as the targeted company.
2. Estimate the unlevered betas (β_u) for the chosen peer group, using the following formula:

$$\beta_u = \frac{\beta_L + \beta_D * \frac{D}{E} * (1 - t)}{1 + \frac{D}{E} * (1 - t)} \tag{9}$$

Considering that:

$$\beta_D = \frac{K_d - (r_f + CRP)}{MRP} \tag{10}$$

Where,

- $\circ$ β_u = Unlevered Beta
- $\circ$ β_d = Beta of Debt
- $\circ$ β_L = Levered Beta
- $\circ$ $\frac{D}{E}$ = Debt-to-equity ratio
- $\circ$ t = Corporate tax rate
- $\circ$ MRP = Market Risk Premium
- $\circ$ CRP = Country Risk Premium
- $\circ$ r_f = Risk-free rate
- $\circ$ K_d = Cost of Debt

3. Perform a weighted averaged of the unlevered betas calculated in the previous step. Given that the peer group chosen has the same business risk as the targeted company, assume that this average coincides with the β_u of the company.
4. Using data from the company, estimate its levered beta:

$$\beta_L = \beta_u + (\beta_u - \beta_D) * \frac{D}{E} * (1 - t) \tag{11}$$

Where,

- $\circ$ β_L = Levered Beta

This approach provides a far more accurate beta estimate for the firm, given that it reflects the current business risk of the industry through the chosen peer group. Moreover, it is computed using the current debt-to-equity ratio of the company, rather than with an average of an historical period chosen in the regression method (Damodaran, 1999).

1.2.1.7 Cost of Debt

The last key input to compute the WACC is the cost of debt (K_d), and it measures the firm's current cost for borrowing funds. It is determined by the risk-free rate and the default risk of the company, and, as these variables increase, so does the cost of borrowing money. Furthermore, given that the WACC accounts for the value of tax shields, the after-tax cost of debt will also benefit from an increase in the corporate tax rate (Koller et al., 2020).

For investment grade companies that are liquid and trade frequently, the default-risk is so low that the estimation error becomes immaterial, and as such the yield-to-maturity of the firm's long-term bonds can be used as a proxy for the cost of debt (Damodaran, 2002).

On the other hand, for firms that are illiquid and do not trade on a regular basis, the cost of debt can be estimated "by adding a default spread to the risk-free rate, with the magnitude of the spread depending upon the credit risk in the company" (Damodaran, 2008c).

$$K_d = r_f + \text{Default spread} \tag{12}$$

If the company is rated, it is possible to estimate the cost of debt by adding a default spread to its official rating. For non-rated companies, the practitioner can either estimate the cost of debt through the company's recent borrowing history, or use synthetic ratings based on its forecasted financial ratios (Damodaran, 2002; Koller et al., 2020).

1.2.1.8 Equity Value

Once the Enterprise Value (EV) is computed with the concepts described in the previous sections, the valuation of the firm as a whole is completed. However, it still needs to be adjusted in order to truly represent the portion of the company owned by the shareholders. To do so, the Equity Value (EQV) of the firm must be computed, as follows:

$$EQV = EV + \text{Non–operating assets} - \text{Non–equity claims} \tag{13}$$

Starting with the non-operating assets, even though these are not included in the FCFF, they still represent value to the shareholders. Consequently, to get to the firm value, there are four categories of assets that must be considered. The first one is cash and near-cash investments,

such as riskless or extremely low risk investments typical of companies with hefty cash balances. The second one is investments on equity or bonds from other companies, either for strategic or investment purposes. The third one is related to holdings in other private or public firms. And finally, the fourth category is related with assets that do not generate cash flows but may still represent value to the shareholder (Damodaran, 2002).

The other item to adjust relates to all non-equity claims, which includes short-term and long-term debt, debt equivalents, and hybrid securities (Koller et al., 2020). A general rule of thumb provided by Damodaran (2002) is that the debt subtracted from the firm value should not be lower than the one used to compute the cost of capital. Thus, what is chosen to be capitalized as debt, must be subtracted in order to estimate the value of equity.

1.2.1.9 Growth

To finalize the segment of the literature review related with the DCF-FCFF valuation method, it is of utmost importance to discuss growth.

As previously mentioned, the value of a business is a function of its expected earnings growth rate in the future. Consequently, all future cash flows generated by the firm will be dependent on the forecast of this growth. Given its role, estimating future revenues and earnings is a critical input when performing a valuation process, especially for high-growth firms.

The first important notion to outline is that not all growth is healthy for a company. In essence, growth only creates value when a company manages to generate returns on invested capital (ROIC) greater than the cost of capital. As such, for a firm to achieve sustainable growth in the long run, it must have control over the proportion of earnings that are reinvested back into the business, and be highly critical of the returns earned on these investments (Damodaran, 2008a; Koller et al., 2020).

Damodaran (2002) considers that there are three basic ways of estimating growth: through historical growth rates; through analyst estimates of growth; and to estimate by analysing the fundamental determinants of growth.

Using historical growth rates is perhaps the most intuitive measure when assessing future growth. However, looking at past earnings – which is, by definition, backwards looking – seems to go against the idea of investing in a firm's future capability of generating cash flows. While it might be correct to use this method when valuing stable firms, there are some dangers and limitations when valuing high-growth businesses. Nonetheless, it does still convey valuable information when making estimates for the future, and many analysts find it important to assess past performance (Damodaran, 2002; Damodaran, 2008a).

The second way of estimating growth is related with analysts' forecasts of growth. Damodaran (2008a) points out that "for public traded firms, the most common source of expected earnings growth rates is the equity research analysts who follow the firm". That said, there are some variables that might increase the number of followers certain companies have, which in turn improves the accuracy of these estimations, such as its market capitalization, institutional holding, and trading volume. The general consensus amongst practitioners is that using analysts' forecasts is more accurate than relying on historical growth rates.

Finally, the third method ties growth to the actions that firms take to create and sustain growth. This way, growth is determined by the quality of the assets the firm reinvests in, and the forecasted outcome of such investments - which include the creation of distribution channels, R&D, acquisitions, and marketing. This can be assessed by computing variables such as the return on equity (ROE), return on invested capital (ROIC), and reinvestment rate. Damodaran (2002) deems this as the soundest way of estimating growth given that, in essence, by estimating these inputs, the company's fundamental growth rate is also being estimated.

There are two basic principles that the three methods accept: growth and reinvestment have a cause-effect relationship; and the best measure for quality of growth relies on determining the returns on the firm's investments.

1.3 Relative Valuation

Whereas in the DCF valuation the idea is to determine the value of assets within a business based on their cash flows, potential growth, and riskiness, in the Relative Valuation the purpose is to value assets based on how their peers are currently priced in the market (Damodaran, 2002). This method is based on the company's income statement, and it seeks "to determine the company's value through the size of its earnings, sales, or other indicators" (Fernández, 2001).

There are two requirements to apply this methodology: the first one is that prices need to be standardized in order for assets to be valued on a relative basis; and the second is the need to find a peer group of firms with similar characteristics as the company that is being valued – to ensure that you are comparing apples-to-apples.

There are several reasons for its popularity, among which the fact that a valuation based on multiples and comparable businesses requires fewer ambiguous or subjective assumptions, less data and in-depth analysis of the company being valued; allowing a quicker valuation when compared to a DCF valuation, and is far more simple to pitch to clients or investors (Fernández, 2001; Damodaran, 2002).

That said, there are several pitfalls to be on the lookout for. Because it requires fewer assumptions, it may lead the analyst to overlook key variables such as risk, growth, and cash flow potential. Furthermore, since a multiples approach tends to reflect the current state of the market, it may lead to poor estimates depending on if the market is over or undervaluing the comparable firms. Finally, the lack of transparency regarding the underlying assumptions may cause biased analysts to choose multiples or peer groups that ultimately justify the desired price (Damodaran, 2002).

Consequently, this method can be easy to misestimate, and its usage is highly debatable. As such, Fernández (2001) states that Multiples are most useful on the second stage of a valuation, enabling the analyst to compare and identify any differences with the primary valuation method. Thus, performing a relative valuation can validate and test the estimation of the DCF approach, as well as strengthen and complement the overall valuation results.

1.3.1 Multiples

The value of a business can be compared relative to the earnings and revenues it generates, the book value of its assets, or to measures specific to a certain industry (Koller et al., 2020).

According to Fernández (2001), multiples can be divided into three categories, as presented in the table below:

Table 2. **Categorization of Multiples**. Adapted from Fernández (2001)

Equity value multiples	P/E (Price to Earnings Ratio) P/S (Price to Sales) P/BV (Price to Book Value)
Enterprise value multiples	EV/EBITDA (Enterprise Value to EBITDA) EV/Sales (Enterprise Value to Sales) EV/FCF (Enterprise Value to Free Cash Flow)
Growth-referenced multiples	P/EG (P/E to EPS Growth) EV/EG (Enterprise Value to EBITDA Growth)

Multiples based on the Equity Value are those based on the company's capitalization or price, and have the advantage of being intuitive and easy to calculate. As per Koller et al. (2020), the Price to Earnings Ratio is the most widely used multiple due to its simplicity, however it is also very easy to misestimate due to its lack of ties to the firm's financial fundamentals.

Enterprise Value multiples are those based on the company's value. These are very similar to the EQV multiples, but they use indicators that rely on the firm's financial debt in addition to its market capitalization. The EV/EBITDA is also one of the most common multiples for analysts

to use, but similarly to the P/E, it also lacks some key components including changes in working capital requirements, and failure to consider capital investments (Fernández, 2001).

The third category of multiples is mainly used in high-growth sectors such as technology, health, and telecommunications.

1.3.2 Peer Group

The last step to performing a relative valuation is finding a group of companies with similar characteristics to the company that is being valued. In doing so, it is critical to select the right peer group in order to reach an accurate estimate for the company's value.

According to Koller et al. (2020), the ideal number of companies within a peer group ranges from 8 to 15 comparable firms. Even so, most authors agree that it is better to have a smaller and more accurate group, than to tamper your sample with companies that do not present similar characteristics to the one you are trying to value.

Given this, the best practise is to start with a broad peer group, and funnel it down based on characteristics such as similarity in products and services, current performance, economies of scale, strategic advantages, and so on. Subsequently, outliers must be identified and excluded by analysing their multiples in comparison to the peer group average. Once the weighted average is harmonized, it is possible to perform a relative valuation based on inputs from the company's income statement.

2. Market Overview

2.1 Macroeconomic Outlook

The year of 2022 has been marked by the beginning of yet another war in Europe, with the invasion of Ukraine by Russia, on February 24th. This geopolitical event triggered an energy crisis in Europe, after Russia decided to suspend the supply of natural gas to countries belonging to the European Union.

