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The challenges in valuating a company when it wants to make an Initial Public Offering (IPO).

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Introduction

Initial Public Offerings (IPO) are enormously documented, notably IPOs under-pricings and their negative effects on firms.
Nonetheless, IPOs intrinsic valuation determination, which might be the essence of such problem, has received little attention from academicians while it is relatively important for a company to be able to be correctly valued in order to both yields the largest returns from the IPO as well as the largest short and long term profits.

In addition, it has been documented that underwriters consistently miss-value (most notably undervalue) a firm willing to make an IPO (Vismara et al., 2014; Deloof et al., 2009). These aspects place a larger weight on the company responsibility to be able to correctly asses its value. However, many different methods exist to value a firm, which might render such valuation quite tremendous for firms (most notably those with little or no experience in this matter).

In the present thesis, we will analyse various methods that might be used to value an IPO. We will also examine their difficulties in this particular context. For each method, we will use studies that will help us overcome such difficulties and yield the most accurate value of the firm. We will, then, analyse and criticize such techniques in a practical way by valuating a Belgian company as if it were to undergo an IPO. This will help us to assess the practicality and the apparent reliable outcome highlighted in these studies.

1. General overview

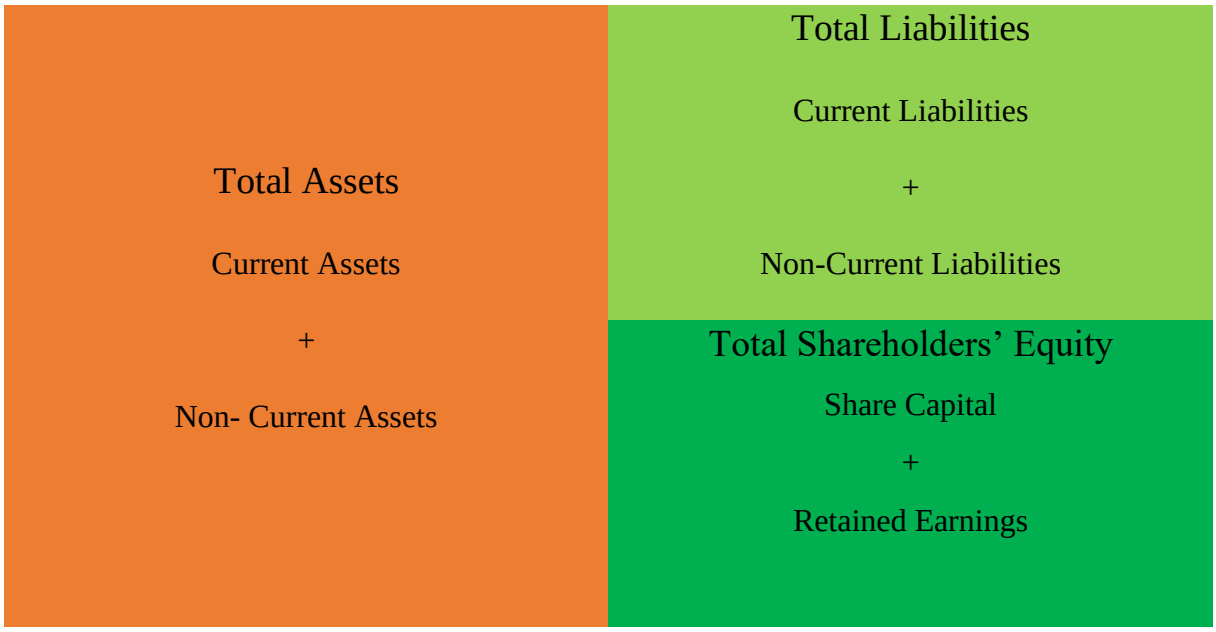
1.1. Company general description

1.1.1. Balance sheet

The balance sheet (Figure 1.1) is one of the three basic financial statements and is central to financial modelling as well as accounting. The balance sheet shows the total assets of the company, and how they are financed, whether by debt or equity. It may also be considered a net worth statement, or a financial status statement. The balance sheet is based on the equation: Assets = Liabilities + Equity (McLaney & Atril, 2019).

Figure 1.1

Balance Sheet of a Company



Note.
Reproduced from McLaney, E., & Atril, D. (2019). Financial Accounting for Decision Makers (9th ed.). Pearson.

The balance sheet is split into two sections. On the left hand, all the assets are displayed and on the right hand, the liabilities and the equity of the shareholders are displayed. The principal line items are typically defined by liquidity on both sides.

1.1.2. Cash Flow Statement

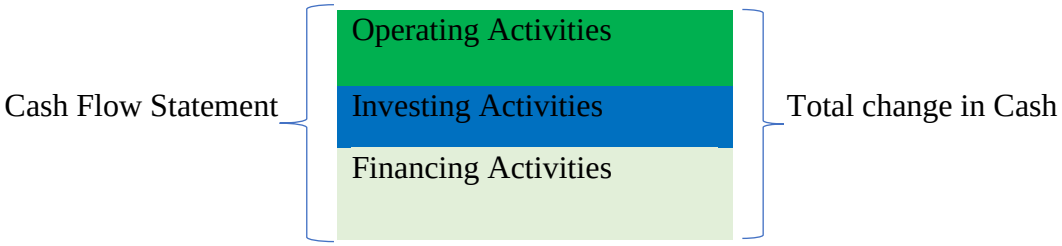
A cash flow statement (Figure 1.2) depicts the amount of cash that has been earned and consumed over a certain period. There are three classes in a cash flow statement:

1. operating activities,
2. investing activities, and
3. financing activities of a company and are organized respectively.

The net cash received for or used for each of the three operations is tallied up to arrive at the overall change in cash for the period, which can then be added to the opening cash balance to meet the bottom line, the closing cash balance, of the cash flow statement (McLaney & Atril, 2019).

Figure 1.2

Cash Flow Statement of a Company



Note.
Reproduced from McLaney, E., & Atril, D. (2019). Financial Accounting for Decision Makers (9th ed.). Pearson.

One of the key factors for measuring the inflow and outflow of cash is to contrast the cash from operations against net income. This contrast lets executives, analysts and customers gauge how well an organization is performing its activities. The cash balance statement represents the total sum of money from the sales that the organization collects.

The explanation for the disparity between cash and profits that the financial tax is calculated on an accrual basis, where it fits sales and expenditures for the accounting period, while profits may not have been collected yet and expenditures may not have been charged yet. The cash flow statement only recognizes cash earned or paid out (McLaney & Atril, 2019).

