

Changes in the valuation of companies during COVID-19

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Abstract

This study aims to expand the knowledge of the effects of the COVID-19 on the main valuation methods supported by the literature. Specifically, on the affectations that this pandemic had on the shareholder's-equity based method, the discounted cash flow, and the multiples of comparable companies. Additionally, to be able to detect whether there have been sectors that have suffered more than others in terms of valuation. To reach this objective, different variance analyses of the valuations of the main IBEX-35 companies before and after the COVID-19 have been conducted. An impact on the main valuation methods by an alteration of the company's enterprise value is expected, as well as across different economic sectors. Furthermore, the use of different discount rates to adapt the discounted cash flow to the level of risk and the EBITDA multiple to be the least sensitive to changes is foreseeable.

Keywords: *Valuation methods; COVID-19; equity-based method; discounted cash flow; multiples*

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1. Introduction

It is usually said that a business is worth whatever someone is willing to pay for it. The value, however, should not be perplexed with the price. Price is the amount reached among the seller and the buyer in the sale of a firm (Fernández, 2004), “*value is what you get*” (Warren Buffet). And sometimes the distance between price and value can be detrimental.

Things may seem easier when a company is listed on the stock exchange, because we know what the market is currently paying for the company's shares. Nevertheless, the market can also be wrong (Amat, 2019). In the long term, there is a consensus that the prices of what is traded on the stock exchange should be closer to their real value, but in the short-term, prices can move far away from the real value of what is being bought or sold. The irrationality of most stock market participants makes short-term developments unpredictable (Amat, 2009).

We therefore need to come up with a valuation that is reasonable and that we can trust. And this result depends on many characteristics of the company: the sector of activity in which it operates, its managers, its employees, the economic moment, those who want to know the value... (Amat, 2019).

It should be noted that company valuation is not an exact science since the value of a company does not exist as a concrete figure, but rather as a range of values that are subjectively determined and depend on assumptions about the future (Amat, 2011). And in today's world with the COVID-19 pandemic, the future is subject to a very high level of uncertainty.

One of the most impressive stock market crashes in history was during March 2020. In just four days, the Dow Jones Industrial Average declined around 6,400 points, corresponding to almost a fall of 26% (Mazur, Dang, & Vega, 2021). Stock prices plummeted to the point where the New York Stock Exchange had to cease trade numerous times during those days. The panic was so acute that investors saw their retirement savings drop by 30% in two weeks, and rumours about how bad it may go only added to the terror among investors and businesses throughout the world (Forbes, 2021).

In terms of the performance in organisations, if we compare the period between October 2020 and January 2021 from pre-pandemic levels, changes are overwhelming. One-fourth of companies saw their sales fall 50%, with an average of sales dropping 27% (World Bank, 2021). This had a negative effect on most company's financial statements. The operating results, however, were much more drastically affected than revenue with -69% in Q1, -121% in Q2 and -68% in Q3 YoY in selected companies (Deloitte, 2021).

Likewise, in crisis environments such as the current ones, where uncertainty about future events and the future of the economy, in general, is even higher, company valuation models present unique problems in their application (Santandreu & Torres, 2012), causing traditional valuation methods to become misconfigured.

And this not only affects people that want to buy or sell a business. Company valuation has many more goals and can have multiple reasons (Fernández, 2004), among others: testing whether a company has gained or lost value to assess the performance of the management team, setting managers' bonuses, gathering information on the value of shares to be able to make a tax declaration, an inheritance or a divorce.

Despite the different papers, books or extensive research about companies' valuation methods, there are few studies concerning the real effects of economic recessions in the process of valuation, and no one detecting the whole impact of COVID-19 in the main valuation methods among different industries.

Hence, the main motivation for this research is on the one hand, to provide a good understanding of the key concepts of any valuation: the real value of assets, the company's wealth generation, the risk, the value of money and future perspectives, among others (Amat, 2019). And, on the other hand, to detect the main effects of a crisis of such magnitude as that of COVID-19 on company valuation and thus, bring the opportunity to open up new lines of intervention to facilitate their implementation in times of uncertainty.

The pursued bachelor's degree in business and innovation management delivers the opportunity to build on the knowledge acquired in finance, accounting and management to carry out this study. In addition, the conduction of this paper may mark the beginning of a personal career in the field of finance and investment banking.

2. Theoretical framework

2.1. Initial analysis

Prior to starting valuating a company, it is important to have a clear idea of the company's situation and future prospects. There are situations that increase the value of a company (wealth generation, liquidity surpluses...) and others that can reduce its value (organizational problems, fights among shareholders...) (Amat, 2019).

The following phases of the initial analysis will allow understanding in a fast and simple way of the company valuated and its environment. At a company level, the business life cycle and the internal part of the SWOT will provide an insight into the corporate situation. In turn, the EVA will give out the company's potential to generate wealth.

Externally, the other part of SWOT will offer the knowledge of the company's competence in the sector. And finally, at a more macro level, the economic cycle will give the comprehension of whether it is a good time to buy or sell, or whether it is better to wait.

2.1.1. Business life cycle

The business life cycle is the movement of a company over time in phases, and it is usually classified into five stages: launch, growth, shake-out, maturity, and decline (CFI, 2022b). Understanding which phase the company is in can make a difference when analysing the enterprise.

Valuation changes depending on the stage of the company. Many established organizations have a healthy financial position and are growing at a rate of about 5% annually. On the other hand, startups do not have many processes and assumptions about the future will be required (Forbes, 2018).

2.1.2. Economic cycle

The economy usually follows circular movements created by expansion phases and followed by contraction phases. Growth characterizes economic expansion. A contraction, on the other hand, results in a recession, which is characterized by a drop in economic activity that lasts at least a few months. (Investopedia, 2022a).

However, it is common for acquisitions made in recession years to be more profitable than acquisitions made in years of economic expansion. This is mainly due to the

overrated prices paid for companies when the economy is growing, compared to the undervalued ones in times of crisis (Amat, 2019).

2.1.3. SWOT

Once we know the stage of the business life cycle, we need to perform a SWOT (strengths, weaknesses, opportunities, and threats) analysis. This is a framework for assessing a company's competitive situation and developing strategic plans. (Investopedia, 2021e).

It is important to analyse properly both the internal and external environment of the company since one strength like a new patent can increase the value of the firm, but a threat such as a new competitor in the market can also decrease it.

2.1.4. EVA

Economic Value Added is a financial performance metric that measures the value created by the company. It is calculated from three different data:

- Net Operating Profit After Tax (NOPAT): the profit generated by the company through its core operations, net of taxes, and without taking into consideration financial expenses (Investopedia, 2021c).
- Assets: this value is obtained from the acquisition value of the assets after deduction of the corresponding amortization.
- Cost of Capital: is the cost to the company of the money it gets from its shareholders and other creditors.

Figure 1. Economic value added

$$\frac{\text{NOPAT} = \text{Operating Income} \times (1 - \text{Tax Rate})}{\text{Assets} \times \text{Cost of Capital}} \\ \text{EVA}$$

Source: Created by the author from the revision of (Amat, 2016)

In other words, EVA is what is left over after all expenses have been met and a minimum expected shareholder return has been satisfied. Therefore, value is created in a company when the return generated exceeds the shareholders' opportunity cost (Amat, 2016). When it is negative, it means that the operating profit obtained by the company does not cover the cost of the asset it uses.

2.2. Shareholder's equity-based method

These are the conventional valuation methods that require the availability of an audited balance sheet as recently as possible. In this way, it is possible to determine the equity value, which is the variance between assets and liabilities (Amat, 2011).

2.2.1. Enterprise value, equity value and value of a part of the company

As mentioned before, we can value different possibilities from an organisation, and we must know exactly what we are valuating:

Enterprise value is the value of the entire balance sheet; or in other words, all its assets (which is equal to equity plus liabilities). It provides a precise estimate of the overall current value of a business (Investopedia, 2022b).

Equity value is also referred to as the value of the shares held by shareholders (assets minus liabilities). Making a comparison to a house, the enterprise value would be the value of the house, and the value of the shares would be the value of the owner (value of the house minus the outstanding mortgage) (Amat, 2019).

The result of dividing the equity value by the number of shares is the share value. And there are also times when the focus is on valuating a part of the company, such as certain assets like brands or business units.

2.2.2. Book value

A company's book value, or net worth, is stated in the balance sheet as the value of the shareholder's equity (capital and reserves). This also refers to the difference between total assets and liabilities, which is the surplus of the company's total goods and rights over its total third-party debts (Fernández, 2004).

Figure 2. Book value

$$\text{Book value} = \text{Assets} - \text{Liabilities} = \text{Equity (net worth)} = \text{Value of shares}$$

Source: Created by the author from the revision of (Amat, 2019)

These methods have the great advantage of simplicity, but have important limitations, especially that they do not consider intangible assets (brands, know-how, customers network, etc.) and expectations of future wealth generation (Amat, 2011). It is also

affected by a flaw in its own definition criteria: accounting criteria are prone to certain subjectivity and differ from "market" standards (Fernández, 2004).

Because of problems such as those mentioned above, the book value practically never equals the real value of companies. Despite this, the book value is usually the starting point for a valuation (Amat, 2019).

2.2.3. Adjusted book value

This method aims to address the shortcomings that arise when valuation is based solely on accounting criteria (Fernández, 2004). This takes into account the market value of the company's assets on the balance sheet and also corrects debts to reflect their real market value (Amat, 2019).

Figure 3. Adjusted book value

$$\text{Adjusted book value} = \text{Adjusted total assets} - \text{Adjusted liabilities}$$

Source: Created by the author from the revision of (Amat, 2019)

In order to know the market value, expert appraisals should be carried out, where the market value may be quite different from the book value. It is worth mentioning that the book value of an asset is usually the acquisition value and incorporates depreciation (CFI, 2022a).

When a company has no or very low profit-making capacity and its assets are of interest, it is recommended to value it at the adjusted book value (Amat, 2019). However, it still has many of the limitations of the book value (intangibles not included in the balance sheet, do not take into account the capacity to generate future profits...).

2.2.4 Substantial value

The substantial value (or asset replacement value) constitutes the funding required to create a company with the same conditions as the one being valued. Assets that aren't used in the company's activities are usually excluded from the calculation (unused land, holdings in other companies, etc.), which do include in the book value and in the adjusted one (Fernández, 2004).