Moreover, with the World economy still suffering from the aftermath of the pandemic, the war in Ukraine has aggravated several areas which already posed a problem world-wide. Since July of 2021, families and business have endured a continued increase in prices of raw materials, fuel, energy, and other primary goods. This geopolitical pressure has created a spiralling effect, causing a massive increase in the general price of goods and services, translating into higher inflation. According to data gathered from INE (*Instituto Nacional de Estatística*), the average inflation rate reached c. 7.83% in 2022.
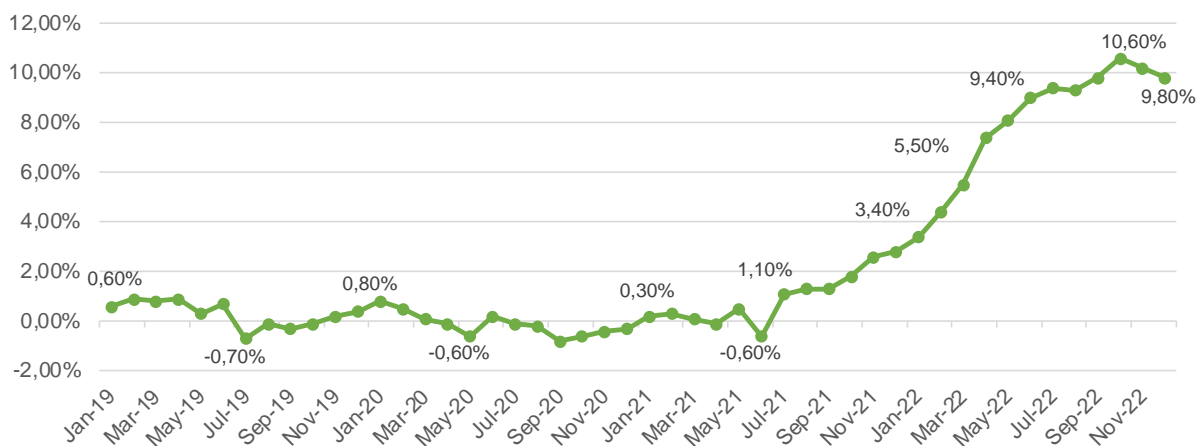
Figure 1. **Harmonized Index of Consumer Prices in Portugal**. Adapted from Banco de Portugal.

By analysing **Figure 1**, it is possible to see that the inflation rates have spiked going into 2022. Furthermore, according to data available in Banco de Portugal, the forecasted average inflation rate for 2023(F) is 5.5%, decreasing to 3.2% in 2024(F) and to 2.1% in 2025(F). Thus, the general prediction is for businesses to continue to bear the impact of the pandemic and the war in the medium-term, and will have to make their best efforts to pass-through some of these costs to their clients across all segments of the market.

In order to reach these forecasted levels, governments across Europe have been implementing several measures to fight inflation and to support families & businesses. Furthermore, the ECB has triggered several increases in interest rates with the purpose of

slowing down the increase in prices, which in turn increases the pressure on firms and individuals that have variable interest rates associated with their debt.

Besides that, according to the Annual Management Report of NOS of 2022, there have also been several disruptions in the supply chains, which increases delivery times and associated costs of goods within several industries. Moreover, there has been a higher frequency of cyberattacks, posing a problem especially for firms operating in the technological sector.

All these factors have affected consumer patterns and the index of consumer trust, due to the increased potential of an economic recession worldwide.

By analysing the GDP growth in **Figure 2**, it is possible to see that the global economy suffered a big hit due to the COVID-19 pandemic, and is still recovering from its effects.
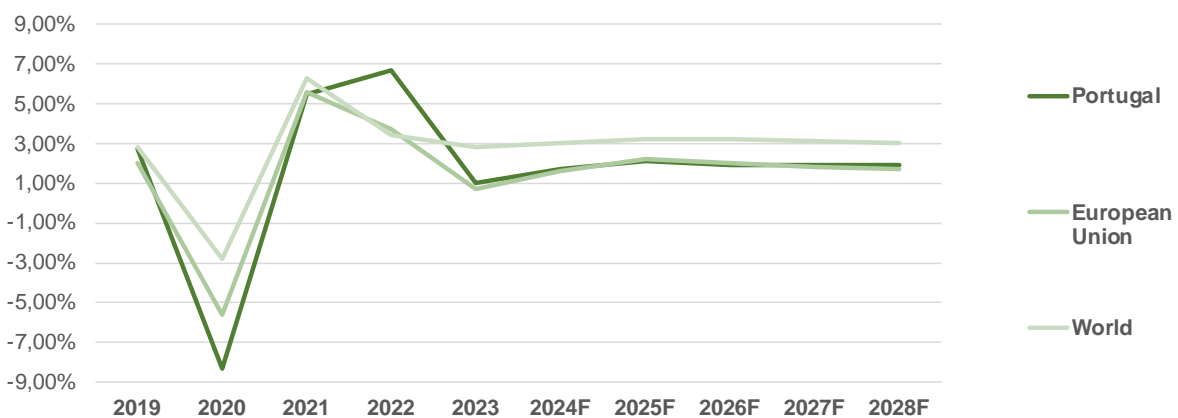
Figure 2. **Real GDP growth**. Adapted from IMF.

Additionally, in accordance with figures from the IMF dating from 1980, Portugal's GDP growth rate reached its lowest recorded level at c. -8.3% in 2020, highlighting the impact of the pandemic in the Portuguese economy. Despite this, it is possible to see that by 2025, the forecasted real GDP growth will recover to the pre-pandemic levels.

2.2 Industry Overview

2.2.1 Telecommunications

Telecommunications is a key subsector of the Portuguese communications industry, and it has a large impact in the country's economy, generating wealth by creating many qualified jobs and providing several investment opportunities. It encompasses a broad range of services, including fixed and mobile solutions for Television, Internet, Voice and Data.

According to data gathered from ANACOM's annual report of 2022 "Pacotes de Serviços de Comunicações Eletrónicas", the number of subscribers to full-service packages was over 4.6

million in Portugal, increasing c. 3.6% in respect to 2021. This evolution managed to be even higher than in 2020, and translates into 1,867 million euros in revenues (+4.3%) - reinforcing its position as a key driver of economic growth.

As mentioned before, this industry provides an important contribution to the Portuguese economy, with the government also taking part in expanding the technological infrastructure of the country. According to data extracted from ANACOM's website, investment in the sector contributed to c. 3.72% of Gross Fixed Capital Formation (GFCF) in 2021, representing an increase of about 0.8 p.p. in relation to the previous year.
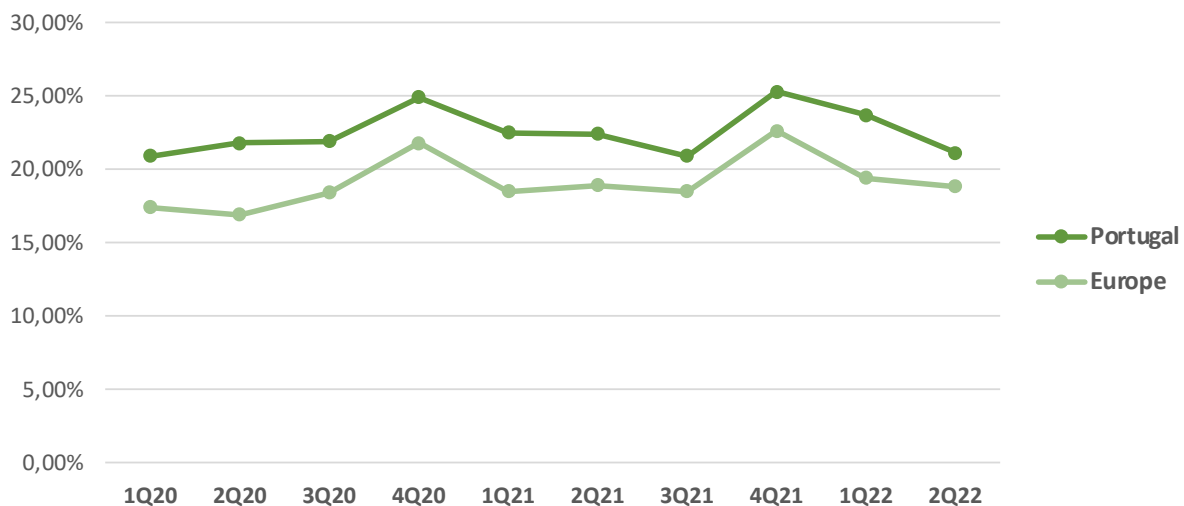
Figure 3. **Ratio of capex over revenues in telecom sector**. Adapted from Annual Report NOS (2022).

As depicted in **Figure 3**, the telecommunications market in Portugal distinguishes itself through high capital expenditures that translate into proportional revenues above the European average. Furthermore, despite the pandemic, investment was not only seemingly unimpacted, but it even peaked twice in the last quarters of 2020 and 2021.

Regarding prices in the industry, a study performed by ANACOM in the report "Evolução dos preços das telecomunicações" of December 2022, showed that since 2009 the Harmonized Index of Consumer Prices (HICP) for telecommunications in Portugal has increased c. 7.7%, while in the European Union prices decreased in c. 10%. Moreover, during the last 12 months Portugal faced a deviation of +1.7% in relation to the EU average. As such, it is possible to conclude that the sector faces some issues related with the disruption of the supply chain, and with the increased inflation arising from the current macroeconomic situation – ultimately passing these prices through to the final consumer.

2.2.2 Players

The telecommunications sector is highly competitive, and as such firms spend considerable resources in trying to get a competitive edge, either through technological advances or by offering more competitive prices.

The largest players in the sector include MEO, NOS and Vodafone, which accounted for over 97% of market share of service packages in 2022. All these providers offer fixed and mobile solutions for Television, Internet, Voice and Data.

Service Providers	2021	2022	% Change
MEO	40.8%	41.1%	0.3%
NOS Group	35.9%	35.5%	-0.4%
Vodafone	20.0%	20.3%	0.4%
NOWO	3.2%	2.9%	-0.3%
Other providers	0.1%	0.1%	0.0%

Figure 4. **Market share of service packages**. Adapted from ANACOM.

Figure 4 represents the market share that each player has when it comes to the number of active clients that subscribe to the available service packages. This is deemed as one of the best areas to measure dominance in the market, as the services provided in these packages encompass a broad range of products that the telecommunications market has to offer.

That being said, MEO is the largest telecommunications provider in Portugal as of 2022, with a market share of c. 41.1% (+0.3 p.p. in relation to the previous year). Conversely, NOS saw its market share being reduced in 0.4 p.p. in respect to 2021, ending the year with a market share of c. 35.5%. Despite this, NOS remains the leader in Communications, Entertainment & Media in Portugal, mainly due to the size and diversity of its group.

Coming in third, Vodafone lags behind its two biggest competitors, with a market share representing 20.3% of the Portuguese market. It is also important to note that, on the 30th of September of 2022, Vodafone announced the acquisition of NOWO from Carbonitel – which could imply an increased effort to compete eye-to-eye with MEO and NOS.

2.2.3 Regulatory Authorities

Founded in 1989, ANACOM (*Autoridade Nacional de Comunicações*) is the national regulatory authority for the Portuguese communications sector, and it carries the responsibility of supervising and regulating all players operating in the industry. This includes defining and enforcing rules aimed to promote competition, and to protect consumer interests. Thus, all companies that wish to provide electronic communication networks and services in Portugal

are subject to approval by ANACOM, and need to abide by its rules while operating in the market.

In addition, companies providing Television and Audiovisual contents related with media services need to comply with ERC (*Entidade Reguladora para a Comunicação Social*). Among other tasks, it is mainly responsible for ensuring compliance with the norms and principles that govern the media in Portugal.

Finally, looking through a transversal spectrum of the businesses operating in Portugal, companies must comply with the laws enforced by ADC (*Autoridade da Concorrência*) and by CNDP (*Comissão Nacional da Proteção de Dados*).

3. Company Overview

3.1 Company Profile & History

NOS, SGPS is a group of communications and entertainment founded in 2013, from a merger between Zon Multimédia and Optimus Telecomunicações, which at the time were two of the biggest players in the Portuguese communications sector. The transaction was announced in 2012, and it changed the telecommunications scene in Portugal after it got the approval from ANACOM, ADC and CMVM. The deal allowed for the two giants to join forces and create synergies between the two existing businesses, ultimately cementing NOS as one of the main sharks in the industry.

Nowadays, NOS is the biggest group of Communications, Entertainment & Media in Portugal, offering fixed and mobile solutions for Television, Internet, Voice, and Data, as well as Cinema and Audiovisual services to customers in all segments of the market – residential, private, business and wholesale. For the corporate market, the company offers an extended supply of products and services, namely ICT, IoT and Cloud services. In addition to this, NOS has been developing adjacent services to complement its core business, mainly with the creation of "NOS alarmes" in a partnership with Securitas Portugal, an advertising business called "Playce", and a line of insurance services. Finally, NOS has also established joint-ventures with strategic partners such as Sport TV and ZAP to leverage its core business.