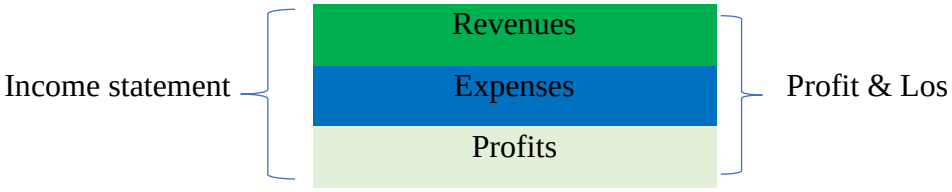
1.1.3. Income Statement

The Income Statement (Figure 1.3) is one of the central financial statements of a company that outlines its profit and loss over a certain period. The profit or loss is established through a simple equation :

Profit or loss = all revenues - all expenses from operational and non-operational activities.

Figure 1.3

Income Statement of a Company



Note.
Reproduced from McLaney, E., & Atril, D. (2019). Financial Accounting for Decision Makers (9th ed.). Pearson.

The income statement shows in a comprehensible and compelling manner the firm's revenue, costs, gross profit, selling and administrative expenses, other expenses and revenue, taxes paid, and net profit. The income statement is divided into time periods that comprehensibly follows the activity of the firm (McLaney & Atril, 2019).

1.2. What is an IPO?

An initial public bid (IPO) refers to the method of selling a private corporation's shares to the market in a new stock issue. A public sale of shares helps a company to collect money from public investors. The move from a private to a public corporation will be a valuable opportunity for private investors to understand their investment profits in full, as it usually provides equity discounts for new private owners. In the meantime, it also helps public creditors to take part in the sale.

An organization that plans an IPO will usually pick an underwriter or underwriters. They will also opt for an exchange in which the shares will be issued and then publicly traded.

The principal responsibility of the investment bank in the IPO process is to ensure that it will sell a certain amount (defined beforehand with the firm) of newly issued shares to investors (including helping in valuating the firm). Indeed, the investment bank serves as a broker

between the company and investors. Investment banks offer underwriting services on new investment issues anytime a company wants to go public and is seeking equity capital. Underwriting essentially entails the investment bank buying a consented-upon number of new shares that it then resells via a stock exchange. Part of the role of the investment bank is to analyse the company and assess a fair price to sell its shares at. The IPO journey is commonly being supervised by more than one investment bank.

1.3. IPO process?

Part 1 – Hire an investment bank

Most banks have a solid relationship with one or several investment banks. Hence, these banks will be already aware of the firm's intention to go public. In the case of a company having strong relationships with any specific bank, the firm itself will get in contact with an investment bank.

Consequently, the selected investment bank(s) will prepare the pitch (or the pitch book), which will include a preliminary valuation of the firm by analysts. This is the presentation of the company for potential future investors. It will try to picture the best image of the firm in order to attract as many investors as possible and at a reasonable price that would not be below the market.

Then, the company choose one or several banks, forming the syndicate, that will help in the IPO process. More than one bank are being selected for various reasons; e.g. certain investors prefer working with a certain investment bank and the more banks participate in the syndicate, the bigger the chances of attracting important investors.

The banks are typically divided into three categories:

- The Global Coordinator: one or two banks who will assume the role of overseeing the entire process and coordinate workstreams.
- The Book Runners: they handle the entire marketing effort. Taking care of analyst presentations, roadshow presentations, and managing the whole banking syndicate. There can be one, two or more banks assuming this position. Most of the time Global Coordinator are also active as Book Runners.

- The Co-Lead Managers: they help with the marketing efforts of the transactions and contribute with their networking and expertise.

The more important the role of a bank, the more fees it will be able to earn in an IPO. Some of the most prestigious investment banks will not accept being hired as co-lead managers as it would be a hit for their reputation. Moreover, banks allocation to each syndicate category is determined in accordance with their relationship with the company and the quality of their pitch book, and the investment bank relationship with certain types of investors that the company might be interested in.

Part 2 – Due diligence and Kick-Off Meeting

The kick-off meeting is a meeting reuniting all the party involved in the IPO process; such as the company executive, the investment banks, lawyers, external auditors, etc.

The investment banks will commit to selling shares to investors, this process is called an underwriting agreement. Four different arrangements are possible:

- Firm Commitment
- Best Efforts Agreement
- All or None Agreement
- Syndicate of Underwriters

In addition, underwriters have to prepare several documents. Namely, the engagement letter, the letter of intent, the underwriting agreement, the registration statement, and the red herring document.

In brief, all these documents are here to be in accordance with the regulations and to form a form of contract between the company and the underwriters.

Part 3 – Pre-Selling Phase

The pre-IPO analyst meeting takes place, this is the moment when the company tells underwriting investment bank’s employees more about their firm and advise bankers on the approach they should have to sell their shares.

Subsequently, is the pre-marketing phase. During this phase, the banks meet with several institutional investors to teach them about the company. Afterwards, these investors will tell bankers what are their thoughts about the company and the price range they would be knee to pay for a certain amount of shares.

Thanks to this pre-marketing phase (and to other factors), the banks are now able to establish a price spectrum for the shares.

Part 4 – The IPO Roadshow

Underwriters go on a roadshow to meet investors in one-on-one or group meetings. This is a crucial part since a lot of investors can be attracted during this phase.

During the roadshow period, the banks may modify the price range of the share. Shareholders, bankers and the company all want to fix a high price. However, if a price is set too high, the banks might have to decrease it, which in return can have a negative impact on investors trust in the company. The bankers might also revise the number of shares allocated to the company. As with the price, too many fluctuations might spread uncertainty to investors.

Part 5 – The IPO Pricing Decision

After the roadshow, the price is set by the banks during a meeting with the company's executives. The price will be based on the offer and the demand for the shares to the investors. Hence, if too few shares are to be bought by investors price will decrease, and conversely.

It is not uncommon that the underwriters decide to decrease the price of the shares so that during the first day of trading the shares can show a favourable increase.

Part 6 – Allocation

After that, the price has been decided the investment banks will allocate the shares to the investors. On the one hand, the banks will tend to be keen at allocating more shares to investors that will generate more profits, on the other hand, it would be more advisable to allocate more shares to investors willing to hold shares for a longer period of time.

Part 7 – Trading

Once all investors have had their shares allocated the shares start being traded on the stock market, it is now said that any investor can buy the company shares.

Part 8 – Stabilization

Once the company shares are being traded on the market the investment banks will hand over to the company recommendations on the aftermarket stabilisation of the shares.

In case of shares purchase shortcoming, the investment banks can set in place a stabilisation. This can be done by buying shares at the IPO trading price or below. Stabilisations are not actions that can happen in the long term. This is a short-term activity during which the banks can alter the shares price.