Figure 4. Substantial value

$$\text{Substantial value} = \text{Gross substantial value (operational assets)} - \text{Liabilities}$$

Source: Created by the author from the revision of (Amat, 2019)

When we want to buy a company and the seller asks for a very high price, it is useful to know the substantial value. In this way, we can know if by acquiring similar assets (at a lower price), we can have a company like the one we want to acquire, and perhaps it is better to opt for this route instead of acquiring the company (Amat, 2019).

2.3. Discounted cash flow method

If we compare a company to a dairy cow, the above methods would value a cow on the basis of kilogram weight and price per kilo. If, on the other hand, we are interested in the capacity to generate wealth, we will base our valuation on the expected number of litres of milk to be obtained in the remaining years of the cow's life, and on the final value (called residual value), if it is estimated that the cow will have value when it stops producing milk (Amat, 2011).

Therefore, the discounted cash flow seeks to find out the company's worth by evaluating the cash flows it will generate in the future and then discounting them at a risk-adjusted discount rate (Fernández, 2004). In other words, they are based on finding the equivalent monetary amount at today's value of a series of expected future values (Santandreu & Torres, 2012).

These methods are probably the most widely accepted from an academic as well as from a practical standpoint (Takács et al., 2020) because of two main reasons; the future expectations (Mariscal, 2021) and its methodology that values the most intangible part of the company, such as the business model, the client portfolio, the brand or the human capital (Santandreu & Torres, 2012).

In this sense, according to Fernández (2004), *“the different cash flow discounting-based methods start with the following expression:*

Figure 5. Discounted cash flow

$$V = \frac{CF_1}{1 + K} + \frac{CF_2}{(1 + K)^2} + \frac{CF_3}{(1 + K)^3} + \dots + \frac{CF_n + VR_n}{(1 + K)^n}$$

Source: General method for cash flow discounting (Fernández, 2004)

Where: CF_i = cash flow generated by the company in the period i ; VR_n = residual value of the company in the year n ; K = appropriate discount rate for the cash flows' risk".

The DCF is generally applied to assess the total enterprise value (Takács et al., 2020), but with some adjustments, we can also find the equity and share value. In addition, it has to be decided over how many years the forecast is to be made. The most common is a five-year forecast, although it can be longer if reliable forecasts are possible (Amat, 2019).

2.3.1. Free cash flow

As a way to forecast the wealth to be generated by a company it is usually used the so-called free cash flow, which is the flow produced by operations (omitting all the payments generated by financial debt), and after taxes (Amat, 2011). It is calculated with the following equation:

Figure 6. Free cash flow

Earnings Before Interest and Taxes (EBIT)
+ Depreciation and Amortization
EBITDA
- Taxes
- Investment in Capital Expenditures (CAPEX)
- Investment in Needs of Funds for Operations (NFO)
Free Cash Flow

Source: Created by the author from the revision of (Amat, 2019)

The starting point is the EBIT since only operationally related elements are considered, and by adding amortizations (a non-cash expense), the EBITDA is obtained. Afterwards, taxes, CAPEX (investment in non-current assets) and NFO (investment in current assets) are subtracted. The latter is calculated as follows:

Figure 7. Needs of funds for operations

$$\text{NFO} = \text{Accounts Receivable} + \text{Inventories} - \text{Accounts Payable}$$

Source: Created by the author from the revision of (Martínez Abascal, 2012)

As claimed by Martínez Abascal (2012), there are two main categories of assets in any enterprise: net fixed assets (FA) and needs of funds for operations (NFO). The sum of the two is called net assets (NA), and they are financed exclusively by debt and equity.

Therefore, the free cash flow reports the cash generated by the company after reinvestment needs in current and non-current assets have been met, but considering that the business has no financial debt (Amat, 2019).

We must forecast the cash we will get and must pay in each period to compute future free cash flows. This is the basic method for creating a cash budget. However, in the context of firm valuation, this task necessitates anticipating cash flows further in advance than is typically done in any cash budget (Fernández, 2008).

2.3.2. Discount rate

Once the future cash flows have been estimated, the next step is to calculate their present value, as we want to know how much the company is worth today. For this purpose, we will use a rate that takes into account the fact that money loses value over time and the risk involved (Amat, 2011).

The higher the discount rate, the more profitability is required for a project and therefore the lower the value of the company. For that reason, the estimation of an appropriate discount rate is a key factor for an accurate valuation of the company, as a small variation in the discount rate can lead to very different valuations (Santandreu & Torres, 2012).

The weighted average cost of capital (WACC) is used for this purpose. This is the average of the cost of equity (k_e) and debt (i), measured by the weight of each in the company's balance sheet (Fernández, 2019):

Figure 8. Weighted average cost of capital

$$\frac{\text{Cost of equity } (k_e) \times \text{weight of equity in the balance sheet} + \text{Cost of debt } (i) \times \text{weight of debt in the balance sheet}}{\text{WACC (weighted average cost of capital)}}$$

Source: Created by the author from the revision of (Amat, 2019)

Debt is usually only considered as financial liabilities, as non-financial liabilities usually consist of automatic financing that is generated by the activity itself and is part of the NFO. Thus, the cost of each type of debt will be the so-called AER (annual equivalent rate) which is the actual interest rate that a loan cost (Amat, 2019).

To know the cost of equity, Amat (2019) argues that it is necessary to have information on the shareholders' opportunity cost, which is the minimum return they wish to obtain in the company, which depends, among other things, on the alternative return they could obtain if they invested in other investments with a similar level of risk.

Consequently, he establishes various alternatives depending on the level of complexity of the valuation:

Figure 9. Alternatives for determining the cost of equity

Level 1:	Ask the shareholder what his opportunity cost is
Level 2:	Use studies that report on the minimum profitability required by shareholders
Level 3:	Risk-free rate + Market risk premium
Level 4 (for listed companies):	Risk-free rate + Market risk premium (general market risk and company-specific risk)

Source: Created by the author from the revision of (Amat, 2019)

The quickest way to find out the opportunity cost of shareholders is to ask them. However, in most cases, they will be unaware of it (Amat, 2019). In the case we cannot ask it, there is the option to use studies or web pages in which appears, for example, the shareholder's opportunity costs by sectors in Europe.

In the case of the third level the investor is deemed to require that his investment should give him at least the interest provided by risk-free investments plus compensation for the risk of equity investment:

The risk-free rate is usually the current rate of the 10-year treasury bonds, and normally, the bond of the state where the company is issued is used (Santandreu & Torres, 2012). Therefore, if we want to value a company listed in the IBEX-35 we would use the Spanish 10-year bond yield.

And the market risk premium is added, which is the variance within the historical performance of the stock market (or stock index) and that of bonds (Fernández, 2009). This premium arises because the investor asks for an additional return for the risk involved in investing in a company rather than in government bonds (Amat, 2011).

Fernandez, Bañuls, & Acin performed a survey in 2021 comparing the market risk premium (MRP), risk-free rate (RF) and Km (MRP + RF) used by professors, analysts, papers and universities all over the world:

Table 1. Market risk premium (MRP), risk-free rate and Km (%)

	Average 2021			Average 2020			Average 2019			Average 2018			Average 2015		
	Km	RF	MRP	Km	RF	MRP	Km	RF	MRP	Km	RF	MRP	Km	RF	MRP
USA	7,3	1,8	5,5	7,4	1,9	5,6	8,3	2,7	5,6	8,2	2,8	5,4	7,9	2,4	5,5
Spain	7,4	1,0	6,4	7,6	1,3	6,3	8,2	1,7	6,4	8,8	2,1	6,7	8,1	2,2	5,9
Argentina	41,6	24,2	17,4	29,6	12,3	17,3	25,0	10,1	14,9	23,1	9,3	13,9	35,5	12,6	22,9
Australia	9,0	2,6	6,4	10,3	2,4	7,9	9,2	2,8	6,5	9,7	3,1	6,6	9,2	3,1	6,0
Austria	6,6	0,6	5,9	7,1	0,9	6,2	7,4	1,3	6,1	8,2	2,0	6,2	8,4	2,8	5,7
Belgium	6,5	0,6	5,9	7,2	0,9	6,2	7,4	1,2	6,2	7,8	1,6	6,2	6,7	1,3	5,5
Brazil	14,2	6,5	7,7	12,7	4,8	7,9	15,4	7,2	8,2	15,7	7,3	8,4	16,5	9,0	7,5
Canada	7,6	1,9	5,6	7,4	1,8	5,7	8,3	2,5	5,8	8,7	2,9	5,8	8,3	2,3	5,9
Chile	10,2	3,9	6,3	10,2	3,6	6,6	10,5	4,2	6,3	10,2	4,1	6,1	10,4	3,9	6,5
China	9,0	2,8	6,2	9,8	3,1	6,7	11,5	4,0	7,5	10,1	3,8	6,3	12,6	4,5	8,1
Colombia	13,8	6,9	6,9	14,5	6,3	8,2	13,9	6,2	7,7	15,4	6,7	8,7	12,1	3,8	8,3
Czech Rep.	7,7	2,0	5,8	8,2	1,8	6,4	8,7	2,4	6,3	8,5	2,6	5,9	7,4	1,8	5,6
Denmark	6,5	0,7	5,8	7,0	0,9	6,1	7,2	1,2	6,0	7,6	1,6	6,0	6,8	1,3	5,5
Finland	6,5	0,6	5,9	7,5	1,0	6,5	7,3	1,1	6,2	7,6	1,7	5,9	6,9	1,2	5,7
France	6,6	0,8	5,8	7,0	0,8	6,2	7,2	1,2	6,0	7,4	1,6	5,9	7,2	1,5	5,6

Source: Market Risk Premium (MRP), Risk Free Rate and Km (%). Averages of the surveys of 2021, 2020, 2019, 2018 and 2015 (Fernandez et al., 2021)

The fourth and last level adds the company-specific risk to the market risk premium, which is the differential risk presented by a company due to its characteristics (economic sector, the strategy followed, strengths, weaknesses...) (Amat, 2019). This additional risk is measured by the Beta, which is an indicator that measures the variation of a stock's return relative to the market average (Santandreu & Torres, 2012).