The NOS group is constituted by 15 companies, most of which are either 100% owned by NOS or in which it has majority participations (**Figure 5**). The group strives through its diversity, allowing for a high consumer reach by satisfying demand in several markets.

NOS Comunicações, S.A. **(100%)**	NOS Lusomundo Visuais, S.A. **(100%)**	NOS Lusomundo Cinemas, S.A. **(100%)**	NOS Audio – Sales and Distribution, S.A. **(100%)**	NOS Wholesale, S.A. **(100%)**
NOS Technology, S.A. **(100%)**	NOS Sistemas, S.A. **(100%)**	NOS Inovação, S.A. **(100%)**	NOS Corporate Center, S.A. **(100%)**	NOS Mediação de Seguros, S.A. **(100%)**
NOS Açores Comunicações, S.A. **(84%)**	NOS Madeira Comunicações, S.A. **(78%)**	Dremia, S.A. **(50%)**	ZAP **(30%)**	Sport TV, S.A. **(25%)**

Figure 5. **NOS, SGPS constitution**. Adapted from Annual Reports NOS (2022).

Despite the diversity of the group, in a standalone scenario the Telecommunications business generated c. 93% of the total EBITDA contribution at €606M in 2022, whereas the Media & Entertainment branch only contributed to €45M of the consolidated EBITDA (c. 7%).

That being said, 2022 was a year marked by a very solid operational performance, with the consolidated EBITDA increasing in 5.4% with respect to 2021. Moreover, the company invested heavily on the expansion and modernization of its technological infrastructure, with capex reaching an historical maximum over a single fiscal year – increasing 17.4% in relation to the previous year and accounting for over 30% of NOS' consolidated Revenues. Consequently, the Net Income was down by 4 p.p., totalling €138.5M in 2022 (excluding the sale of towers to Cellnex). Despite this, the investments made allow NOS to remain an industry leader in technological development, promoting long-term value creation and a competitive edge for the firm.

Consolidated revenues €1,521M	Consolidated EBITDA €651M	Capex €496M	Fixed and mobile Voice customers 7,543,000
Clients with fixed network 5,284,000	Market Share Revenue 9M22 31%	5G National coverage 87%	Number of employees 1,803
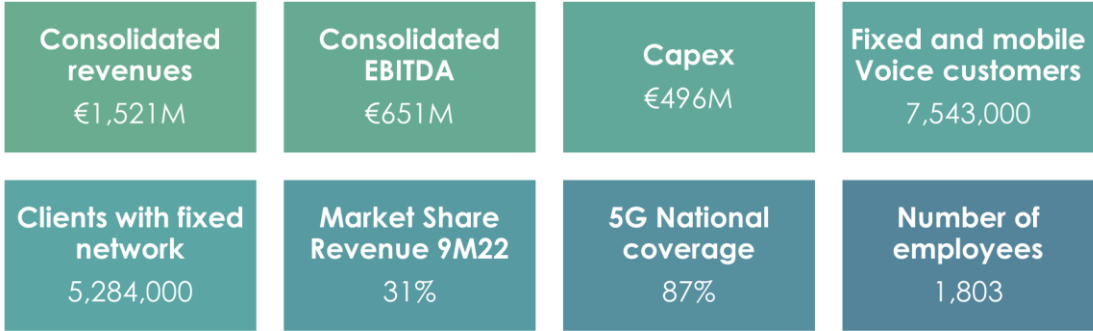
Figure 6. **Main Key Performance Indicators**. Adapted from Annual Reports NOS (2022).

By analysing some of the main KPIs of NOS throughout 2022 (**Figure 6**), it is possible to account for the size of the group in the Portuguese market. The company has a strong presence among families & businesses in need of telecommunication services, and plays a major role in driving economic growth in the sector.

NOS is also a pioneer in the 5G network, having created the most advanced innovation centre for its development in Portugal: the NOS Hub 5G. This has allowed the creation of various strategic partnerships, accelerating the potential of new solutions and products to be brought to the market.

In light of the trending topic that is ESG nowadays (Environmental, Social and Governance), it is also important for firms to show commitment and awareness to these problems - not only because companies in non-compliance might be penalized with fines, but also due to the fact that customers tend to take into account the environment into their decision-making process. As such, companies are shifting for greener and more sustainable solutions to conduct their businesses. Consequently, NOS has committed to achieving the objectives proposed by the

United Nations for the 2030 agenda. Furthermore, based on their performance in 2022, NOS has climbed in the Moody's ESG Solutions ranking and is now recognized as the 4th best European company in the telecommunications sector.

The group has also developed a strategic plan that is in practise until 2025, which is based on 6 key value-drivers: 5G leadership; digital emancipation; providing a competitive offer; engaging in a close relationship with its clients; investing on areas that promote value creation; and empower and capacitate the firm's employees to act towards a common goal. The execution of this business plan has already enabled some goals to come into fruition, mainly with increases in revenue, operational results, market growth, and shareholder remuneration.

3.2 Shareholder Structure

As of December 31st, 2022, the company's share capital amounted to c. €855 million and comprised of 515,161,380 nominal shares, valued at 1.66 euros each. The shareholder structure is as follows:
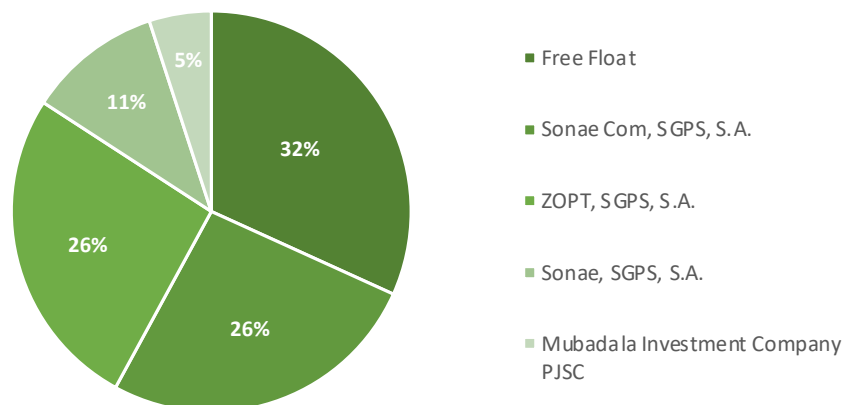
Figure 7. **Shareholder structure**. Adapted from Annual Reports NOS (2022).

The majority of the company's shares are publicly traded on the Euronext Lisbon market, with free float representing c. 32% of total shares.

NOS' major shareholder is the Sonae group, which in total holds c. 37% equity in the firm. Of this stake, 26% belongs to Sonae Com, which is a sub-holding firm that manages assets in the Technological, Media & Telecommunications market, whereas the remaining 11% are linked to the parent company. It is also important to note that, until Dec-22, ZOPT used to be a subsidiary of Sonae, meaning that at one point the group held over 63% of NOS.

Finally, with only 5% equity in the company, Mubadala Investment Company is a sovereign investor based in the United Arab Emirates that manages both national and international assets and investments.

3.3 Business Areas

In 2022, the NOS group generated 1,521 million euros in revenues across all segments of its portfolio of activities. It is important to note, however, that there are intra-group balances that are not considered in a consolidated perspective of the company – since these costs and income cancel out. Nonetheless, when analysing each business area individually, these related-party balances are considered for the financial figures of the company.

That being said, NOS has three main business areas of activity: the largest segment corresponds to the Telecommunications business, which generated €1,469M in revenues and €606M in EBITDA; coming in second there is the Media & Entertainment business, responsible for €90M in revenues and accounting for €45M in EBITDA; lastly, there are three joint-venture businesses, namely a 50% participation in Dreamia, a 30% participation in ZAP, and a 25% equity stake in Sport TV. To note that all these figures correspond to FY22.

As mentioned previously, the telecommunications business caters to all customers in the market, mainly through the residential and private segments (B2C), and through the corporate and wholesale segments (B2B). Through these channels, NOS offers a large set of products and services, such as:

- Last generation fixed and mobile solutions for phone and voice products, servicing over 7.500M clients in 2022. Currently, over 99% of the Portuguese population has 4G mobile network, and 87% are equipped with 5G services. Moreover, NOS owns the largest network of 5G in Portugal, with around 6,000 installed stations across the country.
- Interactive Television content with diverse service packages, providing Pay TV to 1.664M houses and businesses in 2022.
- A fixed next-generation network with a customer base of over 5.200M, as well as broadband services provided to 1.524M clients.
- Complementary offers to the corporate segment of the market through an extended portfolio of telecommunication products and services, offering solutions to all firms regardless of their sector and dimension. Among these are the ICT, IoT and Cloud services.
- A large portfolio of 5G products and investments, among which the opening of the Hub 5G, with the intent of promoting innovation and the creation of new solutions for the corporate world. As of Dec-22, NOS has closed 17 partnerships and developed 33 solutions through this investment. Furthermore, the company has also created a 10-million-euro fund to invest in "5G enabled" Portuguese start-ups.
- Launch of "NOS Alarmes" in March 2022 in a partnership with Securitas Portugal.

- An advertising and digital marketing platform called "Playce".
- Line of insurance services.

By analysing **Figure 8**, one can see the impact of the pandemic on the revenue streams from the Telecommunications segment, with a c. 12% decrease from 2019 to 2020 – translating into 176 million euros less income for the firm. Nonetheless, revenues have been increasing since, and are expected to return to the pre-pandemic levels by 2023.
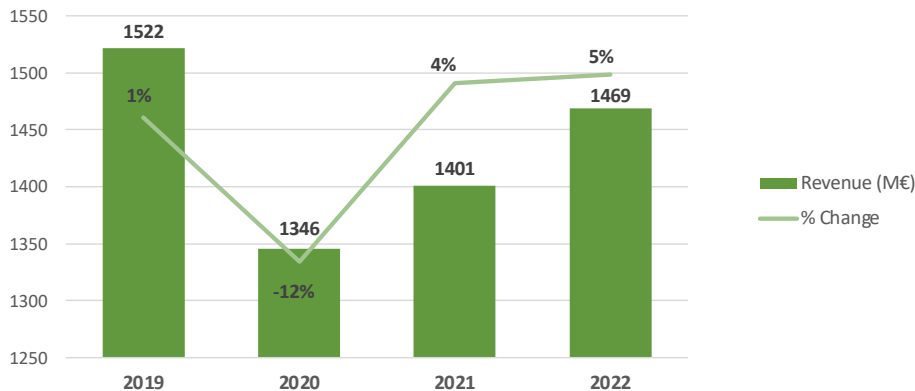
Figure 8. **Revenues from Telecommunications (M€)**. Adapted from Annual Reports NOS.

With respect to Media & Entertainment, this business area can be divided into NOS Cinemas and NOS Audiovisuais, and it encompasses the sale of video productions, movie distribution, cinema exhibitions, and the acquisition/negotiation of TV rights per subscription and per VOD (video-on-demand).