1.4. How is an IPO Priced?

The price range which is set for an IPO depends on multiple factors, it is common to provide a discount to the actual trading value of the company in order to keep investors happy and facilitating the post-launch trading of the shares.

These are the two main ways used to determine how much the company's shares are worth:

- Discounted cash flow valuation is a technique that is applied to determine a company's price. It consists of calculating the present value of all cash flows that the company is going to deliver to its owners. The basis for this valuation is historical results and the business plan that has been prepared by the management team of the company. The discounted cash flow model establishes a possible price range.
- Multiple valuations, consisting of finding comparable companies, having a similar business in term of industry, size, geography, and market strategy. Analysts use the price of these companies and calculate a ratio between their price (of the peers) and operating results (of the peers) this ratio multiplied by the company operating result obtains a sense of the company value.

Towards the end of the IPO process investment bankers idea of the company, value improves after each meeting with investors. Institutional investors are able to tell the banks how many

shares they are willing to buy and at which price, this is the book-building process. At the end of the roadshow, bankers are able to say how many shares can be sold at different price points and suggest a price to the owner of the company that is based on this information.

The investment banks are responsible for the IPO draft of a prospectus. Before doing that they issue a pre-IPO research report, this is a document that comes with the announcement of the IPO to the public and contains a preliminary assessment of the company's business carried out by the investment banks' analysts. The report is circulating through retail and institutional investors. Then the investment banks start the pre-marketing efforts by contacting institutional investors to "learn more about their feelings" toward the equity story of the company willing to be listed. This allows bankers to determine a suitable price range, which depending on the situation can be ten to twenty per cent wide. Once an initial price range has been established it is time for the roadshow. Investment bankers organize one-on-one and group meetings with investors interested in the IPO. This helps them improve their idea about a possible price range. Stock demand evolves throughout the roadshow and book building is significantly influenced by the number of shares institutional investors are willing to buy at a given price. At the same time when retail investors place an order, they can only indicate the maximum price at which they are willing to buy the company's shares, they cannot declare interest in buying different amounts of shares at various price points. The roadshow is an intense process, where tens of meetings are organised and investment bankers along with management travel across several locations to make themselves available when investment bankers and the firm decided on a maximum IPO price then the retail offering begins, somewhere between that time the book building process ends and the investment bankers, the company management, and the ownership have a final meeting to determine the final price of the IPO. During that discussion all factors mentioned hereabove are taking into consideration; DCF valuation, trading of comparable companies, market sentiment, ownership goals, all of which are important, however, the most important indicator of a suitable IPO price is the book of demand.

1.4.1. Main factors influencing the IPO pricing

a. Demand

If a lot of investors are willing to invest in the firm it does not necessarily mean that the firm intrinsic value is bigger, it means that the IPO final pricing of the firm will be bigger. It is interesting to note that very similar firms may have disparate IPO valuation because of the market demand at the time of each IPO. Most companies will go public when the market is favourable for the company, meaning that more shares would be sold than if the market was less favourable. Therefore, it is not surprising that in 2008 many IPO processes were stopped by companies.

b. Growth Prospects

One of the many reasons for an IPO is to raise capital for the company future expansions. Therefore, a company forecasting high future growth should imply a higher IPO valuation as it might attract more demand.

c. A Convincing Corporate Narrative

Out of many quantitative factors influencing the IPO valuation, their factors can be rather considered qualitative. The solid story behind a company can generate more enthusiasm for investors than a strong forecasted growth prospect. The story may include new licenses or project that would revolutionize the industry and generate an exponential return.

Some companies having pitfalls in their financial results may try to embellish their corporate narrative by adding industry veterans and consultants to their expenses, seeking to leave the impression of being a company with skilful managers and in exponential growth.

It is not uncommon that the financial results of a firm may be outshined by its marketing campaign. Therefore, investors must carefully analyse a company financial reports and it’s the risks linked to the company.

Finally, we noticed that the true determinant of the IPO pricing is not the intrinsic value of the firm. this intrinsic value will primarily be used first range to which the company might be priced. In the end, the pricing decision will be determined by the potential investors. This thesis will solely focus on the intrinsic value determination of a firm undergoing an IPO.

1.5. What is valuation?

Value is not a clear indication, but an approximate of the probable amount to be paid in an exchange for goods and services, or a gauge of the monetary benefits of owning those goods and services.

1.5.1. Valuation?

Valuation is the methodical process used to assess the actual (or projected) value of an asset or a company. There are several methods used to perform a valuation. An investor putting a valuation on a firm looks, among other factors, at the management of the corporation, the nature of the financial structure, the likelihood of potential profits and the market valuation of the assets.

1.5.2. Business valuation?

Within corporate finance, the topic of company valuation is often debated. Business valuation is usually conducted when a corporation wants to sell all or part of its activities or to combine or absorb another corporation. Business valuation is the action of establishing the current worth of a company, applying unbiased methods and evaluating all facets of the company.

An overview of the management of the firm, its financial structure, its potential expectations for profitability or the market value of its assets may be parts of a company valuation. The instruments used for valuation can vary between evaluators, businesses, and industries.

1.6. Why valuate a company?

There are many reasons why one would want to valuate a certain business. We could mention a few of them; for a merger or acquisition, for funding purposes, for litigation or to sell or buy the business, etc.

The reason we will focus on this thesis is for an Initial Public Offering (IPO). We will here focus on the intrinsic (fair value) valuation determination rather than the pricing process as explained beforehand.

There are many different ways to valuate a business. Each method would be better used to match the need of the valuation. Meaning that not all methods will be used to value a company prior to an IPO.

A business valuation is mainly complex because the valuation is often subjective. Indeed, one can use a certain technique that would valuate a company to his/her advantage. Nevertheless, even if the method is left to the one valuating the company, the data and the accountancy figures must be accurate and in accordance with the regulation.

1.6.1. Why is it important for an IPO?

It is important to be able to correctly value a firm. It is common for firms in the process of an IPO to be overvalued or undervalued, intentionally or not, by underwriters. In the case of an IPO, although undervaluation is the most commonly known and the most researched by practitioners and academics, both scenarios are possible.

Purnanandam & Swaminathan (2004) argued that the median offer price of IPOs is overvalued by 14% to 50% compared to the industry. It is not clear whether this overvaluation is *implicitly* done by the investment bankers or not, as overvalued IPO generate high returns in the first days. Moreover, underwriters fees depend on the value of the IPO, the higher the offer price the higher their fees. This place the highest responsibility on the company to correctly value itself, as they demonstrated that overvalued IPOs generate lower long-term risk-adjusted returns and profitability. Moreover, an IPO overvaluation might produce large forecasted growth that might not be witnessed inducing the profitability decline to the ex-ante IPO stage. This is explained by investors disappointed by forecasted prospects not materializing.