- Beta = 1: The company evolves as the market. If the market increases 5%, the company increases 5%. And the same when there are market corrections and the stock index falls.
- Beta > 1: It is a more volatile company (more sensitive to changes), and therefore, riskier (Amat, 2019). For example, with Beta = 2, when the market goes up 5%, the company goes up 10% (2 × 5%). Instead, when the market falls by 6%, the enterprise falls by 12% (2 × 6%).
- Beta < 1: The opposite of the previous one. Here we have a less volatile and riskier company that increases less than the market when it goes up, but also decreases less when it goes down.

To know the Beta of a listed company, financial websites can be consulted to facilitate the calculation of these. The betas of the 35 companies that make up the IBEX-35 are as follows:

Table 2. Beta of the companies listed on the IBEX-35

Name	Beta	Name	Beta	Name	Beta
ACCIONA	0,50	CELLNEX	0,27	MAPFRE	0,92
ACERINOX	1,34	CIE AUTOMOT.	1,43	MELIA HOTELS	1,13
ACS	1,17	ENAGAS	0,54	MERLIN	0,41
AENA	0,62	ENDESA	0,26	NATURGY	0,43
ALMIRALL	0,82	FERROVIAL	0,55	PHARMA MAR	1,65
AMADEUS	1,14	FLUIDRA	0,84	R.E.C.	0,24
ARCELORMIT.	2,19	GRIFOLS CL.A	0,54	REPSOL	1,03
B.SANTANDER	1,66	IAG	1,20	ROVI	0,17
BA.SABADELL	1,81	IBERDROLA	0,38	SIEMENS GAME	1,42
BANKINTER	1,33	INDITEX	0,94	SOLARIA	1,24
BBVA	1,58	INDRA A	1,25	TELEFONICA	0,97
CAIXABANK	1,52	INM.COLONIAL	0,34		

Source: Compiled by the author from (Bolsa de Madrid, 2022b) and (Infobolsa, 2022)

This approach is based on the Capital Asset Pricing Model (CAPM) for the determination of the discount (Amat, 2011; Santandreu & Torres, 2012). According to Amat (2011), *“the CAPM model has the following expression:*

Figure 10. Capital asset pricing model

$$K_e = RF + (MRP \times \text{Beta})$$

Source: Created by the author from the revision of (Amat, 2011)

Where: *RF* = risk-free rate; *MRP* = market risk premium; *Beta* = company-specific risk”.

2.3.3. Determination of the enterprise value

As stated by Amat (2019), to find the enterprise value using this method we should follow five different steps. The first one would be to calculate the present value of the future cash flows with the suitable discount rate with the formula from Fernández, (2004).

However, since the number of years included in the formula in the previous section is usually less than the expected life of the company, an estimate of what the company will be worth at the end of the last year considered in the forecast must be added (Amat, 2011). This estimate is the residual value, which is a perpetuity added to the last cash flow that is calculated (Santandreu & Torres, 2012):

Figure 11. Perpetuity

$$\text{Perpetuity} = \text{FCF}_n / k$$

Source: Created by the author from the revision of (Amat, 2011)

Where: FCL_n = free cash flow in year n; k = discount rate.

The third step would be to add the value of non-operational assets, which are the assets held by the company that are not necessary for the generation of free cash flows, such as non-operational properties, financial investments or idle cash (Amat, 2011). Since these assets may have a real value, they are added at time zero to the present value of the flows to determine the value of the company (Amat, 2019).

On the other hand, if there are contingencies due to circumstances such as debts for pending lawsuits or environmental issues, for example, the estimated present value of expected future payments for these items is deducted from the value of the company (Amat, 2011).

The last step is to subtract loans and other financial debts outstanding at the time of the valuation. This is the reason why both interest payments and capital repayments are omitted when calculating free cash flows. The impact of this subtraction is that the more indebted a company is, the more its value will be reduced (Amat, 2011).

It is known as net financial position, and when calculating it, liquidity surpluses and financial investments not required for operations are subtracted from financial debt. Cash needed for the normal operation of the company is not considered an excess of liquidity (Amat, 2019):

Figure 12. Net financial position

+ Financial assets (cash and other equivalents and financial investments not required for operations)
- Financial liabilities (long and short-term debt)
Net financial position

Source: Created by the author from the revision of (Amat, 2019)

Once the five steps have been completed, the enterprise value and the equity value can be calculated:

Figure 13. Determination of the enterprise and equity value through the discounted cash flow method

+ Present value of the future cash flows
+ Residual value at the end of the last year
+ Value of non-operational assets
- Contingencies
Enterprise value
- Net financial position
Equity value

Source: Created by the author from the revision of (Amat, 2019)

This method would be suitable if the prediction rate of future cash flows is convincing, i.e., the prediction of sales, operating costs, and capital investment is very accurate (Sutjipto et al., 2020). However, the main constraint is that those future estimates are difficult to determine in a frequently changing business environment where markets are more complex and psychologically driven (Cifuentes, 2016).

2.4. Multiples of comparable companies' method

Valuating a company using multiples means valuating it similarly to the market price of comparable companies (of the same sector, similar risk, size, growth and wealth generation) (Amat, 2019). These prices are compared with indicators of the wealth generated by the companies concerned, such as profit, cash flow, EBITDA (earnings before interest, taxes and depreciation) or sales, for example (Amat, 2011).

When using It, the data of the comparable companies and those of the company being valued must refer to the same period. Also, to use the means of the comparable

companies, unless outliers are distorting the mean, which in this case we will use the median (Amat, 2019).

The most used by literature are the multiples derived from the income statement, that they try to figure out how valuable a firm is based on the magnitude of its earnings, sales, or other variables (Fernández, 2004). There are also multiples based on the balance sheet, but these are the least used as they may have significant limitations like the shareholder's equity-based ones (Amat, 2019).

Furthermore, as stated by Vargas (2013), the most commonly used indicators under the multiples valuation method fall into two groups: those relating to the equity value and the enterprise value. The first group has already discounted the financial expenses (such as net income), whereas the second does not (such as sales, or EBITDA, for example). Therefore, in the last case, once the enterprise value has been obtained, the financial debt has to be deducted to arrive at the value of the shares.

Fernández (2001), exposes the primary finding that multiples usually always have a wide range of values (dispersion), reason why multiples-based appraisals are highly controversial. However, this method is effective in a second phase of the valuation: after doing the valuation using another approach, a comparison with the multiples of comparable firms allows us to measure the valuation conducted and detect disparities between the company appraised and the firms it is compared with.

Following this idea, Goedhart, Koller, & Wessels (2005), consider that contrasting a company's multiples to those of competitors can enhance a firm stress-test its future cash flows, comprehend inconsistencies among its performance and that of its competitors, and have meaningful dialogues about whether it is strategically stated to generate more value than other industry players.

2.4.1. Price earnings ratio

Also known as PER or price-to-earnings ratio (P/E), is one of the most commonly used multiples (Santandreu & Torres, 2012). This ratio divides the market capitalization of a company by the total net income. It can also be calculated on a per-share basis:

Figure 14. Price earnings ratio

$$\text{PER} = \text{Market capitalization} / \text{Total net income} = \text{Share price} / \text{Earnings per share}$$

Source: Price Earnings ratio (PER) (Fernández, 2001)

Where: Earnings per share = total net income divided by number of shares.

Fundamentally, the price-to-earnings ratio shows how much money an investor will have to put into a company to get \$1 of that company's profits. If a firm was trading at a P/E multiple of 10x, the clarification is that an investor is willing to pay \$10 for \$1 of current earnings (Investopedia, 2021d) and thus, needs the benefits of 10 years to recover the price paid.

The idea is to pay a low PER when buying a company, as long as the company's future prospects are favourable and the company is not stagnating. Higher values are accepted when there is a well-founded expectation that the company will grow significantly in the coming years (Amat, 2019).

2.4.2. Dividend yield

Dividend yield is calculated by dividing the amount a firm pays to their shareholders for owning a share of its stock by the current stock price:

Figure 15. Dividend yield

$$\text{Dividend yield} = \text{Annual dividends per share} / \text{Share price}$$

Source: Dividend Yield Definition (Investopedia, 2021a)

Where: Annual dividends per share = total annual dividends divided by number of shares.

Focusing on dividends may augment rather than slow returns, according to historical research. Still, while large dividend yields are appealing, they may come at the expense of the company's prospective growth. Hence, it is not recommended that investors evaluate a stock based on its dividend yield alone (Investopedia, 2021a).

2.4.3. Enterprise value to sales

This ratio divides the price paid for a company (enterprise value) by the sales turnover:

Figure 16. Enterprise value to sales

$$\text{EV/Sales} = \text{Enterprise Value} / \text{Sales}$$

Source: Enterprise Value to Sales (EV/Sales) (Fernández, 2001)

A lower EV/Sales multiple, in general, indicates that a company is more appealing or undervalued in the market. A greater multiple, however, is not always indicative of overvaluation because investors may predict that future sales would rise (Investopedia, 2021b).

Compare the EV-to-sales ratio of your company to that of other companies in the same industry to get the most out of this indicator, as, for example, this multiple is greatly reduced in sectors operating with lower profit margins (like supermarkets) (Amat, 2019).

2.4.4. Enterprise value to EBITDA

For analysts, this is one of the most commonly utilized multiples (Fernández, 2001), as well as by venture capital firms in periods of economic growth and in businesses based on new technologies (Santandreu & Torres, 2012). It divides the enterprise value by the earnings before interest, tax, depreciation and amortization:

Figure 17. Enterprise value to EBITDA

$$\text{EV/EBITDA} = \text{Enterprise Value} / \text{EBITDA}$$

Source: Enterprise Value to EBITDA (EV/EBITDA) (Fernández, 2001)

In many sectors, a ratio between 4 and 6 is considered acceptable, being higher in listed companies (Amat, 2019). Despite that, the use of EBITDA has positive and negative aspects:

According to Goedhart, Koller, & Wessels (2005), as a rule, this ratio is less exposed to manipulation by changes in capital structure. Therefore, a change in the capital composition will have no systematic effect because the enterprise value includes both debt and equity, and EBITDA represents the profit available to investors.

However, the EBITDA is not a final result, but an intermediate margin (Amat, 2019), which does not include the changes in the need of funds for operations and capital investments (Fernández, 2001).