It is important to underline the uncontested leadership of NOS in the cinema segment of the Portuguese market, with a presence in over 214 screens across the country. Moreover, it was also the first chain in Europe to become fully digital, as well as one of the first worldwide to use technologies such as IMAX, 4DX, XVision, and ATMOS. Despite the dominance, NOS suffered a big hit with COVID-19, and is still recovering to the pre-pandemic revenue levels.
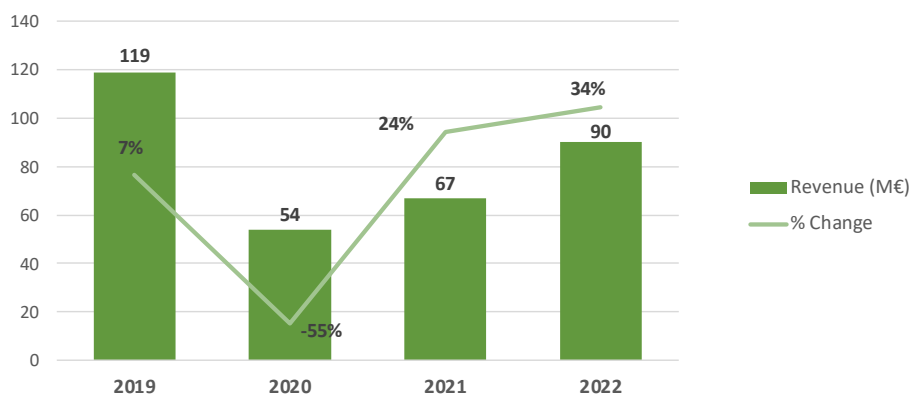
Figure 9. **Revenues from Cinema and Audiovisual services (M€)**. Adapted from Annual Reports NOS.

As it is possible to see in **Figure 9**, the revenue streams in this business area decreased in over 50% from 2019 to 2020, given its high dependence on the income generated through cinema exhibition sales. Furthermore, although there has been a visible and gradual recovery since the peak of the pandemic, revenues in 2022 are still c. 29 million euros below the 2019 figures.

Finally, NOS has also established joint ventures with some strategic partners - namely Sport TV, Dreamia, and ZAP. These investments are solely an adjacent business, and their purpose is to help in leveraging the core activities of the firm.

3.4 Financial Analysis

In line with the figures showcased in the previous section, the operational performance of NOS has been recovering throughout the period under analysis (**Figure 10**).
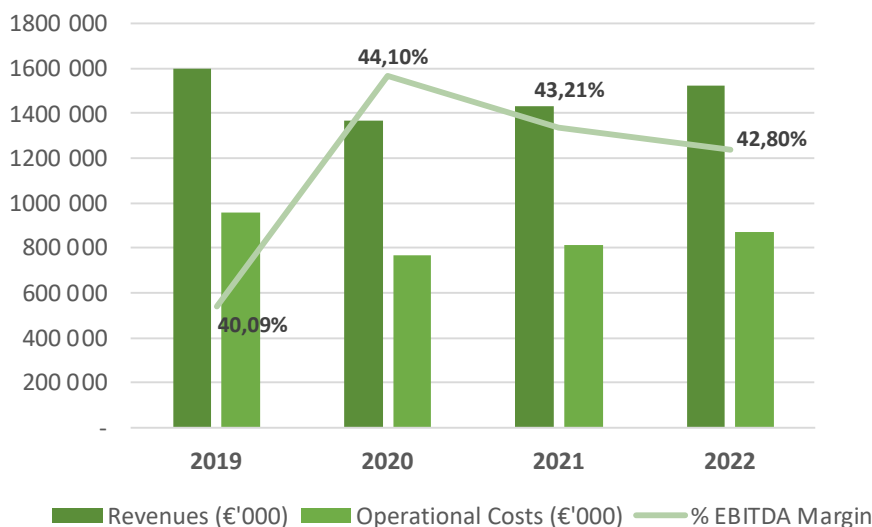
Figure 10. **Revenues, Operational Costs and EBITDA margin**. Own estimates; NOS Annual Reports.

In 2022, the company's revenues experienced a 6.34% growth rate in respect to the previous year's figures, which were around €1,430M. This phenomenon has been in line with the tendency to return to the pre-pandemic levels, as NOS is experiencing consolidated growth rates far larger than the 1.46% recorded in 2019 – which can be justified with the lift of restrictions related to COVID-19, and with the capitalization of the recent investment opportunities taken on by the firm.

The operational costs amounted to c. €870M in 2022, increasing in over 100 million euros since 2020. This percentage change in expenses during the past three years (FY20: -20.19% FY21: 6.23% FY22: 7.09%) is mostly related with the inflationary pressures experienced worldwide that were discussed in Chapter 2. Despite these macroeconomic conditions, NOS

has increased efforts in order to optimize its operational activities, aiming to mitigate some of these effects.

Regarding the EBITDA margin, despite the increase in EBITDA from €618M to €651M in 2022 (c. 5.4%), the operational expenses of the firm grew at a higher rate than the revenue – especially in the Cinema and Audiovisual segment. Notwithstanding, although the EBITDA margin decreased to 42.80%, it is still 2.72 p.p. above the pre-pandemic rate, and it can be considered as an extremely healthy margin for the telecommunications industry.

Another key aspect to consider when evaluating a company relates to its ability of paying off short-term liabilities without having to rely on raising external capital. This provides investors with fundamental knowledge on how the revenue streams generated by the company can fulfil its outstanding obligations. The most common method of measuring liquidity is through a set of ratios, as showcased in **Figure 11**.
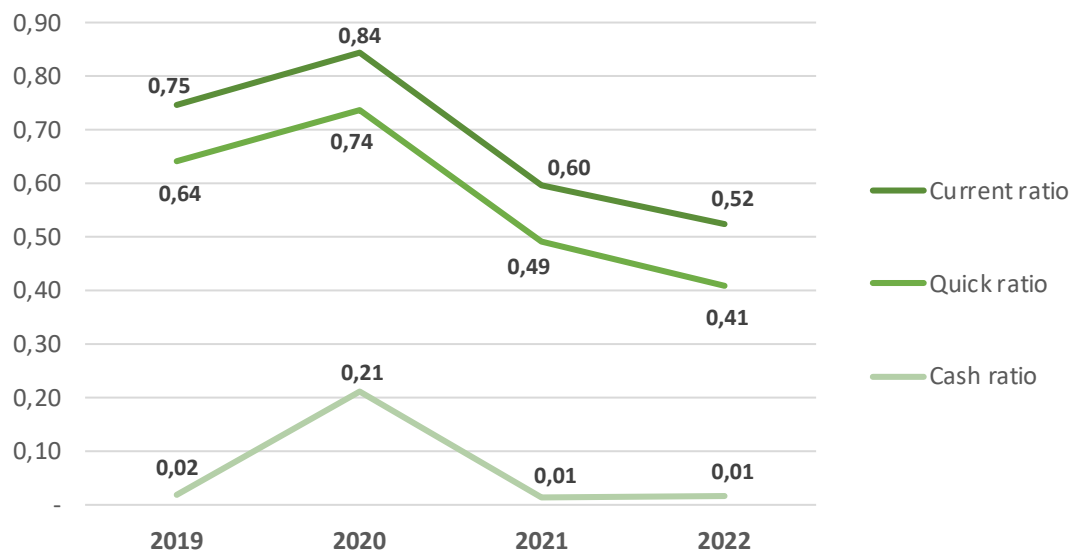
Figure 11. **Liquidity Ratios**. Own estimates; NOS Annual Reports.

Straight off the bat, it is possible to conclude that NOS does not have enough current assets in its balance sheet to cover the amount of liabilities due in the short-term, given that these ratios are well below 1.00 throughout the period under analysis.

Starting off with the current ratio, it measures the capability of the firm to settle its payables and outstanding debt within a year. As it is possible to see, this ratio drastically decreased after 2020, mainly due to a large increase in the firm's current liabilities. This originates from the heavy investment aforementioned, with capex reaching an all-time high at €626M (including Leases and other contractual rights), and with the fact that this investment was mostly financed with short-term debt – hence increasing the total amount in this caption of the balance sheet.

Similarly to the current ratio, the quick ratio accompanied its peaks and valleys. This happens because it measures liquidity according with the same principles, however it funnels even deeper into what are considered as assets that can be converted easily into cash. Thus, instead of considering the current assets as a whole, for this ratio only the more liquid assets are taken into account, such as cash and cash equivalents, marketable securities and accounts receivable. That said, with these parameters, the liquidity of NOS is even more fragile in light of the recent capital expenditure and the way it was financed.

Lastly, the cash ratio measures NOS' ability to pay off its current liabilities only using cash and cash equivalents. As it is possible to see in **Figure 11**, the company holds extremely low sums in this caption in comparison to its outstanding payables and debt (FY19: €13M; FY20: €153M; FY21: €11M; FY22: €15M). Nonetheless, the cash ratio is very conservative and limited, since it is not feasible or realistic that a company would hold consistently large amounts of cash. As such, the low cash ratio is more of an indicator that money is being distributed among its shareholders, or in this case that it is being invested elsewhere to generate higher returns in the future.

Regarding the capital structure, the firm has been able to keep a steady debt-to-equity ratio despite the increase debt used to fund its capital expenditures (**Figure 12**).
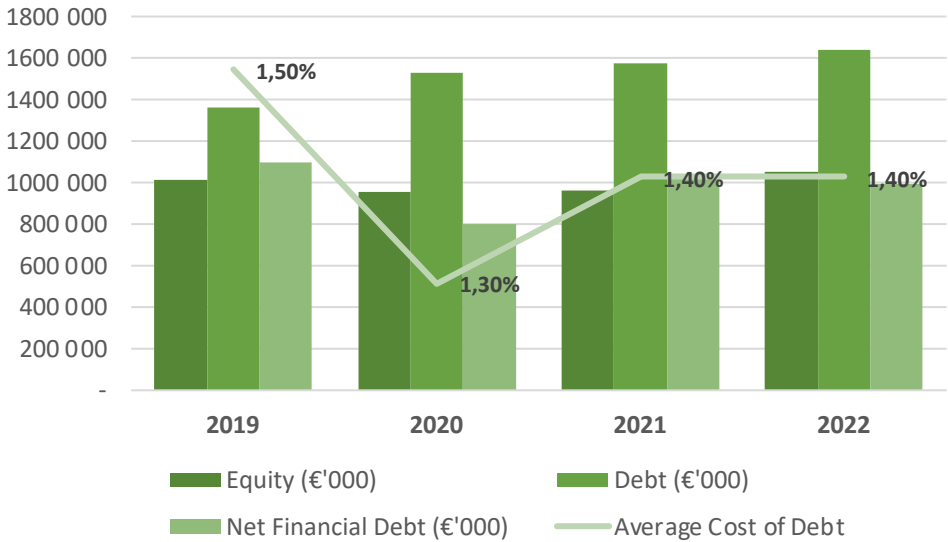
Figure 12. **Capital Structure analysis**. Own estimates; NOS Annual Reports.

In 2022, NOS registered a level of debt amounting to €1,638M, which translates into an increase of €278M since 2019. Most of the debt taken by the company corresponds to short-term borrowings, increasing from €143M to €427M during the same period (+198%). Moreover, average maturity of debt is 2.2 years, with an average cost of financial debt of 1.40% in 2022

(excluding financial leases). It is also important to note that, as of Dec-22, 62% of the debt issued by NOS was at a fixed rate.

With respect to Equity, the evolution up to €1,052M is mainly related with a higher Net Income (FY19: €143M; FY20: €92M; FY21: €144M; FY22: €224M), which is driven by an increase in revenues allied to a decrease in costs and losses in the income statement.

Furthermore, the equity structure also experienced some changes. When NOS was founded in 2013 from the merger between Zon and Optimus, the capital of the company increased by €856M and was registered in the form of Capital Issued Premium. However, on April 21st of 2022, a General Board meeting approved an increase in the share capital of the firm by incorporation of this Capital Issued Premium in the amount of €850M.

In conclusion, NOS has been able to maintain a somewhat steady debt-to-equity ratio, with an average of 0.90 from 2019 to 2022. Regarding future forecasts, the company states in its Annual Report of 2022 that it is compromised in preserving the current capital structure – considering it to be solid and conservative.