Opposingly, the IPOs under-pricing is well documented. It is a cross-border phenomenon as it has been shown to be present in most markets in the world (Engelen & van Essen, 2010). This plausible scenario is also a risk for the firm as a large sum of money might be left on the table. Accordingly, the average IPO first-day return between 2001 and 2020 was 16.7%, with a total of US$101.57 billion left on the table (Ritter, 2021). In Belgium, the average under-pricing of a selection of firms analysed by Engelen (2003) was quite similar to the U.S, namely of 14.32%.

Therefore, the potential amount that firms might be receiving from IPO proceeds could potentially be superior in case of non-undervaluation.

In line with IPO undervaluation, Vismara et al. (2014) showed that underwriters, while selecting a pool of comparable firm in order to value an IPO, systematically select overvalued firms for the firm to look undervalued. This leads to long-term poor performance for the analysed firm.

We have outlined that underwriters tend to miss value a firm willing to make an IPO. It was also been shown that such miss valuation, whether it is overvalued and undervalued, leads to either short or long term performances for the firm or to a large amount of money that could have been generated for the company through the IPO.

This is why it is relatively important for a company willing to make an IPO to be correctly valued.

2. Valuation methods

Table 2.1

Valuation Techniques Used by Underwriters to Value IPOs.

Valuation method	Percentage of underwriters using this method	Percentage of fair values based on this method	Percentage of fair values based on this method conditional on the underwriter using this method
Comparable firm/transactions multiples	87.28	43.88	50.26
∟*Price-earnings ratio*	83.77	24.82	29.62
∟ *Price–cash flow ratio*	41.23	5.63	13.65
∟ *Price–sales ratio*	24.12	4.05	16.78
∟ *Price–book ratio*	16.23	1.54	9.52
∟ *Enterprise value–sales ratio*	24.56	3	12.21
∟ *Enterprise value– earnings ratio*	24.56	4.27	17.38
∟ *Other ratios*	7.02	0.57	8.08
Dividend discount model	59.21	23.92	40.41
Discounted cash flow	59.21	21.8	36.82
Economic value added	19.29	5.83	30.23
Underwriter-specific techniques	11.4	4.57	40.09

Note.
This Table presents the valuation techniques used by underwriters to value 228 French IPOs between 1990 and 1999. Reproduced from Roosenboom, P. (2012, February 8). Valuing and pricing IPOs. *Journal of Banking & Finance, 36,* p. 1657.

Roosenboom (2012) showed that underwriters, while valuing an IPO, predominantly use four to five different methods[1]:

1. The Comparable Company Analysis (CCA)/Multiple Analysis
2. The Dividend Discount Model (DDM)
3. The Discounted Cash Flow (DCF)
4. The Economic Value Added (EVA)
5. The Sum-of-the-parts (SOTP)

We will, now, analyse these different methods and try to outline which method is more adapted to value a firm in the context of an IPO, in general, and on a Belgian scope.

[1] Ranked by usage

2.1. The Comparable Company Analysis (CCA)/Multiple Analysis

2.1.1. Introduction CCA/Multiple Analysis

The principle of relative valuation is to determine the value of a company based on how comparable companies are currently valued in the financial markets.

Relative valuation is very popular. It derives its popularity from the fact that its conclusions are clear and understandable to present to people unfamiliar with financial concepts. It is also faster to value a company with relative valuation than with other valuation methods.

Finally, relative valuation allows us to measure the sentiment of the financial markets since valuation is based on comparisons with other companies. Fund managers prefer relative valuation because they can compare their performance with other similar funds (Damodaran, 2012).

The multiples used for the CCA analysis are ratios. The most commonly used ratios are based on the revenues, the EBIT, and the EBITDA of the comparable firms (Pinto et al., 2010).

a. Formula for a given year:

$$MV_T = \left(\frac{MV_C}{VI_C}\right) * VI_T \quad (2.1)$$

where :

- MV_T= Market value of the target company T
- MV_C = Market value of the comparable company C
- VI_C = Measure of value for the comparable company C
- VI_T = Measure of value for company T
- $\left(\frac{MV_C}{VI_C}\right)$ = Market value multiple for the comparable company

b. Link with IPO valuation

A study from Roosenboom (2012) on IPOs on the French market outlined that the multiple analysis is the most commonly used method to price IPOs. They also argued that the **CCA** method is the valuation method with the lowest prediction errors among the different methods analysed (including the DCF and the DDM).

In addition, firms willing to make an IPO are commonly relatively young rendering their valuation difficult, especially methods requiring forecasts. This is why the comparable analysis is widely used in the scenario of an IPO (Kim & Ritter, 1999). They also showed that the multiple analysis is the most commonly used method to price IPOs on the U.S. market, as well as being the least biased method. This supports the findings of Frank & Volker (2003), which also showed similar findings for IPOs on the European market. They also added that the multiple analysis is the method leading to the highest accuracy.

In addition, How et al. (2007) suggested that the use of the comparable valuation method was also relevant while pricing IPOs in less populated areas (i.e. Australia); where it might, at first, seems to be more difficult to find comparable companies.

Finally, Deloof et al. (2009), which analysed the valuation of IPOs in Belgium, outlined that the multiple analysis is the most accurate valuation method after the DCF and followed by the DDM. They also showed it is the most commonly used method after the DCF method.

c. Which firms to select?

In order to yield the most accurate intrinsic value of the firm through this valuation method, both in the short and long term, it is important to select an adequate set of comparable companies.

Dittmann and Weiner (2005) argued that there are different criteria possible to select comparable firms, such as firms with similar Return on Aset (ROA), Total Asset (TA), or both simultaneously or firms operating in the same industry (as specified by the SIC code).

Moreover, one could select firms operating in the same country, region (EU15 in this study) or OECD.

They observed that, in general, firms selected on basis of a similar ROA yield the lowest absolute prediction errors. In addition, the quality of this peers' selection can be further improved by choosing firms with a similar total assets amount for the U.S., UK, and Ireland.

Moreover, according to this study, comparable firms should be selected in the same country for firms operating in the U.S., the UK, Denmark, and Greece, in order to have the highest level of accuracy in the analysis. While, for other European countries analysed, the analyse is more rigorous by selecting similar firms from the 15 European Union member states (EU15) or the OECD organisation[2].

However, it might be difficult to find public comparable firms within the same country, especially in small countries such as Greece or Denmark. In such a scenario it is then, advised to select firms from the most analogous countries (such as the EU15 or the OECD).

d. How many firms to select?

On the one hand, practitioners tend to use a small sample of firms for a comparable valuation while on the other hand, the academic literature tends to use the entirety of firms operating in the same industry.