2.5. COVID-19 impact on valuation methods

March 2020 meant the end of the longest bullish market since March 2009. After 130 months of an upward trend, stock markets such as the Dow Jones or the IBEX-35 dropped by 37% and 39% respectively (EDEM, 2022).

Still, two years after this stock market crash, the Spanish index is the only one among the main European indexes that have not managed to recover from the blow and has registered a fall of 14% since that fateful February to date, with only 15 stocks that have managed to recover from the Covid crash (elEconomista, 2022).

This is not by chance since a large number of the companies that make up the index are financial and tourism companies, which are fully affected by the pandemic (EDEM, 2022). And it was reflected in the whole Spanish economy, which suffered the largest QoQ contraction in its history up to that point (-5,2%) (Hernández de Cos, 2020).

Taking all of this into consideration, an analysis of how valuation methods are affected in times of crisis (like the COVID-19) is necessary to see its impact and try to solve the problems that they present during economic recessions (Santandreu & Torres, 2012).

2.5.1. Effects on the shareholder's equity-based method

“Any epidemic or pandemic can affect the value of a business by affecting its value drivers – sales growth, operating margin, asset turnover and cost of capital” (Koller et al., 2010). Mohanty & Mishra (2021), suggest including the firm's cost structure as another value driver since lockdowns applied to restrict the spread of COVID-19 will be particularly sensitive to enterprises with larger fixed costs. The exact impact would be determined by the firm's cost structure, debt level, and working capital investment rate (Mohanty & Mishra, 2021).

One example of an affected industry is the airline business, where in order to survive they needed to adjust their planning processes for scheduling, pricing and revenue management to adapt to market conditions. Moreover, having a strong cash position to keep the lights on was the most important priority (Vinod, 2021).

As stated by Santandreu & Torres (2012), adjustments will probably need to be made depending on which accounting policies and criteria have been followed to reflect the economic facts. The market value of a property may be very different from that shown

on the balance sheet of a company which is obliged to reflect it at its acquisition value minus the depreciated value so far (Santandreu & Torres, 2012).

2.5.2. Effects on the discounted cash flow method

COVID-19's actual impact on cash flow is determined by several factors (Mohanty & Mishra, 2021) like in the case of a firm that may make only a part of the total revenue it forecasted earlier and consequently, assuming a decrease in its free cash flow.

There are other cases though, where the pandemic situation benefits the business operations and improves the past valuations. It is the case of Pharma Mar, where the valuation of the company according to the discounted cash flow method increases in the forecast period (2021-2024), compared to that calculated for the historical period (2016-2020) (Mariscal, 2021).

Anyway, in times of uncertainty, we have to deal with the essence of the problem: the probabilistic nature of the cashflows (Cifuentes, 2016). And because we cannot predict the future, we can use a prior decision tree that allows us to associate the possible cash flows with a probability of success for each of them (Santandreu & Torres, 2012). If we are unable to estimate a key variable, we can perform a sensitivity analysis to assess how the value varies according to different scenarios (Amat, 2011).

The discount rate is also affected by the constant increases and decreases in government bonds in countries with high uncertainty. Furthermore, falls in the stock index like the IBEX-35 cause the return on the risk-free asset to be higher than that of the index, resulting in a negative market risk premium (Santandreu & Torres, 2012). Therefore, the author suggests using the German bond to mitigate risks. Also, we can use a different WACC for each year if relevant factors such as market interest rates, financing structure, taxation or risk (among others), change (Amat, 2011).

2.5.3. Effects on the multiples on comparable companies' method

A study conducted by Declerck (2016), on the valuation of companies between 2002 and 2009, concluded that market multiples are sensitive to the economic crisis since they differ broadly from year to year. Nevertheless, the 2008-2009 economic recession had a greater effect on the valuation of food firms than the one in 2002, causing multiples to decline much more in the second one (Declerck, 2016).

During that period the multiple EV/EBITDA offer a smaller range in the results than EV/Sales or EV/Net profit (Declerck, 2016). This fact suggests why (Amat, 2019; Santandreu & Torres, 2012) considers it one of the most used, and (Goedhart et al., 2005) to use enterprise-value multiples rather than P/E ones.

Even so, “multiple ratios are sensitive to the type of sub-sector” (Declerck, 2016). For that reason, it is essential to have multiples extracted from operations that are related to the company we are valuing (Santandreu & Torres, 2012), and taking into account the use of peers with similar ROIC and growth forecasts (Goedhart et al., 2005).

Table 3. COVID-19 impact and adjustments on valuation methods

Valuation method	COVID-19 impact	Adjustments
Shareholder's equity-based	<ul style="list-style-type: none"> - Affectation of its main value drivers - Impact depends on the cost structure - Market value differ from book value 	<ul style="list-style-type: none"> - New planning processes and liquidity surpluses - The accounting criteria to reflect economic facts
Discounted cash flow	<ul style="list-style-type: none"> - Uncertainty in future cashflows - Variation in the discount rate 	<ul style="list-style-type: none"> - Use of decision tree - Sensitivity analysis - German bond as risk-free asset - Use of a different WACC for each year
Multiples on comparable companies	<ul style="list-style-type: none"> - Multiples are sensitive to economic crisis - EV/EBITDA as the one with smaller spread in results - Sensitive to the type of sub-sector 	<ul style="list-style-type: none"> - Use multiples extracted from company-related operations - Use of peers with similar ROIC and growth forecasts

Source: Created by the author

2.6. Theoretical framework conclusions

The evidence presented above proves the relevance of a correct valuation of companies and how this process is affected by an economic crisis such as the one we are currently experiencing with the COVID-19. Likewise, following the idea of the model “QQC” exposed by Santandreu & Torres (2012), it is essential that before starting the valuation of a company, answer the questions “what, how and when” regarding our task.

As exposed during the research, we can value two different aspects of a company: the enterprise and the equity value. The differences between them have been set out as well as different methods to achieve both of them clearly.

Selecting the right method can be a difficult task. Each of the models presented has its advantages and limitations. As stated, the discounted cash flow is the most used by literature. Yet, it has negative aspects like it does not allow us to identify differences between the firm valued and the firms it is compared with, which multiples do. Thus, my conclusion is that all of them are useful and complement each other at the time doing a complete company valuation.

Finally, we must take into consideration the current environment we are living in. Regarding the review of how the previous methods have behaved during the last’s economic recessions, everything points to the fact that this time will be no less. Therefore, it will be essential to detect the affectations of the main value drivers in a company, to mitigate the uncertainty in future cashflows, or reduce the sensitivity of the multiples employed (among others), and thus make a valuation appropriate to the circumstances.

Based on these aspects, this study aims to find out the degree to which company valuation methods are affected and to realize whether COVID-19 is a crisis like any other, or whether it goes beyond that.

3. Objectives and hypothesis

From the above contextual study, it has been concluded that economic recessions affect company valuation methods and that each crisis may affect the valuation of companies differently from the previous one. Although various ways of adjusting these methods for successful valuation in times of uncertainty have been presented, the role of COVID-19 in the valuation process needs to be determined.

For this reason, the main objective of this research is to determine the extent to which COVID-19 affects company valuation methods. Reference is made to the methods of valuation to those exposed during the research carried out. The degree of impact of the pandemic will be measured based on of the changes made from pre-pandemic levels, as well as across industries.

The following questions are therefore addressed in order to demonstrate the extent to which COVID-19 influences company valuation:

A1.- “Is the COVID-19 an element that has influenced the process and the final valuation of companies?”

A2.- “Has the pandemic affected the valuation of companies differently depending on the sector they belong to?”

Based on the main question proposed, the study starts from the following hypotheses:

H1.- The pandemic has affected companies' value drivers and thus, the enterprise value.

H2.- The use of different discount rates is necessary to adapt the discounted cash flow to the appropriate level of risk and uncertainty.

H3.- The EV/EBITDA rate is less sensitive to changes and consequently, the most reliable multiple.

4. Methodology

4.1. Data collection

To address the questions posed, the collection of data to develop the empirical work will be based on companies listed in the IBEX-35. The reasons why the work will be approached in this way are first because listed companies present their quarterly and yearly results earlier and in a more regulated way. For example, PYMES still need to submit their 2021 results. Also, the fact that the Spanish economy and companies have been one of the most affected by the pandemic will facilitate the detection of variations in company valuation, if any.

In this way, the data will be taken from the companies' annual earnings reports as well as from the information provided by the stock exchange where the company in question trades. The use of tools such as a market screener and news about future forecasts from professional analysts will be key to knowing the market trends. Once all the financial figures have been obtained, they will be stored for further analysis.

4.2. Data analysis

The procedure for analysing the valuation of the companies will be carried out using Excel. The main idea is to be able to create a model that allows valuating the company using the three main methods, as well as showing all the changes that companies may have undergone as a result of COVID-19.

However, the IBEX-35 encompasses 35 different firms, a very high number if we want to analyse the valuation of a company in detail. For this reason, the first step is to choose a coherent criterion that allows us to answer the previous objectives of the research without the need to evaluate the entire index.

Since one of the main questions is whether COVID-19 has affected differently the valuation of companies regarding the sector they belong to or not, one company will be chosen from each of the main sectors of the Spanish index. As stated by Bolsa de Madrid (2022), there are seven different ones. Yet, one of the sectors includes banks, and as claimed by different authors such as (Martí Cembranos, 2014), those organisations are valued differently than the others and they need special valuation methods. Therefore,

the “Financials” sector will be replaced by the “Pharma” industry because of the impact that they had during the pandemic.

Within each of the seven sectors, the company with the highest market capitalisation will be chosen, which are those that have the greatest impact on the market.

Table 4. Companies selected for the analysis

Sector	Name	Market Capitalization 15/03/2022 (thousand euros)
Oil and Energy	IBERDROLA	63.409.996
Industrials and Materials	FERROVIAL	19.057.726
Consumer Goods	INDITEX	68.285.845
Consumer Services	AENA	20.565.000
Pharma	GRIFOLS	6.460.131
Technology and Telecommunication	CELLNEX TELECOM	28.355.139
Real Estate	INMOBILIARIA COLONIAL	4.333.114

Source: Compiled by the author from (Bolsa de Madrid, 2022a)

The period analyzed will be from 2017 to 2021 (both included). During those 5 years, the valuation will be carried out by their Spanish organization. Almost all of them are indeed multinationals with several locations in different countries, but by analyzing the numbers of the parent company (all of them headquartered in Spain), they will be in equal conditions as well as a more accurate insight of the impact in this country will be achieved.