3.5 Stock Performance

The following graphic (**Figure 13**) represents NOS' share value at close and its corresponding variation in comparison to that of the Portuguese Index (PSI-20).
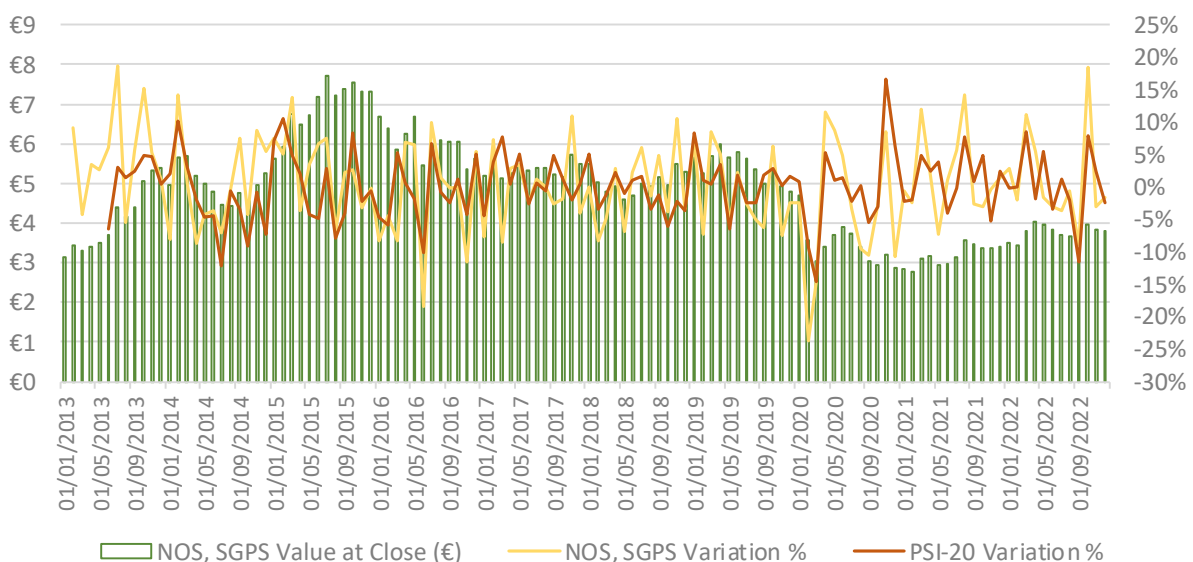
Figure 13. **Stock performance comparison between NOS and the PSI-20 (2013-2022).** Yahoo Finance.

From 2013 until 2022, NOS' share price experienced a 20.05% growth – translating into a €0.632 price increase – which compares to a 3.59% devaluation of the PSI-20 during the same period. Regarding 2022, the share price of the firm has also outperformed the Portuguese Index.

As of December 31st, 2022, the market capitalization of NOS ascended to €1.949 billion, representing a €192.7 million increase in comparison to the previous year.

In reference to the recent performance of the stock, NOS closed the year with a price quote of €3.784, appreciating in c. 11% in comparison to the end of 2021. Furthermore, the share price fluctuated between a minimum of €3.204 and a maximum of €4.120.

4. Valuation

As discussed in Chapter 1, the share value of NOS at the end of 2022 will be performed with the support of two valuation methods: the Discounted Cash Flow approach, performing the Free Cash Flow to the Firm; and the Relative Valuation (multiples method).

4.1 Assumptions

For the execution of the valuation process and the respective financial model, several key assumptions will be discussed in the following sections of this chapter. Furthermore, an historical period stretching back to 2019 was taken into consideration, due to the impact of the pandemic on the company's balance sheet and income statement. This way, it is possible to analyse the performance of NOS during a period which was not affected by a major macroeconomic event, and compare it to the present period of recovery and growth into the pre-pandemic levels of operation.

Regarding future estimates, taking into account the time-interval and the quality of information available on NOS and the telecommunications industry, a forecasted period of 5 years was assumed for this analysis (2023F - 2027F).

4.2 Discounted Cash Flow approach

4.2.1 Growth Forecasts

As previously described, in order to correctly estimate the growth of NOS, it is of utmost importance to assess each specific source of revenue within the business in a separate manner. In fact, if one were to consider globally, the company's consolidated accounts as a sole source of income and expenses, all segments of its portfolio of activity would be implicitly growing at the same rate, and as such the analysis would be more prone to mistakes and inaccuracy. On the other hand, by analysing each business area individually, it is not only possible to compare it directly with the historical performance of that particular segment, but it also allows for a comparison to be made with the industry in which it is inserted.

<u>EBITDA</u>

That being said, an EBITDA forecast of the company was performed based on estimates made by NOS' analysts, for a time period starting in 2021 and stretching into perpetuity as showcased in **Figures 14, 15 & 16**.

EBITDA Growth Rate	2021-2026	Perpetuity
Telco	3.00%	2.00%
Cinema	4.20%	2.00%
Audiovisuals	-6.20%	2.00%

Figure 14. EBITDA Growth. NOS Annual Report 2022.

EBITDA Breakdown	Weight %
Cinema & Audiovisuals	100%
Cinema	*70%*
Audiovisuals	*30%*

Figure 15. **EBITDA breakdown within Cinema & Audiovisuals.** Own estimates.

EBITDA

(€'000)	2019	2020	2021	2022	2023F	2024F	2025F	2026F	2027F
Telco	584 228	565 069	566 738	600 882	618 908	637 476	656 600	676 298	689 824
Cinema and Audiovisuals	56 832	38 112	51 223	50 178	50 720	51 268	51 821	52 381	53 429
Consolidated EBITDA	641 060	603 181	617 961	651 060	669 628	688 743	708 421	728 679	743 253

Figure 16. **Consolidated EBITDA.** NOS Annual Reports 2019, 2020, 2021 & 2022.

Starting with the Telecommunications segment, a CAGR of 3% was assumed until 2026. This estimate was based on past performance, in the increasing trend in the number of customers adhering to these services, on the current market conditions, and on future expectations for the industry. Since the company provides the individual figures for the EBITDA pertaining to this business area without intra-group transactions, it is possible to apply this growth rate directly to 2022, and compound it to the following periods.

Conversely, Cinema and Audiovisual services are treated under the same cost centres, and as such the respective CAGRs cannot be applied in such a straightforward manner. Thus, in order to get the individual EBITDA contributions of each business segment, a percentage weight was calculated based on the individual revenue streams provided in the Annual Reports of the company (**Figure 15**). For further detail regarding this computation, please consult **Appendixes D.1 – Operating revenues** and **D.2 – Operating revenue breakdown**. It is also important to note that, since the COVID-19 pandemic highly impacted the revenues generated by cinema exhibitions, the average contribution was performed through an assessment of the weight of each segment in the pre-pandemic period (2019).

Consequently, the 4.2% CAGR applied to the Cinema segment is based upon the recovery of sales to the pre-pandemic levels. Furthermore, to support the assumption for this high growth rate during the next 4 years, several sensitivity analyses were conducted by NOS with respect to the projected number of tickets sold, average income per ticket, and different expenditure degrees regarding future investment.

With respect to the Audiovisual services, a CAGR of -6.2% was considered based on a shift in investment focus from the production of audiovisual content into the other business areas, and on a poor industry outlook. Since this segment requires capital to generate revenues, mainly

through the acquisition of acquired contents and distribution channels which are then sold/capitalized, less investment correlates to a lower EBITDA contribution from this segment.

Finally, a 2% perpetuity growth rate was assumed in all areas of the business, which can be justified with the expectations for inflation and evolution of the private consumption rate for Portugal and Europe in the future.

Revenues

After having estimated the consolidated EBITDA for the company, it is possible to forecast the revenues based on the historical levels of EBITDA as % of revenues (**Figure 17**).

Revenue Forecast									
(€'000)	**2019**	**2020**	**2021**	**2022**	**2023F**	**2024F**	**2025F**	**2026F**	**2027F**
Revenues	1 599 230	1 367 886	1 430 299	1 521 007	1 573 828	1 618 754	1 665 004	1 712 615	1 746 868
EBITDA	641 060	603 181	617 961	651 060	669 628	688 743	708 421	728 679	743 253
EBITDA as % of revenues	*40.09%*	*44.10%*	*43.21%*	*42.80%*	*42.55%*	*42.55%*	*42.55%*	*42.55%*	*42.55%*

Figure 17. **Revenue Forecast.** NOS Annual Reports 2019, 2020, 2021 and 2022, & Own Estimates.

To do so, an average was performed between 2019 and 2022, and an estimate of EBITDA as % of revenues translating to 42.55% was assumed for the subsequent years of operation. After having computed this rate, it is possible to forecast the revenues by simply working backwards with the following expression: $\text{Revenues}_n = \text{EBITDA}_n$ / **42.55%**.

Depreciation

The tangible and intangible assets with a finite life are depreciated using the straight-line method, from the moment they become available for use, and pertain mainly to buildings & constructions; technical, transportation & administrative equipment; telecom & software licenses; and contractual rights.

Depreciation and Amortization									
(€'000)	**2019**	**2020**	**2021**	**2022**	**2023F**	**2024F**	**2025F**	**2026F**	**2027F**
Revenues	1 599 230	1 367 886	1 430 299	1 521 007	1 573 828	1 618 754	1 665 004	1 712 615	1 746 868
D&A	421 318	409 842	419 467	480 887	461 330	474 499	488 056	502 012	512 052
% D&A to revenues	*26%*	*30%*	*29%*	*32%*	*29%*	*29%*	*29%*	*29%*	*29%*

Figure 18. **D&A Forecast.** NOS Annual Reports 2019, 2020, 2021 and 2022, & Own Estimates.

The forecasted D&A was computed based on the historical percentage of depreciation and amortization to revenues, using an average of c. 29% (**Figure 18**).

Regarding impairment losses, these were disregarded from the analysis due to its non-recurrent nature and unpredictability.

CAPEX

Concerning Capex, this item was calculated by applying a growth rate on the Depreciation & Amortization figures calculated previously: D&A * (1 + **2.85%**).

This estimation corresponds to the weighted average growth rate for the Telecommunications and Cinema & Audiovisual business areas, using the EBITDA growth rates aforementioned. Please refer to **Appendix E – EBITDA weight per business area** for further detail regarding this computation. It is also important to note that the weight of the Cinema & Audiovisual services were further broken down based on **Figure 15**.

Working Capital

The working capital of NOS was computed based on the difference between its operating current assets and its operating current liabilities. The items considered were extracted from the company's balance sheet, and are showcased in **Figure 19**.

Working Capital					
(€'000)	**2018**	**2019**	**2020**	**2021**	**2022**
Operational Cash	2 182	12 819	153 285	10 902	15 215
Accounts receivable	398 852	393 904	326 766	348 240	340 831
Inventory	38 885	34 081	43 628	44 014	67 223
Accounts payable	(302 899)	(297 189)	(340 095)	(354 134)	(349 272)
Value-Added Tax (VAT)	(17 780)	(14 891)	(3 533)	(10 565)	(15 407)
Working Capital	**119 240**	**128 724**	**180 051**	**38 457**	**58 590**
ΔWC	n.a.	9 484	51 327	(141 594)	20 133

Figure 19. **Working Capital.** NOS Annual Reports 2019, 2020, 2021 and 2022, & Own Estimates.

To forecast the evolution of this caption for the period under analysis, the weight of the company's operational current assets and liabilities was considered in respect to the revenues generated for that corresponding year (**Figure 20**).