In general, choosing a set of 10 comparable firms is optimal. The mean pricing errors for 50 and 10 comparable firms are similar, indicating that increasing the firm sample does not increase the accuracy (Cooper & Cordeiro, 2008).

The optimal number of firms to select in the multiple analysis, according to Cooper & Cordeiro (2008), for each industry has been summarised in Table 7.1[3].

[2] See Dittmann, I., & Weiner, C. (2005, January 6). *Selecting Comparables for the Valuation of European Firms.* Berlin: Humboldt University for more information about each country best pool of comprable firms.
[3] Note that all tables and figures starting with the number 7 are places in the appendix in section 7.

2.1.2. Ratio used:

2.1.2.1 Price-earnings ratio

a. What Is Price-Earnings Ratio – P/E Ratio?

The Price-Earnings Ratio (P/E ratio) is a formula in order to assess the value of a firm by analysing its share price against its earnings per share (EPS).

One uses the P/E ratio to assess the relative price of a firm's stock in a point-by-point comparison. The P/E ratio can be calculated as follow:

$$\text{P/E Ratio} = \frac{\text{Market value per share}}{\text{Earnings per share (EPS)}} \tag{2.2}$$

$$\text{P/E Ratio} = \frac{\text{Market Capitalization}}{\text{Total Earnings}} \tag{2.3}$$

The traditional P/E formula uses the present share price and EPS. The variant uses market capitalization and the total earnings of the firm. Both yield the same outcome.

The nominator and denominator of the P/E ratio can be obtained by searching for the financial data of the firm on any financial database (e.g. the Bloomberg Terminal as used in this thesis).

b. Investor Expectations

A big P/E typically indicates that faster revenue increase is expected relatively to a firm with a smaller P/E. Moreover, a low P/E may signal that a firm is undervalued at that time being or that the firm is performing extremely well in comparison to its prior periods.

It is a common ratio that depicts a better understanding of the firm's worth. When evaluating a firm's value, P/E is relevant since it helps investors to appreciate how profitable the firm is.

c. Forecasted P/E

Forecasted earnings represent a more accurate representation of the real firm value, the absolute prediction error for historical earnings, current year forecasted earnings, and the next year's forecasted earnings were 55.0%, 43.7%, and 28.5%, respectively (Kim & Ritter, 1999). It is important to have in mind that the forecasted earnings are provided by investment bankers, the figure might, therefore, be manipulated to outline a value they deem more favourable.

They also outlined that the use of other ratios (market-to-book, price-to-sales, enterprise value-to-sales, and enterprise value-to-operating cash flow ratios) is more precise than using historical earnings.

Moreover, firms valued with forecasted earnings ratios have a higher proportion of valuation within 15% of the actual firm value. Note that their study may not completely be consistent with the reality, as the data that were used excluded many firms (i.e. those with negative earnings and those that did not have earning forecasted available) (Liu, Nissim, & Thomas, 2000).

The Forecasted P/E ratio is subjacent from the P/E ratio except that it is the estimated future earnings (per share) that are being used.

The Forecasted P/E ratio is computing with the following formula:

$$\text{Forecasted P/E} = \frac{\text{Current Share Price}}{\text{Estimated Future Earnings per Share}} \tag{2.4}$$

$$\text{Forecasted P/E} = \frac{\text{Market Capitalization}}{\text{Estimated Total Earnings}} \tag{2.5}$$

Pragmatically, if the P/E ratio is bigger than the forecasted P/E ratio it means that the market predicts earnings to rising and vice versa.

d. Limitations of Forecasted P/E

In order to compute the Forecasted P/E ratio computation are being made. Indeed, the earnings are not simply being used as with the P/E ratio, computation is required to calculate the estimated future earnings. Hence, computation mistakes could arise.

Moreover, businesses may underestimate earnings to achieve a better Forecasted P/E ratio the following therm. In addition, independent consultants can also have forecasts which could diverge from the expectations of the firm, causing uncertainty.

Finally, as mentioned beforehand, since the earnings Forecasted are provided by investment bankers they might be manipulated to obtain a value that is more favourable to the image they want to depict of the firm.

One should also note that a single ratio, used with no other ratios as a comparison point, cannot depict the whole financial situation of a firm. This is why, although being the major ratio in the comparable valuation approach, other ratios are being used.

2.1.2.2 Price–cash flow ratio

The price–cash flow (P/CF) ratio is a financial ratio that compares the value of a firm's market capitalization to its operating cash flow. It can be computed as follow:

$$\text{The price–cash flow} = \frac{\text{Share Price}}{\text{Operating Cash Flow per Share}} \tag{2.6}$$

$$\text{The price–cash flow} = \frac{\text{Market capitalization}}{\text{Operating cash flow}} \tag{2.7}$$

where:

Operating Cash Flow = Operating Income + Depreciation – Taxes + Change in Working Capital

This ratio is notably appropriate for companies having extensive non-cash expenses, such as depreciation. It might happen that companies are not profitable, although having positive operating cash flows, as they have extensive non-cash expenses. Thus, the P/CF allows one to have a more comparable image of a company with its peers.

A low ratio is a sign of stock undervaluation in the market. One might prefer this ratio over the P/E ratio as earnings can be more simply manipulated.

Therefore, this ratio is widely used by analyst because it can be less easily manipulated by the company. Also, operating cash flow might be employed to highlight real activities

manipulation. While pure earning manipulation might be more difficult to detect if not analysed with other metrics (Andreas, 2017).

Roychowdhury (2006) also documented the use of Operating Cash Flow to avoid earning manipulation. They added that such manipulation might happen more regularly in high growth industries has in such industry companies are more penalised if they miss investors expectations.

2.1.2.3 Price–sales ratio

a. What is the Price–sales ratio?

The price-sales ratio (P/S), also called the "revenue multiple" or the "sales multiple", compares a firm's market price per share (or total market capitalisation) with its sales value per share (or total sales). It evaluates the benefit (through the market) of each euro (or whatever currency is being used) of sales generated by the firm.

The following two formulas are used to calculate the P/S ratio:

$$\text{P/S ratio} = \frac{\text{Market Price per share}}{\text{Sales Value per Share}} = \frac{\text{Market Capitalization}}{\text{Total Sales}} \tag{2.8}$$

b. Limitations of the Price–sales ratio

The P/S ratio does not reflect the level of debt a company faces, oppositely to the enterprise value to sale (EV/S) ratio. A company being in financial difficulties but still having a high level of sales could have a good P/S ratio and yet still be illiquid the following quarter. For instance, two companies, one very leveraged and one barely leverage, and both having the same P/S ratio would both seem equally worth investing in, if one solely looks at the P/S ratio.