The methodology to analyze this study will be approached in different ways to successfully address the hypotheses set out above:

Table 5. Methodology for data analysis

Hypothesis	Valuation method used	Approach
<i>H1: The pandemic has affected companies' value drivers and thus, the enterprise value.</i>	<ul style="list-style-type: none"> - Shareholder's equity based - Discounted cash flow - Multiples on comparable companies 	<ul style="list-style-type: none"> - Comparison between pre-pandemic levels and among sectors (variance analysis)

H2: The use of different discount rates is necessary to adapt the discounted cash flow to the appropriate level of risk and uncertainty.

- Discounted cash flow

- Usage of “Damodaran” database to select the appropriate discount rate according to the year and sector

H3: The EV/EBITDA rate is less sensitive to changes and consequently, the most reliable multiple.

- Multiples on comparable companies

- Comparison between pre-pandemic levels and variance analysis among sectors

Source: Created by the author

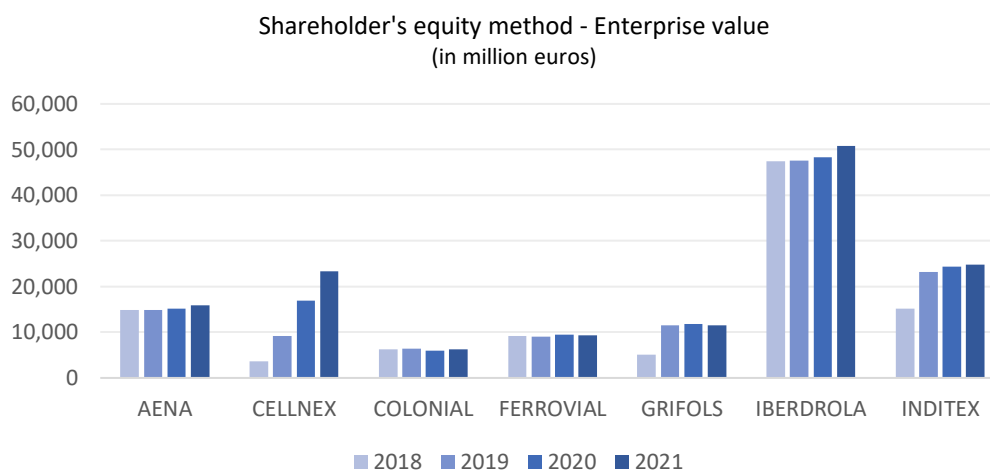
5. Results

The results obtained will be displayed by the valuation method used to perceive the different outcomes that each approach has during the period analysed and to answer the previous hypothesis exposed.

5.1. Shareholder's equity-based method

This initial and most simple method has been the least affected by changes in the enterprise value of companies during the COVID-19.

Figure 18. Enterprise value obtained with the shareholder's equity method



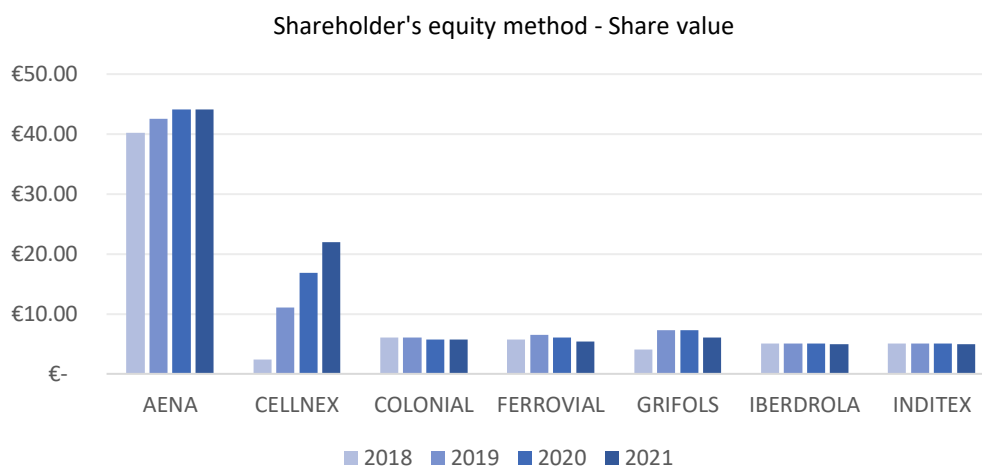
Source: Created by the author with Excel

Figure 18 summarizes the data obtained from the seven companies during the last four years (2018-21). Most of the companies grew in times of the pandemic (2020) compared to the previous period (2019). The only one with negative results is Colonial which decreased its enterprise value by a -5% during 2020 because of the sale of real estate assets to tackle the crisis.

Although a greater impact was expected regarding this method, some companies' value growth indeed stagnated during the period mentioned above. That is the case with Grifols and Inditex. Both of them grew 125% and 53% in 2019 to just 1,5% and 5% the year after respectively.

Things slightly change when obtaining the share value of the organisations through this method. Although the equity value remains solid as the enterprise value, more companies performed negatively in 2020 compared to the previous values.

Figure 19. Share value obtained with the shareholder's equity method



Source: Created by the author with Excel

These companies are Ferrovial, Grifols, Iberdrola, Inditex as well as the previously mentioned Colonial. The reason why this change from the enterprise value is that even though companies can grow their overall value in times of economic crisis, some of them need more financial liabilities like debt to cope with difficulties. This increment in liabilities leads to a decrease in equity and consequently, a decrease in the share value.

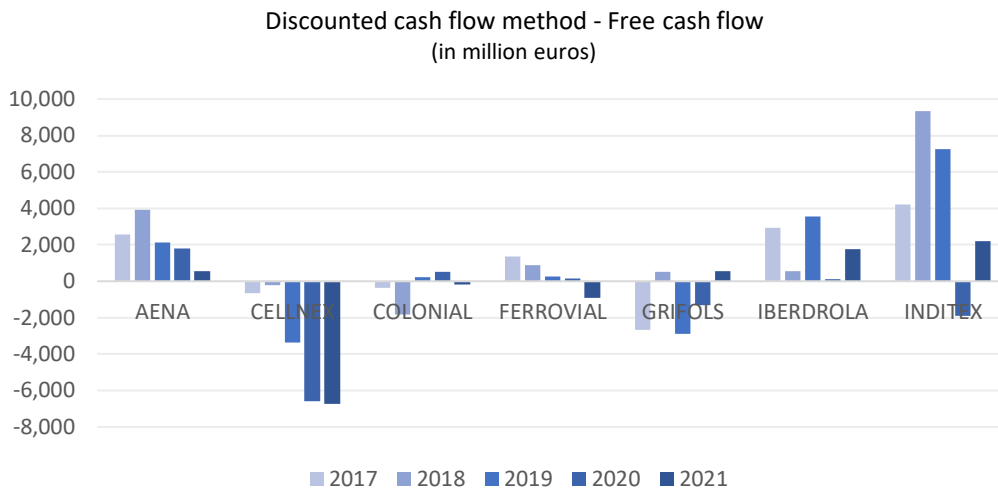
However, those drops are not so severe and are logical during a recession. Some of them were just a -0,1% like in the case of Grifols, and the biggest fall was from Ferrovial at a -6,8%. On the other hand, Aena and Cellnex outperformed and their share value grew 3,7% and 52,5% respectively.

5.2. Discounted cash flow method

Since to use this method properly you have to do the valuation of a period of some years (usually 5), the year 2017 will be included to get 3 different valuations of 3 years each one; 2017-19 (pre-covid analysis), 2018-20 (including the year of the covid appearance), and 2019-21 (post-covid).

Signs that this method has been affected more severely are noticeable in the results of the free cash flow for each company. Despite being the first calculation and not even a final result of the value of a company, a variation in this result could lead to a change in the enterprise valuation.

Figure 20. Free cash flow obtained with the discounted cash flow method

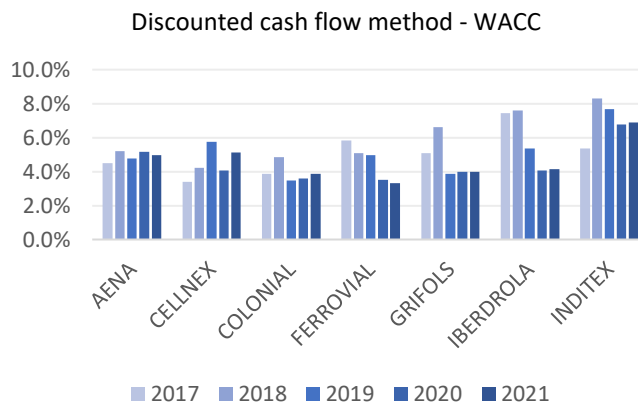


Source: Created by the author with Excel

It is observable in *Figure 20* that almost all of the companies analysed performed poorly regarding the wealth they have generated during the COVID-19 in comparison to previous years. Only two companies improved the wealth generated; Grifols by 54% (but still in negative numbers), and Colonial with an increase of 121% thanks to the sale of non-current assets.

Also, it should be noted that even though some companies such as Inditex or Iberdrola managed to surpass the situation in 2021, others didn't. In the case of Aena is reflected the affectation of the pandemic on the airline industry which cut part of its income. Cellnex is also in decline, but in this case, is because it is a fast-growing tech company that is investing resources heavily.