Working Capital Forecast										
(€'000)	**2018**	**2019**	**2020**	**2021**	**2022**	**2023F**	**2024F**	**2025F**	**2026F**	**2027F**
Revenues	1 576 161	1 599 230	1 367 886	1 430 299	1 521 007	1 573 828	1 618 754	1 665 004	1 712 615	1 746 868
Operating Current Assets	439 919	440 804	523 679	403 156	423 269	438 663	451 185	464 075	477 346	486 893
as % of revenues	*28%*	*28%*	*38%*	*28%*	*28%*	*28%*	*28%*	*28%*	*28%*	*28%*
Operating Current Liabilities	320 679	312 080	343 628	364 699	364 679	351 492	361 525	371 854	382 488	390 138
as % of revenues	*20%*	*20%*	*25%*	*25%*	*24%*	*22%*	*22%*	*22%*	*22%*	*22%*
Working Capital	**119 240**	**128 724**	**180 051**	**38 457**	**58 590**	**87 171**	**89 659**	**92 221**	**94 858**	**96 755**
ΔWC	n.a.	9 484	51 327	(141 594)	20 133	28 581	2 488	2 562	2 637	1 897

Figure 20. **Working Capital Forecast.** NOS Annual Reports 2019, 2020, 2021 and 2022, & Own Estimates.

The average as % of revenues was computed by dismissing 2020, due to its financial inconsistency in comparison to the other years (mostly related with the peak of the pandemic). As showcased above, the company maintained an extremely stable weight of operating current assets throughout the years, amounting to c. 28% of revenues. Regarding the operating current liabilities, it is possible to see an increase in this caption, however it is important to note that it is under the influence of the current macroeconomic conditions. Despite the uncertainty, it is foreseeable that the costs will decrease slightly in the future, and as such 22% is a reasonable estimate for this caption.

4.2.2 Free Cash Flow to the Firm

After having forecasted the items susceptible to growth, it is possible to build the DCF-FCFF model accordingly.

DCF - Free Cash Flow to the Firm									
(€'000)	2019	2020	2021	2022	2023F	2024F	2025F	2026F	2027F
EBITDA	641 060	603 181	617 961	651 060	669 628	688 743	708 421	728 679	743 253
Depreciation & Amortization	(421 318)	(409 842)	(419 467)	(480 887)	(461 330)	(474 499)	(488 056)	(502 012)	(512 052)
EBIT	219 742	193 339	198 494	170 173	208 299	214 245	220 366	226 667	231 201
Taxes	(49 442)	(43 501)	(44 661)	(38 289)	(46 867)	(48 205)	(49 582)	(51 000)	(52 020)
NOPLAT	170 300	149 838	153 833	131 884	161 431	166 040	170 783	175 667	179 180
Depreciation & Amortization	421 318	409 842	419 467	480 887	461 330	474 499	488 056	502 012	512 052
Operating Cash Flow	591 618	559 680	573 300	612 771	622 761	640 538	658 839	677 679	691 232
Capex	(444 209)	(479 445)	(609 822)	(625 814)	(474 479)	(488 024)	(501 967)	(516 321)	(526 647)
ΔWC	(9 484)	(51 327)	141 594	(20 133)	(28 581)	(2 488)	(2 562)	(2 637)	(1 897)
FCFF	137 925	28 908	105 072	(33 176)	119 701	150 026	154 311	158 721	162 688

Figure 21. **Free Cash Flow to the Firm.** NOS Annual Reports 2019, 2020, 2021 and 2022, & Own Estimates.

The reduction in cash flow from 2019 to 2020 is mostly related with the €231M decrease in revenues due to the COVID-19 pandemic. Despite the recovery in 2021, not only was it still c. 11% below the pre-pandemic revenue levels, but the company also committed to high capital expenditures related with the Telecommunications sector. Under the same lines, the Capex in 2022 reached an historical high with a €626M investment, namely related with the commitment to become the largest 5G network in Portugal – which was achieved after having installed over 6,000 stations across the country.

That being said, the Capex is expected to decrease to more normalized levels in the future, and as such there was no need to adjust the formula of D&A*(1+g) to account for high investment in 2023.

As showcased in **Figure 21**, the Free Cash Flow to the Firm is expected to steadily increase until 2027, surpassing the 2019 levels by 2024.

4.2.3 Discount Rate

4.2.3.1 Cost of Debt

The cost of debt of the company was computed based on information provided by NOS in the Annual Reports, namely the total amount in borrowing debt and the respective interest expenses supported by the company.

Cost of debt				
(€'000)	2019	2020	2021	2022
Current borrowings	143 281	167 126	301 068	427 453
Non-current borrowings	1 216 847	1 363 514	1 275 541	1 210 181
Interest expenses	24 087	25 307	37 712	37 010
Cost of Debt	1.77%	1.65%	2.39%	2.26%

Figure 22. **Cost of debt.** NOS Annual Reports 2019, 2020, 2021 and 2022, & Own Estimates.

For further detail regarding the current and non-current borrowings considered for this computation, please refer to **Appendixes F.1 to F.4 – Borrowings**.

The cost of debt considered for the WACC corresponds to 3%, to reflect the increase in the interest rates in the second half of 2022 (that will mainly impact in the cost of debt of 2023) and also the increased weight of short-term debt within the debt structure of NOS, making the cost of debt more exposed to the movements of interest rates.

The tax rate used in the model corresponds to the statutory tax rate of 22.5%. Given this, it is possible to compute the after-tax cost of debt in the following manner:

$$\text{After--tax Cost of Debt} = 3.00\% * (1 - 22.5\%) = 2.33\% \tag{14}$$

4.2.3.2 Capital Structure

Determining the capital structure and the debt-to-equity ratio is key in order to compute the cost of equity and the weighted average cost of capital.

Capital Structure				
(€'000)	2019	2020	2021	2022
# shares outstanding	513 163	512 503	515 161	515 161
Share price	3.364	2.858	3.364	3.784
Market value of Equity	1 726 281	1 464 734	1 733 003	1 949 371
Market value of Debt	1 360 128	1 530 640	1 576 609	1 637 634
D/E Ratio	0.79	1.04	0.91	**0.84**

Figure 23. **Capital Structure.** NOS Annual Reports 2019, 2020, 2021 and 2022, & Own Estimates.

The market value of equity was computed by multiplying the number of shares outstanding in the market with the share price in last day of that corresponding year. The market value of debt corresponds to all the financial debt in the company's accounts.

Since NOS states in its Annual Report of 2022 that it is compromised in preserving the current capital structure – considering it to be solid and conservative -, a debt-to-equity ratio of **0.84** was assumed in perpetuity for the financial model.

4.2.3.3 Cost of Equity

Risk-free rate

As stated in Chapter 1 of this report, it is general practice to use a 10-year government bond in mature markets for the risk-free rate. In Europe, the most common practice is to use the yield of the 10-year German Bond, due to its investment grade classification as an AAA country.

Given the current macroeconomic conditions, the yield of the bond closed at 2.56% on December 31st, 2022 – which is extremely high in comparison to the previous periods. It is also important to note that this increasing tendency only started in 2022, due to the inflationary pressures experienced in Europe. Moreover, as of the first day of 2022, the yield of the bond was trading at -0.12%.

Consequently, to accurately estimate the risk-free rate, a daily average was performed for 2022 in order to reach a feasible rate that can be applied to the model in perpetuity. Considering this, an estimate of **1.20%** was assumed to compute the cost of equity. For further detail regarding this yield, please refer to **Appendix G – Yield of 10-Year German Bond**.

Country Risk Premium

The CRP is a variable used to account for the additional risk an investor sustains by investing in a country with a higher degree of macroeconomic risk factors. As such, a premium must be added to in order compensate the investor.

The most common method to compute this variable is by simply taking the yield of the 10-year government bond of the AAA country, and subtract it to the yield of the 10-year government bond of the country in which the company is inserted.

Following the same reasoning of the risk-free rate, a daily average yield of the 10-year Portuguese Bond was performed for 2022 (**2.16%**), with the purpose of achieving a more stable rate to be used in the model. The CRP was then computed as follows:

$$\text{Country Risk Premium} = 2.16\% - 1.20\% = 0.96\% \tag{15}$$

Market Risk Premium

The MRP can be defined as the extra return investors demand for investing on an asset from the market portfolio, instead of investing on a risk-free asset.

The methodology used to estimate the market risk premium consists of two steps. Firstly, assessing Portugal's rating, which according to Moody stands at BAA2. Subsequently, the default spread associated with this rating is simply added to the market premium of a mature market.

A Market Risk Premium of **9.23%** was estimated by Aswath Damodaran on the NYU Stern Business School website, following the same methodology described above.

Betas

The last variable of the CAPM consists of the Levered Beta of NOS. As defined in Chapter 1, the best way of computing it is through the Bottom-up approach.

According to Damodaran's data of European Industry Betas available on the NYU Stern Business School website, the average between 2019 to 2022 for the Telecommunications Unlevered Beta (β_u) stands at 0.43. It was computed by identifying an industry benchmark comprised of companies from developed Europe (which included NOS) and performing a weighted average of their Betas.

After having the β_u of the industry, it is possible to assume that it coincides with the β_u of NOS, given that the peer group has as similar business risk of the targeted company.

The Beta of debt (β_d) of NOS can be computed as follows:

$$\beta_d = \frac{K_d - (r_f + CRP)}{MRP} = \frac{3.00\% - (1.20\% + 0.96\%)}{9.23\%} = 0.09 \tag{16}$$

Once these two Betas are computed, the Levered Beta (β_L) can be estimated using data from NOS, according with the following expression:

$$\beta_L = \beta_u + (\beta_u - \beta_d) * \frac{D}{E} * (1 - t) =$$
$$= 0.43 + [0.43 - 0.09] * 0.84 * (1 - 22.5\%) = 0.65 \tag{17}$$

<u>Cost of Equity</u>

After having computed the variables above, the cost of equity can be estimated according with the CAPM, adjusted for the country risk premium:

$$K_e = (r_f + CRP) + \beta_L * MRP =$$

$$= (1.20\% + 0.96\%) + 0.65 * 9.23\% = 8.17\%$$

(18)

4.2.3.4 WACC

The Weighted Average Cost of Capital accounts for the cost of financing with debt and equity in accordance with their proportional use, hence reflecting the riskiness of the firm's financial items. With the inputs calculated previously, which are showcased in **Figure 24**, it is possible to compute the WACC (**Equation 19**).

Inputs	
Cost of Equity	8.17%
Equity	1
Debt	0.84
Cost of Debt	3.00%
Corporate Tax Rate	22.50%
After-tax Cost of Debt	2.33%
WACC	**5.50%**

Figure 24. **WACC.** Own Estimates.

$$WACC = K_e * \frac{E}{E+D} + K_d * \frac{D}{E+D} * (1-t) =$$

$$= 8.17\% * \frac{1}{1+0.84} + 3.00\% * \frac{0.84}{1+0.84} * (1-22.5\%) = 5.50\%$$

(19)

4.2.4 Enterprise Value

The Enterprise Value corresponds to the present value of all the cash flows generated by the company in the future. These are divided into short-term estimated cash flows according with the forecasted growth of the business, and into a main component called the Terminal Value - comprising of all the cash flows to be generated by the company in perpetuity, according to a

given growth rate. As defined in Section **4.2.1 – Growth Forecasts**, a 2% rate was assumed in perpetuity.

Enterprise Value					
(€'000)	**2023F**	**2024F**	**2025F**	**2026F**	**2027F**
FCFF	119 701	150 026	154 311	158 721	162 688
PV FCFF	113 457	134 783	131 400	128 105	3 747 875
EV	4 255 620				

Figure 25. **Enterprise Value.** Own Estimates.

4.2.5 Equity Value

The Enterprise Value (EV) is then adjusted in order to truly represent the portion of NOS owned by its shareholders. To do so, the Non-Operating Assets and the Non-Equity Claims of the firm must be accounted for.

Starting with the NOA, the items in the company's balance sheet that were considered comprise of the following: cash and cash equivalents (FY22: €15,215k); investment property (FY22: €514k); investment in jointly-controlled and associated companies (FY22: €38,961k); and other non-current financial assets (FY22: €5,248k).