Finally, the P/S ratio does not reflect whether a company is being profitable or not. Sales just outline the amount of sales the company is generating. A company could have higher costs than the level of sales being generated and, thus, not being profitable; such a situation could not be foreseen with the sole analysis of the P/S ratio.

In both cases, the "opposite" appropriate ratio is being used in the comparable valuation, namely the EV/S and the P/E ratio.

2.1.2.4 Price–book ratio

a. What is the Price–book ratio?

The price-book ratio (P/B) reflects the value of a firm perceived by the market against its book value. It is mostly used for firm having little intangible assets, such as real estate companies.

The P/B ratio can be calculated as follow:

$$\text{P/B ratio} = \frac{\text{Market Capitalisation}}{\text{Total Book Value}} = \frac{\text{Market Price per Share}}{\text{Book Value per Share}} \tag{2.9}$$

where:

Total Book Value = Total Assets −Total Liabilities

The book value of a company can be defined as the value of a firm according to its book value found in its financial disclosed documents. It represents what a firm worth if it were to sell all its assets and reimburse its liabilities. Hence, it is what the firm is worth if it were to be liquidated.

Theoretically, a P/B ratio smaller than one is often correlated with a market undervaluation of the firm, on the other hand, a ratio bigger than one is often correlated with shares being overpriced. A small ratio can also be a sign of bad performances within the analysed period.

b. Limitations of using P/B Ratio

Due to different accounting legislation across countries, the P/B ratio may not easily be compared. Therefore, for similar companies operating in different countries, different P/B ratio can arise.

Furthermore, the P/B ratio is more useful for companies weighing more tangible assets in their balance sheet. However, intangible assets have become more and more presents in companies, to the point that to some extent they have become the new norm. Nowadays the largest companies (by market capitalisation) are relying more on intangible than tangible assets (e.g.

Google or Facebook). Hence, using the P/B ratio for many firms would be inappropriate, making this ratio less and less used and somehow outdated (which might explain its low percentage use in IPOs valuations).

2.1.2.5 Enterprise value–sales ratio

a. What is the Enterprise value–sales ratio?

The enterprise value to revenue (or to sales) (EV/S) is a ratio used by dividing a company enterprise value by its annual revenue. It can be computed as follow:

$$\text{EV/Revenue ratio} = \frac{\text{Enterprise Value}}{\text{Revenue}} \tag{2.10}$$

where:

EV = Market Capitalization + Market value of preferred stock + Market value of debt - Cash and investments (respectively cash, cash equivalents, and short-term investments) (2.11)

b. P/S Ratio vs. EV/Sales

The primary difference between both ratios is that the EV/Sales ratio takes into account debts and cash and cash equivalents. The EV/Sales can be more complete than the P/S ratio in order to analyse a firm. Although more complete, it requires more data to be computed, hence more data aggregation or calculation mistakes are inherent to this ratio (Pinto et al., 2010).

c. Why use it?

The EV/S ratio allows contrasting the revenue of a firm against its enterprise value.

The smaller this ratio is the better it is for the company higher valuation. Indeed, if the EV/R multiple is too small it indicates that the company value is undervalued.

When a firm does not have positive earnings (or EBIT and EBITDA), the EV/R can become extremely useful to value a firm. Also, note that a substantial proportion of firms undergoing an IPO do not have positive earnings. This might explain why the EV/R ratio tends to be more often used than the EV/EBIT(DA) ratio by investment bankers for IPO as outlined by Roosenboom (2012).

For such reasons start-up (frequently having a negative net income) and high-growth firms (frequently operating at the break-even point) necessitate the EV/R ratio for valuation. Such, "non-mature" companies, can characterise companies undergoing an IPO.

2.1.2.6 Enterprise value – earnings (EBIT/EBITDA) ratio

As outlined beforehand, EV embodies debt and equity, meaning that the proportion of each (capital structure) will not influence its total value. Therefore, if EV is used as a nominator, a consistent (unlevered) denominator must be used, such as EBIT(DA)[4] or sales. Earnings, which is an operating (levered) metric, does include interests and other related factors. It is important in ratio to have similar items in it, to compare the comparable otherwise the analysis might not be consistent.

A straightforward and simplistic explanation may be to imagine that earnings are solely available for shareholders while EV is available to all investors. Therefore, it is important to compare what is comparable and to, thus, "replace" the earnings with the EBIT or EBITDA.

These ratios can be computed as follow:

$$\text{EV/EBIT ratio} = \frac{\text{Entreprise Value}}{\text{EBIT}} \tag{2.12}$$

$$\text{EV/EBITDA ratio} = \frac{\text{Entreprise Value}}{\text{EBITDA}} \tag{2.13}$$

2.1.2.7 Other ratios

Many other rations can be added, which will not be analysed in this study. Notable ratios are industry-based ratios, such as EV/Page view (Cervellati, 2012) for the technology sector or EV/EBITDAR[5] for the airline sector (Credit Suisse, 2016).

[4] Earnings Before Interest, Taxes, (Depreciation &Amortization)
[5] Earnings Before Interest, Taxes, Depreciation, Amortization & Rental Expense

2.2. DCF Discounted Cash Flow (DCF) method

2.2.1. Introduction DCF method

a. NPV

The discounted cash flow (DCF) methodology follows the same principles as the net present value (NPV). The NPV is used to determine whether an investment project is profitable today. The estimated future cash flows are discounted at a rate that is commensurate with the risk of the project. The result of adding up the various estimated revenues discounted and subtracted by the various investments made throughout the project indicates whether it is desirable to start the project (Damodaran, 2006). Mathematically the NPV is conceptualized as the following expression:

$$\mathrm{NPV} = -\mathrm{C}_0 \sum_{\mathrm{t}=1}^{\mathrm{T}} \frac{\mathrm{C}_\mathrm{i}}{(1+\mathrm{r})^{\mathrm{T}}} \tag{2.14}$$

C_0 is negative as it represents the initial investment. A positive NPV gives the signal that it is interesting to invest in this project, while a negative result will dissuade the investor from investing in it.

The NPV model bases its estimate of the value of an asset on very strong assumptions. The decisions made at the outset of the project are firm decisions that ignore questioning and changing decisions during the project. The r in the equation is the constant discount rate throughout the project (Damodaran, 2006).

b. DCF

The DCF allows determining the intrinsic value of a company. It is a method that will estimate the net present value (NPV) of future cash flows generated by the company (Pinto et al., 2010).

The popularity of the DCF method among analysts is due to several factors. It bases its analysis on a customization of the company being valued. The business plan of the company will allow to elaborate analysis and to make projections on the evolution of the company (Damodaran, 2006).