Figure 21. WACC used in the discounted cash flow method



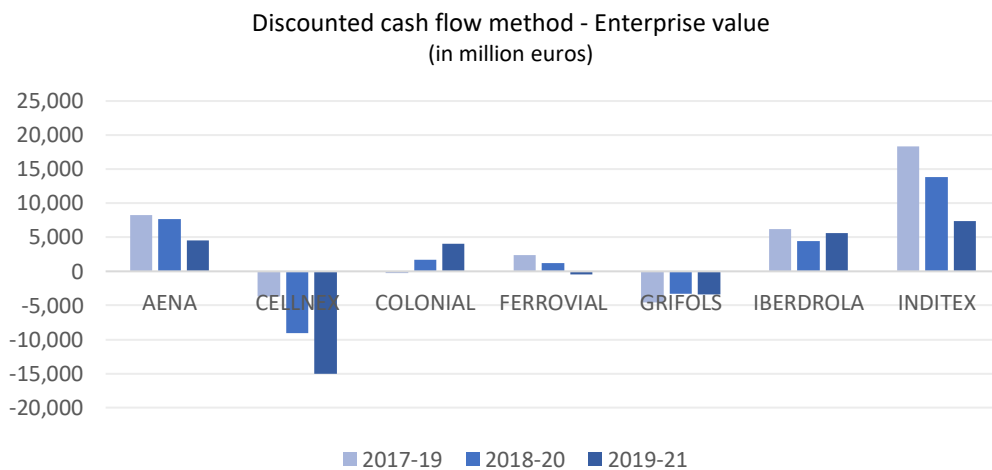
Source: Created by the author with Excel

Figure 21 summarizes the weighted average cost of capital used to perform the different valuations with the discounted cash flow method. To arrive at this calculation, the cost of equity (Ke) used is the one from the “Damodaran” database, which classifies it by European industries. In there, it has been selected the one that belongs to the sector of the company and the corresponding year to adjust properly to the risk level.

Meaningful information can be extracted from this data. There are some companies whose WACC increases in 2020, aiming that there is a higher risk implied in that company and consequently, in the sector. Those companies are Aena, Colonial, and Grifols, where their cost of capital increased by 0,4%, 0,1% and 0,1% respectively. It makes a lot of sense since the consumer services (in this case air transport), real estate and pharma sectors were some with the highest uncertainty during that time.

On the other way, sectors like tech & telecom, energy, consumer goods and industrials were perceived as safer by shareholders and thus, the cost of equity was reduced from 2019 levels. At the same time, they were able to restructure their debt to reduce the financial expenses and therefore, the WACC.

Figure 22. Enterprise value obtained with the discounted cash flow method



Source: Created by the author with Excel

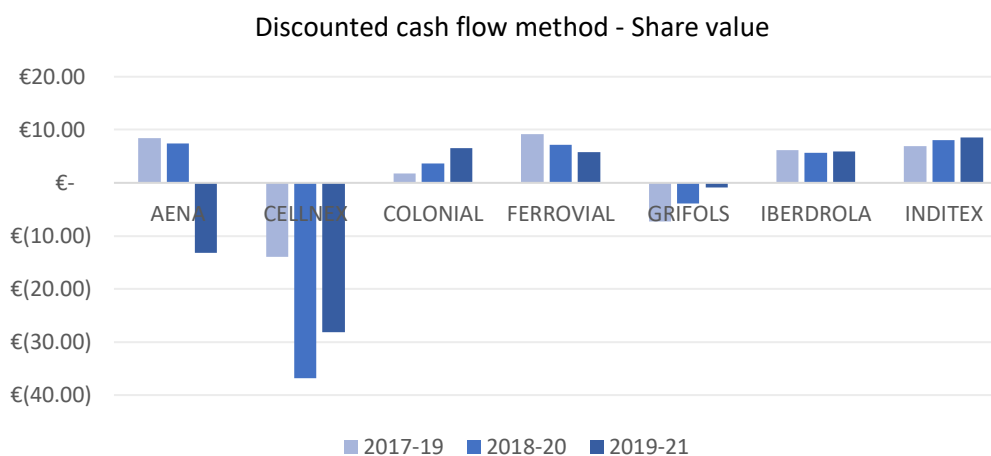
More conclusively this method and the enterprise value obtained have been affected by the COVID-19. Evidence is proven in the data obtained in *Figure 22*; most of the companies lost a considerable part of their enterprise value in the valuation that the year 2020 is included. Not only this, but some of them continue losing value in 2021 until a point where they have a negative valuation.

Different situations and reasonings are found in the analysis. Aena for example had an enterprise value of 8.285 million euros in the 2017-19 period, and because of the huge decrease in its operations (and revenue), ended with a loss of -45% in its value, being valued at 4.558 million euros during 2019-21. Something similar has happened to Inditex, where the decrease in revenue and a further increase in operational costs made the company to being valued from 18.333 million euros to 7.298 million euros in the last period. What's more, the losses that Ferrovial had in 2021 made the company pass from a positive value to a negative one of -473 million euros.

Furthermore, two companies were already in a negative valuation even before the COVID-19 appeared. That is the case with Grifols and Cellnex. The first one, tho, managed to improve this result from -4.579 million euros in the first valuation to -3.432 million euros in the last one, thanks to the disinvestment in non-current assets. The opposite happened to the telecommunication company, that because of its continuous investment in infrastructure its value dropped in -308% to -15.046 million euros in 2019-21.

The most benefited from the valuation by this method are Iberdrola and Colonial. Even the company that belongs to the energy sector saw its revenue fall and consequently its valuation including the year 2020 in -28,4%, they handled to surpass the situation and grow in the last period by 26,8% YoY to 5.592 million euros. That is because its earnings recovered from the pandemic, and thus they generated even more wealth during 2021 than in past years like 2017 or 2018. Colonial, for instance, improved the negative free cash flow that had in 2018 by selling part of its real estate properties to get extra cash flow and therefore, growing for two periods in a row. They grew 665% in the year 2020 to 1.663 million euros, and 141% the following period to achieve an enterprise value of 4.008 million euros.

Figure 23. Share value obtained with the discounted cash flow method



Source: Created by the author with Excel

There are some companies that when obtaining their share value change the previous pattern due to their net financial position. Those whose financial assets are larger than their financial liabilities, improve the previous enterprise value and have an increasing share value. For instance, Inditex has radically changed and during the periods studied increased its value from 6,91€ per share in 2017-19 to 8,58€ per share in 2019-21. The main reason was that they increased their financial investments in companies from the group. The same happened to Cellnex, increasing its share value by 23,3% from second to the third period.

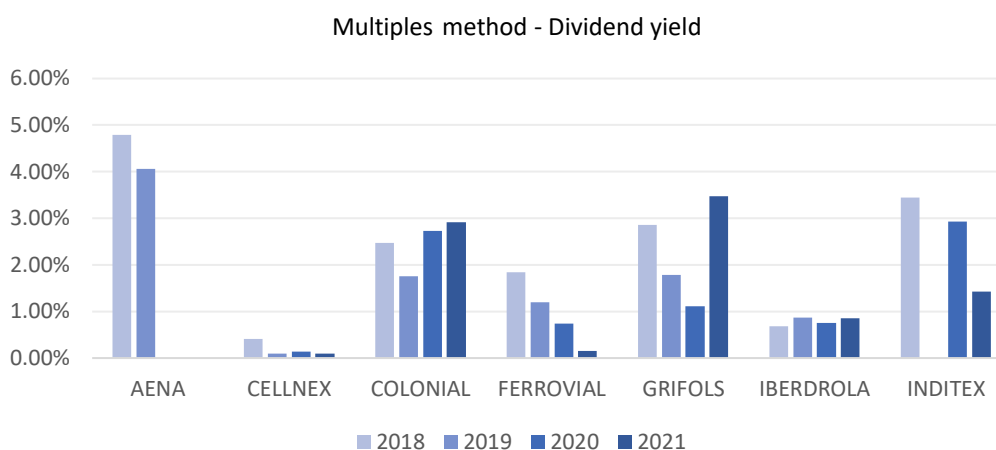
However, there are other cases where the negative financial position leads to a decrease in the share value. Aena is the clearest example; from the first valuation to the second their share price just fell from 8,43€ to 7,41€. From the second to the third though, the drop was more severe, with a decrease of -277% YoY and with a final share value of -13,14€.

Finally, the rest of the organisations followed the same pattern as the previous with the enterprise value. Colonial and Grifols managed to have an increasing share price during all the periods. Even so, the pharma company ended with a negative value of -0,32€ per share. Ferrovial decreased its share value but moderately, and Iberdrola's share price of 2019-21 surpassed the previous by 4,2%.

5.3. Multiples of comparable companies' method

Each of the multiples used in this method to value the companies is independent of the other. This means that the affectations of the COVID-19 in the PER multiple don't have to be the same as in the EV/Sales multiple, and vice versa.

Figure 24. Dividend yield obtained with the multiples method



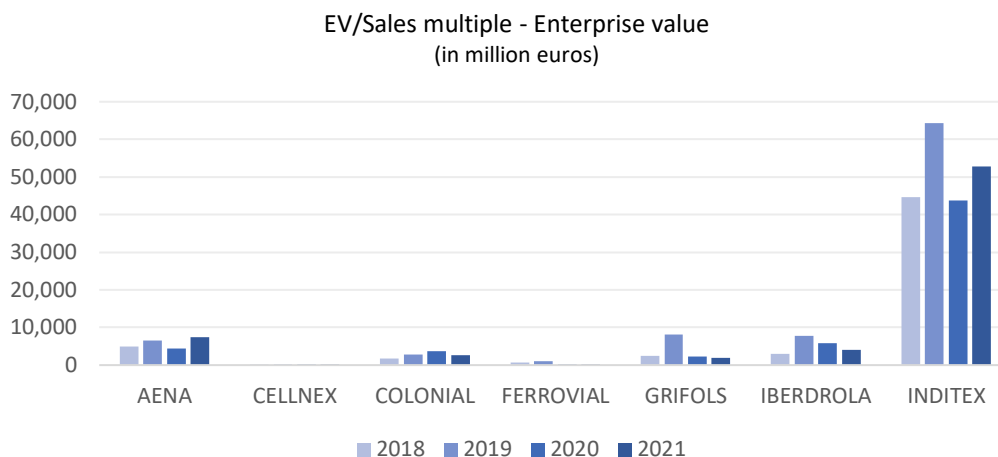
Source: Created by the author with Excel

Figure 24 gives an idea of the evolution of the dividends that the company have paid to their shareholders before and after the pandemic. Evidence is proven with Aena, from paying 4,06% on dividends in 2019 to stopping paying them in 2020 and 2021. Others like Inditex decided at the beginning of 2020 with the appearance of the virus to not distributed the profits obtained during the previous exercise to mitigate risks. That's the reason why in 2019 they gave a 0% of dividends and then in 2020 recovered to 2,93%.