Regarding the Non-Equity Claims, these correspond to the short-term and long-term debt seen earlier in this chapter, which amounted to €1,637,634k by the end of 2022.

$$\text{EQV} = \text{EV} + \text{Non– operating assets} - \text{Non– equity claims} =$$
$$= 4,255,620,000 + 59,938,000 - 1,637,634,000 = €2,677,924,000$$

(20)

4.2.6 Share Price & Recommendation

After having computed the Equity Value, the DCF-FCFF approach is complete, and it is possible to determine the target price of NOS' shares by simply dividing this amount by the number of outstanding shares at the end of 2022.

$$\text{Share Price} = \frac{\text{EQV}}{\text{\# Shares outstanding}} = \frac{2,677,924,000}{515,161,380} =$$
$$= €5.20$$

(21)

As discussed Section **3.5 – Stock Performance**, the share price of NOS fluctuated between a minimum of €3.20 and a maximum of €4.12 throughout 2022, averaging a price quote of €3.80 during the last 10 days of December. Considering the results from the DCF valuation, a share price of **€5.20** suggests that the shares of NOS were **undervalued** at the period under analysis, and therefore the final recommendation is for potential investors to **buy** the company's shares.

Furthermore, NOS has provided information about independent analysts' forecasts regarding their perspective on the company's share price, as showcased in **Figure 26**. It is important to note that only forecasts performed in the end of 2022 and in the beginning of 2023 were considered for this comparison.

Analysts' Estimations	
Entity	**Share Price**
Bestinver	€4.90
Santander	€4.50
New Street Research	€4.50
Intermoney	€4.50
AS Independent Research	€4.40
UBS	€4.25
CaixaBank/BPI	€4.20
Goldman Sachs	€4.00
JP Morgan Cazenove	€3.80
Morgan Stanley	€3.40

Figure 26. **Analysts' estimations of Share Price.** NOS Website - Investors.

Reflecting on the information above, it is possible to conclude that there is a general consensus that the share price of NOS was undervalued, and that potential investors should acquire its shares in the market.

4.2.6.1 Sensitivity Analysis

To further complement the DCF approach, a sensitivity analysis was performed on two key variables of the valuation process: the perpetuity growth rate; and the discount rate (WACC).

		WACC				
		5.00%	5.25%	5.50%	5.75%	6.00%
g	1.50%	5.35	4.78	4.29	3.85	3.47
	1.75%	5.92	5.27	4.71	4.22	3.79
	2.00%	6.58	5.84	**5.20**	4.64	4.16
	2.25%	7.37	6.50	5.76	5.12	4.57
	2.50%	8.31	7.27	6.41	5.68	5.05

Figure 27. **Sensitivity Analysis on Share Price (Euros).** Own Estimates.

Changing the values of these two variables allows for the investor to determine the share price in different scenarios, given the uncertainty associated with the growth rate and the WACC, and the impact that these estimates have in the valuation output.

As such, both inputs were subject to two positive and two negative variations of 0.25%, as showcased in **Figure 27**.

In view of the scenarios presented, the price of NOS' shares fluctuated between a minimum of €3.47 and a maximum of €8.31, which corresponds to a 33% decrease and a c. 59% increase in price in comparison to the DCF valuation. Furthermore, it is possible to conclude that, in the majority of the scenarios, the results still point at the stock being undervalued and at a consequent recommendation for potential investors to buy the firm's shares.

4.3 Relative Valuation

As stated in Chapter 1, the multiples approach is most useful on the second stage of a valuation, and it enables the analyst to validate and test the estimations of the DCF approach, as well as strengthen and complement the overall valuation results.

The multiples chosen to perform the Relative Valuation correspond to the Price-to-Earnings ratio and the EV/EBITDA, as they are the most widely used amongst analysts.

The first stage of this approach comprised of finding a peer group to serve as a benchmark for NOS, based on characteristics such as similarity in products & services, and performance.

Peer Group			
Company	**Country**	**P/E**	**EV/EBITDA**
Liberty Global plc	United Kingdom	-	7.84
A1 Telekom Austria Group	Austria	6.08	3.36
Cellnex Telecom S.A.	Spain	-	16.35
Deutsche Telekom AG	Germany	12.26	6.41
Hellenic Telecommunications Organization S.A.	Greece	16.44	5.03
Magyar Telekom	Hungary	5.25	3.41
Orange S.A.	France	12.71	4.75
Telefónica, S.A.	Spain	8.48	5.46
Swisscom AG	Switzerland	16.38	7.68
Telecom Italia S.p.A.	Italy	-	6.49
BT Group plc	United Kingdom	14.12	5.02
Elisa Oyj	Finland	21.23	12.56
Average		**12.55**	**7.03**
Standard Deviation		5.24	3.83
Average + Standard deviation		17.79	10.86
Average - Standard deviation		7.31	3.20
Average excluding outliers		**13.40**	**5.55**

Figure 28. **P/E and EV/EBITDA Multiples.** Bloomberg & Own Estimates.

As showcased in **Figure 28**, a peer group of 12 companies from the telecommunications industry was considered for this analysis. The data regarding the P/E and EV/EBITDA multiples was taken from the Bloomberg Terminal, and the time frame chosen pertains to 2022.

In order to have a reliable sample for each multiple, outliers had to be identified from their peers by performing a standard deviation around the average of the group. As such, all figures equal or above the average plus one standard deviation, and equal or below the average minus one standard deviation, were excluded from the valuation process.

In consequence of this technique, 3 companies were excluded from the computation of the P/E ratio. Furthermore, there was no data available regarding the multiples of 3 other companies, due to their corresponding Net Income results of FY22. Subsequently, an average of **13.40x** was considered for the Price-to-Earnings ratio.

Regarding the EV/EBITDA multiple, the exclusion process funnelled the sample into a peer group comprised of 10 companies, and a multiple of **5.55x** was computed for the respective valuation.

After having calculated both multiples used for this approach, it is possible to perform the Relative Valuation (**Figure 29**).

Relative Valuation		
(€'000)	**P/E Valuation**	**EV/EBITDA Valuation**
Peer group Multiple	13.40x	5.55x
NOS: Net income	224 444	-
NOS: EBITDA	-	651 060
Enterprise Value	-	3 610 128
Equity Value	3 007 176	2 032 432
# Shares outstanding	515 161	515 161
Share price	**€ 5.84**	**€ 3.95**

Figure 29. **Relative Valuation.** Own Estimates.

By analysing the results of this valuation approach, one can conclude that the estimate for the share price is highly dependent on the chosen multiple. Even though both estimated prices point to the stock being undervalued, the P/E valuation produces a share price c. 54% higher than the average price quote of €3.80 registered in the market at the end of 2022. Conversely, the EV/EBITDA multiple is only €0.15 above the share price at close.

When comparing with the share price of the DCF approach, the P/E ratio is €0.64 higher than the €5.20 quote calculated previously, while the EV/EBITDA multiple yields a price 24% lower. Nonetheless, despite the individual dispersion, both prices are aligned with the findings from the DCF valuation. Moreover, if one were to consider the price quote of €4.89 that arises from

performing the average of the two multiples, it is possible to conclude that the results are similar in both valuations – only reflecting a €0.31 difference between methods.

As such, the final recommendation is for investors to **buy** the company's shares, as both estimates suggest that the shares of NOS were **undervalued** at the period under analysis.

Conclusion

This report was produced with the intent of estimating the share value of NOS, SGPS at the end of 2022, in order to conclude if the shares were being traded at its fair value in the market. To do so, a comparison was performed between the actual value at which the shares were being traded, and the estimated value from a financial model.

The valuation of the company's shares was carried out with the support of two complementary methodologies, with the purpose of reaching a more reliable estimation. The main approach comprised of the Discounted Cash Flow approach, in which the Free Cash Flow to the Firm was performed to determine the Equity Value of NOS. After having done so, a Relative Valuation was executed on a second stage of the process, with the purpose of strengthening and complementing the overall results of the report.

The findings of both methods are consistent, suggesting that the share price of NOS was **undervalued** at the period under analysis. The DCF-FCFF approach produced a target price of **€5.20**, which is considerably higher than the €3.80 price quote registered at the end of 2022. Moreover, of the 25 scenarios presented by the sensitivity analysis that supported this valuation, over 85% still pointed out to the stock being undervalued by the market. As for the Relative Valuation, the P/E ratio produced an implied price of **€5.84**, whereas the EV/EBITDA multiple yielded a price of **€3.95**. Despite both multiples having estimated a target price noticeably different, this valuation enables the analyst to validate the results from the Discounted Cash Flow approach.

Therefore, with these results in mind, the final recommendation is for potential investors to **buy** the company's shares, given that the stock was **undervalued** in the market at the end of 2022.

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Appendix

BALANCE SHEET				
(€'000)	2019	2020	2021	2022
Non-current assets				
Tangible assets	1 034 813	991 613	1 041 100	1 107 052
Investment property	653	637	621	514
Intangible assets	1 014 066	1 041 087	1 205 031	1 209 558
Contract costs	163 101	162 123	162 118	160 594
Rights of use	218 383	260 097	236 063	297 723
Investment in jointly controlled and associated companies	18 244	10 897	18 091	38 961
Accounts receivable - other	4 064	7 504	5 914	4 758
Tax receivable	149	149	149	369
Other financial assets non-current	439	579	2 074	5 248
Deferred income tax assets	80 428	82 782	81 390	89 554
Derivative financial instruments	-	-	361	11 249
Total Non-Current assets	**2 534 342**	**2 557 468**	**2 752 912**	**2 925 580**
Current assets				
Inventories	34 081	43 628	44 014	67 223
Accounts receivable - trade	361 712	290 652	323 934	319 441
Contract assets	68 059	61 602	61 764	60 095
Accounts receivable - other	28 128	28 610	18 392	16 632
Tax receivable	4 631	2 894	2 538	6 906
Prepaid expenses	43 954	34 054	44 878	52 232
Derivative financial instruments	-	-	61	-
Non-current assets for sale	450	450	-	-
Cash and cash equivalents	12 819	153 285	10 902	15 215
Total current assets	**553 834**	**615 175**	**506 483**	**537 744**
Total assets	**3 088 176**	**3 172 643**	**3 259 395**	**3 463 324**
Current liabilities				
Borrowings	143 281	167 126	301 068	427 453
Accounts payable - trade	259 499	252 607	279 993	253 355
Accounts payable - other	33 835	47 438	35 639	53 789
Tax payable	68 202	51 981	19 359	38 842
Accrued expenses	203 726	175 860	175 784	212 430
Deferred income	33 834	33 228	35 603	38 190
Derivative financial instruments	135	346	337	397
Total current liabilities	**742 512**	**728 586**	**847 783**	**1 024 456**
Non-current liabilities				
Borrowings	1 216 847	1 363 514	1 275 541	1 210 181
Provisions	94 959	73 345	82 516	81 267
Accounts payable - other	3 855	40 050	38 502	42 128
Accrued expenses	667	505	497	-
Deferred income	5 123	4 729	4 230	2 824
Derivative financial instruments	265	655	-	-
Deferred income tax liabilities	11 626	5 025	47 326	50 125
Total non-current liabilities	**1 333 342**	**1 487 823**	**1 448 612**	**1 386 525**
Total liabilities	**2 075 854**	**2 216 409**	**2 296 395**	**2 410 981**
Equity				
Share capital	5 152	5 152	5 152	855 168
Capital issued premium	854 219	854 219	854 219	4 202
Own shares	(14 655)	(14 859)	(12 353)	(15 968)
Legal reserves	1 030	1 030	1 030	1 030
Other reserves and accumulated earnings	16 041	12 007	(35 586)	(22 914)
Net income	143 494	92 000	144 159	224 574
Non-controlling interests	7 042	6 685	6 379	6 251
Total equity	**1 012 322**	**956 234**	**963 000**	**1 052 343**