The discounted cash flow method estimates the value of the firm by taking into consideration all the stakeholders that make up the entity's capital (i.e. the various equity and debt holders). The value of the company is determined by discounting the weighted average cost of capital (WACC) on the estimated free cash flow of the company (Damodaran, 2006).

Although a few variants of the DCF model exist, the most commonly used is the two-stage valuation model:

$$V = \sum_{t=1}^{n} \frac{FCFF_t}{(1 + WACC)^t} + \frac{TV_n}{(1 + WACC)^n} \quad (2.15)$$

where :

$$TV = \frac{FCFF_n * (1 + g)}{(WACC - g)} \quad (2.16)$$

where :

- FCFF = free cash flow to the firm
- WACC = weighted average cost of capital
- t = The length of the projection of the FCFF
- g = the growth rate (note that the growth rate of the FCFF is superior to the growth rate of the TV)
- TV = the terminal value

The first stage of the model is called the explicit forecast period with length t. This length, t, of the projection is determined by the industry and the feasibility of the forecast. Forecasts for a DCF valuation will vary between five and ten years.

A residual value (TV), which represents the continuing value, the period that starts in year t+1 will be added to the model to keep the assumption of continuity of the company's activity.

c. Link with IPO valuation

Underwriters, while valuating an IPO do not limit themselves to the CCA method. They also use other methods such as the DCF (Mills, 2005; Roosenboom, 2007).

The DCF is one of the most used methods by underwriters to value IPOs, more than half use it in this process. In addition, when they use it, this method, on average, weighs approximately one-third of the firm value (Roosenboom, 2012).

This method, as well as the multiple valuation methods, both perform equally well in the price determination of the firm (Kapla & Ruback, 1995)

Deloof et al. (2009) analysed how underwriters value firms willing to make an IPO in Belgium and argued that the DCF method is the most commonly used. They also added that this method generates unbiased value estimates and it is regarded as the most reliable one.

2.2.2. Calculate the components of the DCF

2.2.2.1. Calculate the free cash flow

The intrinsic value of a company with DCF is determined primarily using the FCFF or the FCFE.

The Free Cash Flow to the Firm (FCFF) represents the amount of discretionary cash flow that a company generates before paying interest expenses and principal on its debt. It is also commonly referred to as the Unlevered Free Cash Flow (UFCF) as it is the cash flow available to the company as a whole. Free Cash Flow to Equity (FCFE) indicates the discretionary cash flow that the company generates after paying all of its debt-related expenses. While the FCFF is referred to as the cash available to all investors, the FCFE is referred to as the cash available to the shareholders.

If the capital structure of a firm is not stable the FCFF is more adapted than the FCFE. Accordingly, it is commonly known that a firm experiencing an IPO does not have a stable capital structure (Dudley & James, 2013; LIU, 2002; Chipeta, 2016)

Moreover, Deloof et al. (2009) while analysing the pricing of Belgian IPO, solely mentioned the FCFF, pointing out the fact that the FCFE is not used in the scenario of an IPO pricing.

For these reasons, the FCFE will not be used nor analysed in this context.

There are several ways to calculate FCFF from a company's financial statements. The two most common ways are to take EBIT or EBITDA from the company's income statement. From these two indicators of the company's annual earnings, FCFF is determined by taking the following steps (Pinto et al., 2010):

Table 2.2

FCFF Calculation from EBIT & EBITDA

FCFF =	EBIT*(1 – Tax rate)	EBITDA*(1 – Tax rate)
	+ Depreciation & Amortization	+ Depreciation*(Tax rate)
	– Δ Net Working Capital	– Δ Net Working Capital
	+ Gross Capital Expenditures	+ Gross Capital Expenditures

Note.
From Pinto, J. E., Henry, E., Robinson, T. R., Stowe, J. D., & Rath, R. D. (2010). *Equity Asset Valuation* (2nd ed.). (C. Institute, Ed.) Hoboken, New Jersey: John Wiley & Sons, Inc

2.2.2.2. Tax rate?

While analysing the FCFF there are primarily two tax rates to use, namely the effective tax rate and the marginal tax rate.

a. Effective Tax Rate

The effective tax rate can be seen as the tax rate a firm paid a given year. It can be calculated as follow:

$$\text{Effective tax rate } = \frac{Total\ tax\ paid\ in\ t}{Eearnings\ before\ taxes\ in\ t} \tag{2.17}$$

This tax rate tends to be used for historical periods (i.e. while calculated the FCFF of previous years).

b. Marginal Tax Rate

The marginal tax rate is the tax rate an individual or a corporation would have to pay for each additional income. For a company, it can be considered as the official tax rate stated by local authorities (equivalent to 25% in Belgium (Service public fédéral Finance, 2017)).

In the DCF model, for projection periods; including the TV, FCFF, and the WACC; it is this tax rate that will be used (Damodaran, 2012) (Damodaran, Investment Valuation: Tools and Techniques for Determining the Value of Any Asset, 2012).

2.2.2.3. The growth rate in the explicit forecast period?

$$g = \text{plowback ratio} \times \text{Return on equity (ROE)} \tag{2.18}$$

where:

$$\text{Plowback ratio} = \frac{Net\ Income - Dividends}{Net\ Income} \tag{2.19}$$

The main pitfall of this technique for private firms willing to make an IPO is that they might either not distribute any dividends or have negative incomes (or both). It might also be possible that both of these metrics are not stable as the firm is not yet mature. These might render the use of this equation fruitless in the determination of the growth rate.

Other techniques can be used in order to estimate the growth rate of a firm. One could look at the prior years' growth rate of the firm as well as looking at the industry and or similar firms growth rates. In addition, the forecasted growth rate of a public firm operating in the same country could be used (Damodaran, 2012).

2.2.2.4. Terminal value :

There are two commonly used methods to calculate the terminal value in the DCF. The first one being the formula depicted beforehand (equation (2.16)), with a perpetual growth rate. This method tends to be preferred by academicians, it is also extremely sensitive to the assumptions made by the analyst (the growth rate and the WACC). The second method, the exit multiple method, is based on the EV/EBITDA ratio of comparable firms. It tends to be preferred by practitioners as it bases itself on market figures and it is fairly easier to estimate.

a. Perpetual growth rate

The perpetual growth rate method requires the analyst to estimate the stable growth rate at which the firm will, in theory, growth forever. This growth rate cannot be superior to the growth rate of the economy in which the business operates. Indeed, if the company perpetual growth rate is superior to the economic growth rate it means that at some point in time the company would become as large and even larger than the whole economy (Pinto et al., 2010).