Inversely, there are cases like Iberdrola that in the year of the COVID-19 just dropped by -0,11% the distribution of dividends to then in 2021 recover previous pre-pandemic levels. Colonial though, managed to not only maintain the same distribution of profits but to increase them. In 2019 its dividend yield was 1,76%, then in 2020 a 2,72% and finally in 2021 it paid a 2,91% of its market capitalization value in dividends, an increase of 1,15% in just two years.

The multiples that enable obtaining the enterprise value of the companies and thus, answering the first hypothesis, are the EV/Sales and EV/EBITDA.

Figure 25. Enterprise value obtained with the EV/Sales multiple



Source: Created by the author with Excel

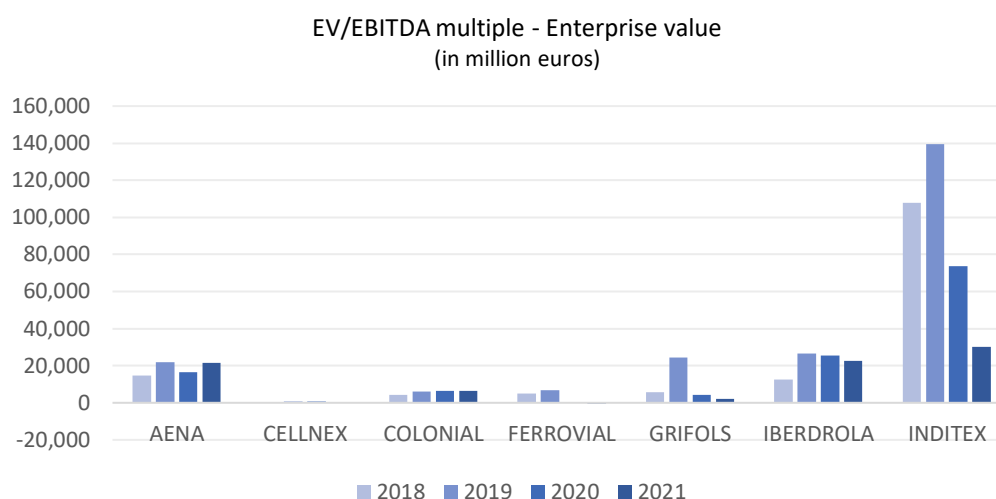
Within the results of the first multiple of enterprise value, it can be perceived in some cases as more realistic values than with the previous methods. Inditex had the largest value because within its sector in the European market (apparel), they are the ones with the largest sales. Even so, its value fell by -31,8% in 2020 (as was logical), but then recovered part of it in 2021 to achieve 52.683 million euros in enterprise value.

Colonial achieved a rise in its value during 2020 of 29% YoY to 3.642 million euros thanks to the overperformance in sales concerning the real estate industry in Europe. Iberdrola though had a value of 7.809 million euros in 2019 and because of its drop in sales, it lost value not only in 2020 to 5.779 million euros, but also in 2021 to end up with an enterprise value of 4.064 million euros.

In other situations, the sales were so affected or directly so low compared to the European multiplier of its sector that they had really low values, but without getting to the point of the discounted cash flow method and its negative values (more unlikely and unrealistic).

That is the case with Cellnex and Ferrovial. The telecommunications company had a value of just 150 million euros in 2019. Despite this, its value continued growing until achieving 164 million euros in 2021. On the other hand, the industrial one lost from 999 million euros in 2019 to 120 million euros in 2020, a fall of -88%.

Figure 26. Enterprise value obtained with the EV/EBITDA multiple



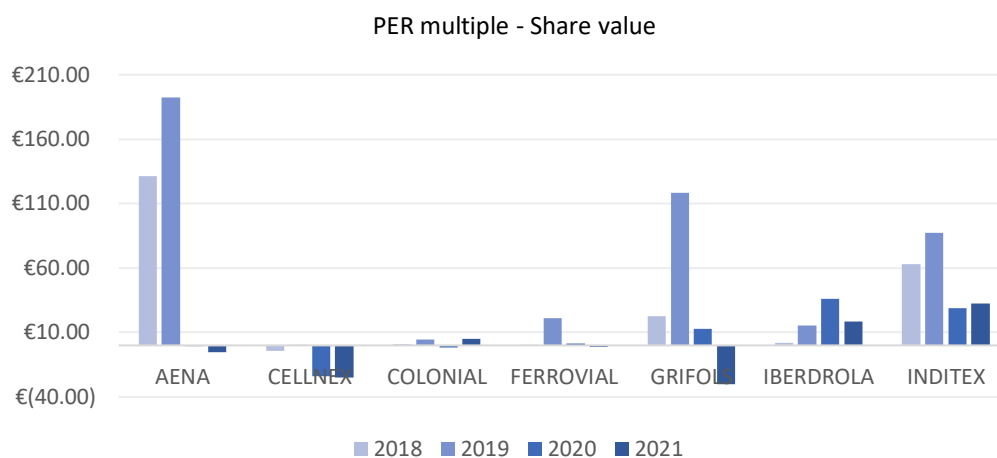
Source: Created by the author with Excel

The same patterns are followed when performing the enterprise value of the companies with the EV/EBITDA multiple. One of the main differences though is that the values with this multiple are bigger than with the previous one. The reason why is that basically those companies manage better their operating revenue and costs than the European ones. Therefore, their EBITDA is relatively bigger and thus, they have a larger value.

However, that is something positive because as exposed during the research, company valuation consists of a range of values rather than an exact number. Consequently, both multiples can be used together since they give the same information and have similar stability. Hence, the enterprise value of Aena in 2020 is between 4.370 million euros (minimum), and 16.416 million euros (maximum).

Significant changes concerning the previous multiple are worth mentioning. There are two main ones; Inditex and Cellnex. The most obvious by the graphs is the clothing company that actually in 2021 dropped its value by -59% compared to 2020, unlike the sales multiple. Cellnex still with small numbers, followed the pattern of Inditex and fell by almost -50% in the last period studied YoY to 394 million euros. Those facts are mainly because both of them didn't manage properly their operating costs during 2021 so they grew and caused their operating margin to diminish.

Figure 27. Share value obtained with the PER multiple



Source: Created by the author with Excel

The PER multiple calculates the equity value (or share value if we divide it by the number of shares), and according to the literature, it is more volatile than the others. By taking a look at the results it is appreciable that changes are overwhelming by comparing them to the ones obtained with the enterprise value multiples. Evidently, the outcome is incomparable, but not the variation of results in times of crisis.

It is visible that some companies even have a negative share value not only after the COVID-19 but even before it appeared. Two main reasons can explain this dispersion in the results: a huge variance in the company's net income to a point that there are losses or extreme PER multipliers from European industries that alter the outcome.

In the first case, there are companies such as Aena, whose share value changed from 192,47€ in 2019 to -0,83€ in 2020. This was because its net income changed from 1.446 million euros to losing 5 million euros in 2020. Cellnex just lost 93 million euros in 2021, but the low earnings that the industry had compared to their market capitalization in Europe made it have a huger multiplier of 180,4 and consequently, a share value of -24,60 € in 2021.

Iberdrola for instance had a share value of 36,77€ in 2020 by having good profits but also by overperforming in an energy sector that was more affected by the pandemic. In 2021 though, the sector recovered, a thing that made its share value drop to 18,50€ even almost maintaining the same net income.

Table 6. Changes in the share value by different multiples

	PER			EV/SALES			EV/EBITDA		
	2019	2020	% Change	2019	2020	% Change	2019	2020	% Change
AENA	192,47 €	0,83 €	100,4%	0,32 €	7,79 €	2559,5%	103,27 €	72,51 €	29,8%
CELLNEX	0,58 €	24,01 €	4228,6%	103,27 €	72,51 €	29,8%	12,79 €	18,28 €	42,9%
COLONIAL	4,61 €	1,87 €	140,6%	4,25 €	6,21 €	46,1%	10,63 €	11,80 €	11,0%
FERROVIAL	21,12 €	1,30 €	93,9%	7,75 €	6,12 €	20,9%	15,65 €	6,46 €	58,7%
GRIFOLS	118,33 €	12,64 €	89,3%	26,47 €	12,55 €	52,6%	64,68 €	17,34 €	73,2%
IBERDROLA	15,66 €	36,37 €	132,2%	6,31 €	5,86 €	7,1%	9,24 €	8,99 €	2,7%
INDITEX	87,48 €	28,98 €	66,9%	26,83 €	20,67 €	23,0%	50,97 €	30,26 €	40,6%
	<u>Average</u>		<u>693%</u>	<u>Average</u>		<u>391%</u>	<u>Average</u>		<u>37%</u>

Source: Created by the author

The option of obtaining the share value with the enterprise value multiples by subtracting the net financial position enables the possibility to compare the three main multiples and see which one has been the least affected during the COVID-19 and in consequence, the most reliable multiple in times of crisis.