***Appendix A*. Historical Balance Sheet.** NOS Annual Reports 2019, 2020, 2021 & 2022.

INCOME STATEMENT

(€'000)	2019	2020	2021	2022
Revenues				
Services rendered	1 485 935	1 262 980	1 295 248	1 362 741
Sales	89 141	86 309	109 186	128 044
Other operating revenues	24 155	18 597	25 865	30 222
Total turnover	**1 599 230**	**1 367 886**	**1 430 299**	**1 521 007**
Costs, Losses, and Gains				
Wages and salaries	85 176	85 331	82 036	85 898
Direct costs	524 058	348 776	339 179	345 019
Costs of products sold	64 228	74 312	99 075	114 562
Marketing and advertising	37 216	24 504	28 621	34 748
Support services	82 335	86 281	84 857	83 466
Supplies and external services	112 863	100 542	137 220	155 238
Other operating losses / (gains)	516	719	518	798
Taxes	32 844	32 747	31 153	34 985
Provisions and adjustments	18 934	11 493	9 679	15 233
Depreciation, amortization, and impairment losses	421 318	409 842	419 467	480 887
Restructuring costs	7 732	5 523	8 539	4 001
Losses / (gains) on sale of assets, net	(547)	(290)	19	(100 423)
Other losses / (gains) on non recurrent net	10 726	50 796	1 279	(3 613)
Total costs	**1 397 399**	**1 230 576**	**1 241 642**	**1 250 799**
Income before losses / (gains) in participated companies, financial results and taxes	**201 831**	**137 310**	**188 657**	**270 208**
Net losses / (gains) of affiliated companies	1 022	9 099	(3 601)	(22 123)
Financial costs	20 661	22 218	34 118	31 578
Net foreign exchange losses / (gains)	139	548	(631)	224
Net losses / (gains) on financial assets	142	53	12	103
Net other financial expenses / (income)	3 826	3 814	3 123	3 319
Total	**25 790**	**35 732**	**33 021**	**13 101**
Income before taxes	**176 041**	**101 578**	**155 636**	**257 107**
Income taxes	32 798	16 342	11 783	32 663
Net income of discontinued operational units	-	6 407	-	-
Net consolidated income	**143 243**	**91 643**	**143 853**	**224 444**
Attributable to:				
NOS Group Shareholders	143 494	92 000	144 159	224 574
Non-controlling interests	(251)	(357)	(306)	(130)
Earning per shares:				
Basic - euros	0.28	0.18	0.28	0.44
Diluted - euros	0.28	0.18	0.28	0.44

Appendix B. **Historical Income Statement.** NOS Annual Reports 2019, 2020, 2021 & 2022.

CASH FLOW				
(€'000)	**2019**	**2020**	**2021**	**2022**
Operating activities				
Collections from clients	1 860 390	1 608 633	1 642 771	1 805 986
Payments to suppliers	(1 015 155)	(785 091)	(820 060)	(953 908)
Payments to employees	(109 959)	(108 366)	(113 771)	(107 520)
Receipts / (payments) relating to income taxes	(18 902)	(33 853)	(712)	(27 613)
Other cash receipts / (payments) related with operating activities	(49 766)	(1 079)	(2 090)	(74 523)
Cash Flow from operating activities	**666 608**	**680 244**	**706 138**	**642 422**
Investing activities				
Cash receipts resulting from:	**5 309**	**379 662**	**6 770**	**143 257**
Financial investments	91	-	1 072	1 100
Alienation of discontinued operational unit	-	2 103	-	-
Tangible assets	1 758	374 409	1 976	136 317
Intangible assets	13	-	4	1
Interest and related income	3 447	3 150	3 718	5 839
Payments resulting from:	**(438 260)**	**(475 981)**	**(678 771)**	**(474 098)**
Financial investments	(200)	(143)	(1 469)	(3 147)
Tangible assets	(243 367)	(215 469)	(271 223)	(226 574)
Intangible assets and contract costs	(194 693)	(260 369)	(406 079)	(244 377)
Cash Flow from investing activities	**(432 951)**	**(96 319)**	**(672 001)**	**(330 841)**
Financing activities				
Cash receipts resulting from:	**423 000**	**268 507**	**288 000**	**478 693**
Borrowings	423 000	268 507	288 000	478 693
Payments resulting from:	**(635 617)**	**(659 522)**	**(463 055)**	**(792 374)**
Borrowings	(352 833)	(414 827)	(199 833)	(520 533)
Lease rentals (principal)	(69 458)	(69 808)	(78 270)	(79 877)
Interest and related expenses	(27 009)	(26 649)	(40 507)	(42 520)
Dividends	(179 607)	(142 516)	(142 376)	(142 357)
Acquisition of own shares	(6 710)	(5 722)	(2 069)	(7 087)
Cash Flow from financing activities	**(212 617)**	**(391 015)**	**(175 055)**	**(313 681)**
Change in Cash and Cash equivalents	21 040	192 910	(140 918)	(2 100)
Effect of exchange differences	15	(123)	74	9
Cash and Cash equivalents at the beginning of the year	(17 754)	(41 772)	151 015	10 170
Cash and Cash equivalents at the end of the period	**3 301**	**151 015**	**10 171**	**8 079**
Cash and cash equivalents	12 819	153 285	10 902	15 215
Bank overdrafts	(9 518)	(2 270)	(731)	(7 136)

***Appendix C.* Historical Cash Flow.** NOS Annual Reports 2019, 2020, 2021 & 2022.

Operating revenue

(€'000)	2019	2020	2021	2022
Services rendered	**1 485 935**	**1 262 980**	**1 295 248**	**1 362 741**
Communications service revenues (a)	1 374 170	1 202 436	1 226 432	1 276 828
Revenue distribution and cinematographic exhibition (c)	54 216	12 626	19 139	35 539
Advertising revenue (a)	24 792	16 653	20 745	19 883
Production and distribution of content and channels (b)	29 767	28 541	26 074	25 767
Others (a)	2 990	2 724	2 858	4 724
Sales	**89 141**	**86 309**	**109 186**	**128 044**
Telco (a)	71 579	81 303	103 404	115 771
Audiovisuals and cinema exhibition (c)	17 562	5 006	5 782	12 273
Other operating revenues	**24 155**	**18 597**	**25 865**	**30 222**
Telco (a)	23 365	17 774	24 741	29 150
Audiovisuals and cinema exhibition (c)	790	823	1 124	1 072
Total operating revenues	**1 599 230**	**1 367 886**	**1 430 299**	**1 521 007**

Appendix D.1. **Operating revenue.** NOS Annual Reports 2019, 2020, 2021 & 2022.

Business area breakdown

(€'000)	2019	2020	2021	2022
Telco (a)	1 496 896	1 320 890	1 378 180	1 446 356
NOS Cinemas and Audiovisuals	102 335	46 996	52 119	74 651
NOS Audiovisuals (b)	29 767	28 541	26 074	25 767
NOS Audiovisuals %	*29%*	*61%*	*50%*	*35%*
NOS Cinemas (c)	72 568	18 455	26 045	48 884
NOS Cinemas %	*71%*	*39%*	*50%*	*65%*

Appendix D.2. **Operating revenue breakdown.** NOS Annual Reports 2019, 2020, 2021 & 2022.

EBITDA Weight per Business Area

(%)	2019	2020	2021	2022	*Average*
Telco	91.13%	93.68%	91.71%	92.29%	*92.21%*
Cinema and Audiovisuals	8.87%	6.32%	8.29%	7.71%	*7.79%*
Weighted Average Growth Rate	2.83%	2.88%	2.84%	2.85%	*2.85%*

Appendix E. **EBITDA Weight per business area.** Own Estimates

| Borrowings (€'000) | 2019 | | | |
	<1 year	1 to 5 years	>5 years	Total
Bond issue	2 334	573 221	-	575 555
Commercial paper	55 648	362 949	50 000	468 597
Foreign Loans	17 121	35 649	-	52 770
Bank overdrafts	9 518	-	-	9 518
Financial leases	58 660	136 823	58 205	253 688
Total	143 281	1 108 642	108 205	1 360 128

Appendix F.1. **Borrowings 2019.** NOS Annual Reports 2019 & Own Estimates.

| Borrowings (€'000) | 2020 | | | |
	<1 year	1 to 5 years	>5 years	Total
Bond issue	2 343	574 007	-	576 350
Commercial paper	78 532	212 463	50 000	340 995
Foreign Loans	17 638	18 078	-	35 716
Bank overdrafts	2 270	-	-	2 270
Financial leases	66 343	190 163	318 803	575 309
Total	167 126	994 711	368 803	1 530 640

Appendix F.2. **Borrowings 2020.** NOS Annual Reports 2020 & Own Estimates.

| Borrowings (€'000) | 2021 | | | |
	<1 year	1 to 5 years	>5 years	Total
Bond issue	152 511	439 385	-	591 896
Commercial paper	64 410	367 477	-	431 887
Foreign Loans	18 090	-	-	18 090
Bank overdrafts	731	-	-	731
Financial leases	65 326	113 002	355 677	534 005
Total	301 068	919 864	355 677	1 576 609

Appendix F.3. **Borrowings 2021.** NOS Annual Reports 2021 & Own Estimates.

| Borrowings (€'000) | 2022 | | | |
	<1 year	1 to 5 years	>5 years	Total
Bond issue	302 944	289 466	-	592 410
Commercial paper	42 888	364 993	-	407 881
Foreign Loans	-	-	-	-
Bank overdrafts	7 136	-	-	7 136
Financial leases	74 485	214 269	341 453	630 207
Total	427 453	868 728	341 453	1 637 634

Appendix F.4. **Borrowings 2022.** NOS Annual Reports 2022 & Own Estimates.

Appendix G. **Yield of 10-Year German Bond (2022).** MarketWatch.
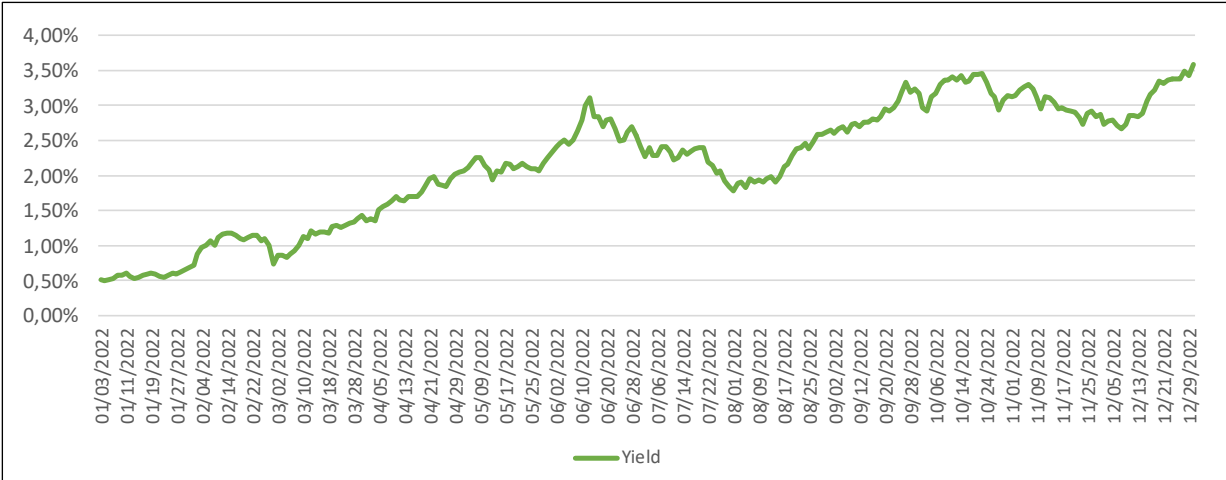
Appendix H. **Yield of 10-Year Portuguese Bond (2022).** MarketWatch.