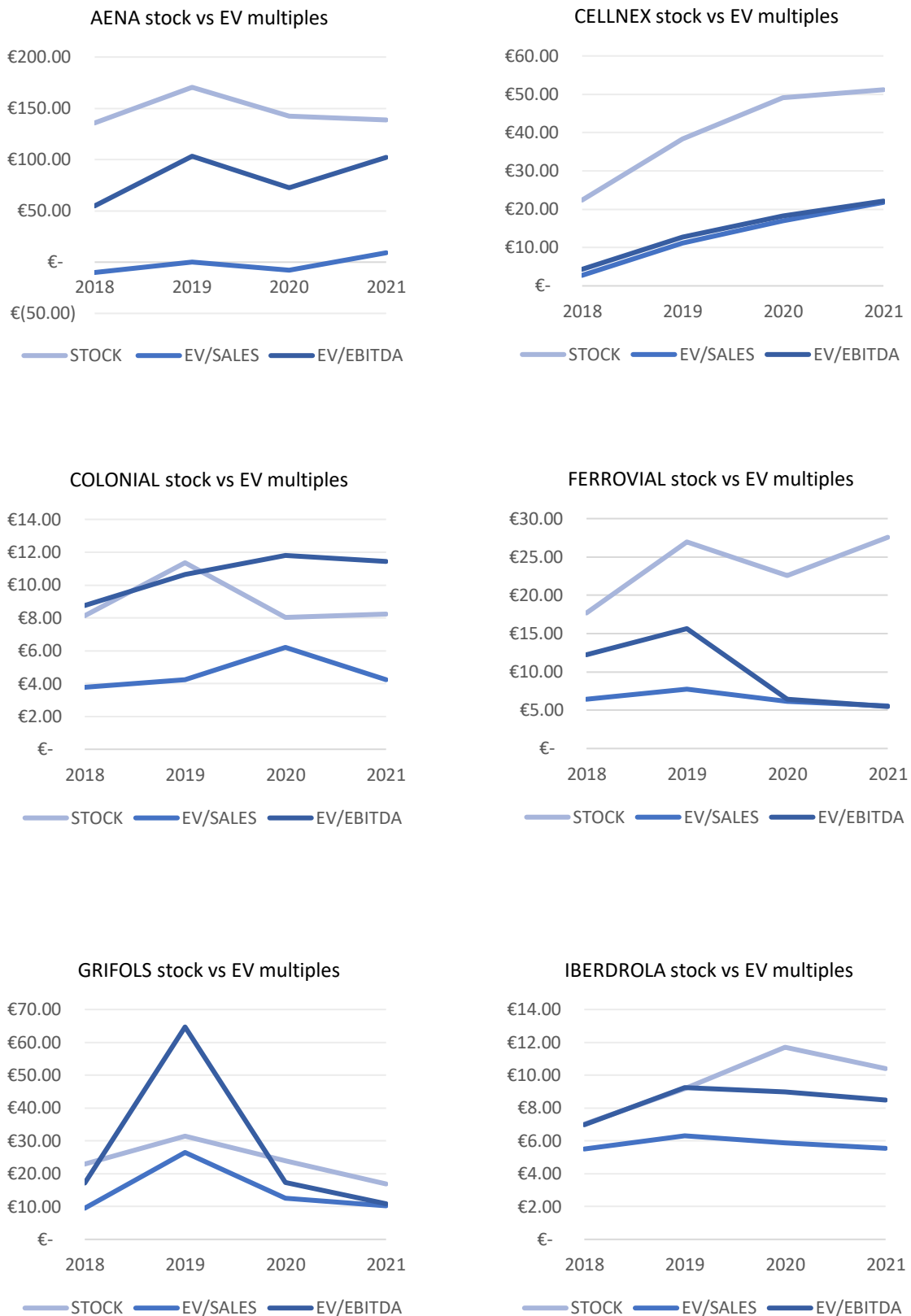
The differences are tremendous between them. As was to be expected from the literature review, the EV/EBITDA has been the least hit by the pandemic by just an average of 37% of change between 2019 and 2020. The most affected industries thus have been the pharma and the industrials.

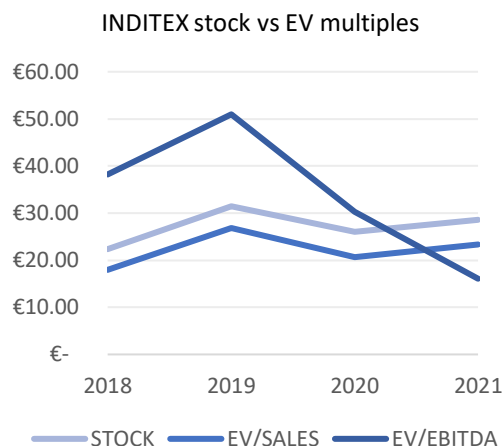
In the second place, there is the other enterprise value multiple, the EV/Sales multiple with a 391% change concerning pre- and post-pandemic levels. However, there is a considerable outlier here that has been Aena that disrupt the average with this -2.559,5% of change. The other companies tho, have been pretty stable with just an average change of 30% among them.

Lastly, the PER multiple has been as foreseeable as the most impacted multiple and the least reliable one with an average change of 693%. Even in this case there is also an outlier such as Cellnex with a variance of 4.228,6%, there have been other really affected companies like Aena or Colonial in a 100,4% and 140,6% of change respectively.

At this point of the analysis and knowing that both enterprise value multiples have been the most reliable during the COVID-19, it is worth comparing the range of share values that they bring with the traded share price of the companies in the market in order to see if there are similarities or not.

Figure 28. Companies stock price comparison with the EV multiples share value





Source: Created by the author with Excel

Before making any possible comparisons between the target price of the multiples and the price at which the companies' shares are sold on the stock market, it should be noted that the traded share price normally includes the forward-looking expectation of investors in the share. Thus, there are shares whose price is higher than the value that valuation methods can give because of the future projections. At the same time, there are undervalued companies where the market price is lower than it should be according to the techniques studied above.

The case of Cellnex for example is a clear one of a company that trades at a higher price than the value reflexed by the multiples method. The main reason why is that it is a tech company with high expectations for future growth within its sector. Despite this, it is appreciable that both multiples follow the upward trend in the share price.

There are also companies like Colonial that were actually trading at the expected price that the multiples settled during 2020 and 2021. For instance, in 2020 the range of prices from the multiples was between 6,21€ and 11,80€, and the company traded at 8,03€.

In fact, the only company where the multiples are not close to the price and trend of the share is Ferrovial, where in 2021 its price went up while the target price of the multiples went down, making a gap of more than 20 euros. It is normal that sometimes it does not come close to the share price as there are many things involved in this, such as the psychological aspect. At the same time, as mentioned during the study, company valuation is not an exact science.

6. Conclusions

After completing the research and analysing in detail the results obtained from it, different conclusions are presented regarding the impact of the COVID-19 on the main company valuation methods.

The first, which is the most obvious and important, is that this past crisis has negatively affected the methods previously studied by altering the company's enterprise value. This is the effect mentioned in the first hypothesis, where as a consequence of the impact on the value drivers of the companies, the value of the enterprise would be affected.

However, not all of them were affected in the same way. This is because each method is independent of the others so one can be affected more than the rest. And even this independence was already known since each method usually gives a different target valuation price, it was not so clear that some would be so affected and others so little.

The one that has been minimally, if at all, affected is the first and most basic method of all, the Shareholder's equity-based method. As proven, after the appearance of the virus just Colonial decreased its enterprise value because it needed to sell assets to have extra liquidity. And even some companies slowed down their growth, it has been by difference the most stable as it analyses the life of the company as a whole.

At the other extreme is the most affected method of those studied, the discounted cash flow. It is interesting since it is the most supported and studied by literature but in times of uncertainty, it suffers from constraints by even giving negative values which are unlikely to happen. The main one is that growth companies that invest a lot of capital in non-current assets have a negative free cash flow, and consequently, their valuation. Therefore, in cases such as Cellnex, this method is not optimal for obtaining an objective value for the company.

Related to this method is also the second hypothesis of the study, the use of a different WACC to adjust the level of risk and uncertainty, which, like the first one, was also fulfilled. As it has been shown, each company had a different discount rate for all the years of the study which has made it possible to detect where the risk was during the covid year. Indeed, Aena, Colonial and Grifols were the ones with higher uncertainty because of the industry of which they are part, causing their WACC to increase in that period.

The third and last method is the multiples of comparable companies, and it could be said that the two multiples that calculate the enterprise value has been moderately affected by the pandemic. The main reason is that on one hand, there has been a clear affectation in the value of those organisations during the crisis as was expected. At the same time, valuations have not varied as sharply as they have in with the discounted cash flow method to the point of having negative values (just the Ferrovial 2021 value of the EV/EBITDA multiple was).

However, the independence of methods has again been demonstrated even within methods as there have been multiple less and more sensitive to the COVID-19. The one with the higher spread in results and thus the less reliable has been the PER. Secondly, the EV/Sales and finally the EV/EBITDA, which has been the most stable multiple in terms of changes in the share value between 2019 and 2020 by difference.

This confirms the third and last hypothesis of the research, which supported the idea that the EV/EBITDA multiple was the least changeable in times of crisis and therefore the most credible. Despite this, it has been proven during the results that it is more efficient to use both enterprise value multiples together to have a range of values and thus, have a realistic approximation of the company's price.

The other main objective of the investigation was to prove if there were some sectors more affected in the valuation due to COVID-19 than others. The answer is yes, as each method has shown that some companies are more vulnerable due to the characteristics of the sector to which they belong. The differences can be seen in the enterprise value of the company since in the equity value the financial position of the company is so unique and different from other peers that it can alter the perception of the sector as a whole.

The real estate sector has been the one affected the most due to the pandemic according to the first valuation method. This is because the sector has needed to sell properties to cope with the situation and thus, reduce the whole value of the company.

On the other hand, the discounted cash flow benefited the previous sector because of this extra benefit for a certain period of time. Similarly, all the others either worsened past values or their values become negative because of the COVID-19, to a point where their wealth generation declined. The telecommunications sector, in particular, stands out

negatively, as the company's operational investments made the enterprise value decrease considerably.

Finally, the real estate and telecommunication sectors were just the ones that overperformed in terms of both Sales and EBITDA multiples. Therefore, the others were significantly affected. The pharmaceutical and industrial sectors, which at least in Spain, were the most affected in the EV/Sales multiple due to their considerable decrease in sales, should be highlighted. Also, add the consumer goods sector which, due to its growth in operational costs, was one of the most affected sectors in terms of the EV/EBITDA multiple.

7. Limitations and further research

The main limitation of this study was the impossibility of analyzing more companies in the sectors studied due to the time spent on examining a single company. With more time, or with the help of professional analysts, it would be possible to analyze not only all the IBEX-35 companies but also companies of different sizes such as start-ups.

Two possible lines of study open up at the end of this research. The first is the opportunity to analyze the impact of past crises such as the one in 2008 on the companies previously analyzed. In this way, it would be possible to know exactly the magnitudes of the two crisis periods, as well as possible similarities or differences between them.

In a different way, and seeing that the discounted cash flow method has been the most affected, to find a new formula that can adapt this method, so successful in stable times, to cyclical moments such as any crisis, in order to find a coherent objective valuation for all type of companies.

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9. Annexes

9.1. Annex I

This annex is the Excel attached with the final work, where it can be found all the data, functions and calculations used to carry out this research. All the other tables and figures employed are included throughout the study.