The usual growth rate applied is the growth rate of the economy (GDP growth rate) in which the company operates (Damodaran, 2012).

b. Exit multiple

Another method, mostly used by professional (for its simplicity), is the exit multiple. The commonly used multiple is the EV/EBITDA multiple. One would compute the median or average multiple for the sample of comparable firms multiplied by the last year EBITDA to obtain the TV of the studied firm (this is fairly similar to the multiple analysis method). This method is not typically used by academicians as the DCF method tends to base its output on intrinsic values rather than comparable firms figures. Indeed, one could argue that using the exit multiple in the DCF valuation erodes the true meaning of the DCF model by incorporating a comparable based valuation. However, in the scenario of a firm willing to make an IPO, figures of comparable have to be used (beta, cost of debts, etc.). Coupled with that such firm would become public and tend towards similar public firms, the exit multiple might make more sense to be used in this scenario.

To sum up, as mentioned in Reis & Augusto (2013) no method has been explicitly outlined to be superior to the other as well as there is no consensus in the scientific literature regarding which method yields the best result, it is, thus, recommended to use both techniques to have a better understanding of the possible TV of the firm.

Moreover, the TV is extremely sensitive to its assumptions (the WACC, perpetual growth rate or exit multiple). This is why a sensitivity analysis should be performed in order to obtain the TV with various below and above rates.

c. Option pricing for the TV

A third method in line with IPO valuation has been outlined in the literature and might be relevant to use in this scenario.

Many argue that, due to the high sensitivity of the TV to the estimation of the growth rate, it may easily be manipulated to arise with the desired value. In the case of an IPO, a too low or too large value might be computed by the investment bank, depending on whether it wants to undervalue or overvalue the company.

Furthermore, the perpetual growth model used for the TV implicitly assumes that the company has the obligation to invest in growth opportunities arising after the explicit forecasted duration. However, a company has no obligation to do so. It is, thus, important to account for this opportunity, and not the obligation, in its TV calculation. Indeed, a company might decide to wait or not make the investment at all, such opportunities have to be accounted for in its TV value. This right to wait is valuable, this is why common models usually underestimate the TV of a firm. It is commonly assumed that growth opportunities are only present for young firms. However, such opportunities are also present for mature firms as technology can have an impact on both young and mature firms (Miller, 2018). Also, note that a firm undergoing an IPO is usually quite young (Ritter, 2021).

1. Model from:

To price this option two different techniques can be used :

(i) The Black-Scholes-Merton option pricing model (Black & Scholes, 1973)

(ii) A binomial tree for a European exchange option (Rubinstein et al., 1979)

Both for a European option (as the exercise is at maturity).

The Black-Scholes-Merton option pricing model will be used here for practicality.

$$E_0 = A_0\, e^{-\delta_A T}\, N(d_1) - X_0\, e^{-\delta_X T} N(d_2) \tag{2.20}$$

$$d_1 = \frac{\ln\left(\frac{A_0\, e^{-\delta_A T}}{X_0\, e^{-\delta_X T}}\right) + \left(\frac{1}{2}\right)\sigma^2 T}{\sigma\sqrt{T}} = \frac{\ln\left(\frac{A_0}{X_0}\right) + \left[\delta_X - \delta_A + \left(\frac{1}{2}\right)\sigma^2\right] T}{\sigma\sqrt{T}} \tag{2.21}$$

$$d_2 = d_1 - \sigma\sqrt{T} \tag{2.22}$$

$$\sigma^2 = \sigma_A^2 + \sigma_X^2 - 2\rho\sigma_A\,\sigma_X \tag{2.23}$$

Therefore:

$$TV_o = TV + E_0 \quad (2.24)$$

where:

TV_o = the terminal value incorporating the option pricing model

TV = the terminal value as calculated with the perpetual growth rate or the exit multiple

E_0 = the value of the option with expiration in T years

A_0 = current value of the underlying asset

X_0 = the strike price (in t_0)

δ_A = rate of return shortfall for $A_0 = 0$

δ_X = rate of return shortfall for $X_0 = 0$

d_1 & d_2 = standard normal variables

$N(d_1)$ & $N(d_2)$ = cumulative normal probabilities

σ_A = volatility of A_0

σ_X = volatility of X_0

ρ = correlation between the rate of return of A_0 and X_0

σ = volatility between A_0 and X_0

Note that, unlike the standard model, the risk-free rate is replaced by the rate of return shortfall for X_0

In our model of option pricing for the TV. The following adjustments will be made in contrast to the variables explained beforehand:

E_0 = The value at t_0 of the right, but not the obligation, to invest in the growth opportunities occurring during the continuing value period

A_0 = value of growth opportunities at t_0 (VGO_0)

X_0 = value of invested capital at t_0 (VIC_0)

Note that T represent the lifespan of the project

where :

$$VGO_T = \frac{\left(\frac{g * NOPAT^{6}{}_{T+1}}{R}\right)}{R^{7} - g} \quad (2.25)$$

[6] NOPAT = Net Operating Profit After Tax (EBIT * (1-tax rate))
[7] R = WACC

$$VIC_T = \frac{NINV_{T+1}}{R - g} \tag{2.26}$$

where:

$$NINV_{T+1} = Capital\ Expenditure - Depreciation \tag{2.27}$$

$$NOPAT_t = (1 - r) * EBIT_t \tag{2.28}$$

Several pitfalls are inherent to the use of option pricing in this case :

(i) Volatility

The volatility is an essential part of the model. However, as those assets are not traded, the volatility of VGO and VIC is not publicly known for a private firm. We will, therefore, use the volatility of similar publicly traded firms.

(ii) Correlation and Beta

As private firms do not have publicly traded shares they do not have a beta (see WACC section for estimating the Beta). Moreover, the correlation between the VGO and the VIC might not be as precise as it would be for a public firm. Indeed, private firm commonly publishes financials yearly whereas it is commonly more frequent for public firms. This might render the estimation of the correlation less precise as less data is present.

2. Link with IPO valuation

Many newly public firms are valued on the financial market in term of growth opportunities rather than in term of accounting measures (e.g. companies having a market capitalization larger than their book value).

Wagner (2004) outlined a positive relationship between the return of a stock and the idiosyncratic risk of the company in the context of recent IPO firms. This finding is consistent with the notion that the equity of such companies is a contingent claim on the underlying assets. If the volatility of the value of the underlying were to increase, so would the value of the option, as well as the value and the volatility of the stock. Wagner also outlined that IPO aftermarket

returns distribution diverges from the distribution of the returns of more mature companies. Conditioning aftermarket returns of IPO firms on their specific risk (idiosyncratic risk) produce a lower statistical significance of abnormal return than using a standard approach. (the lower the better, so a link exists between abnormal and idiosyncratic risk) (as cited in Miller, 2018, p. 262).

Therefore, the TV calculated from the perpetual growth rate does not acknowledge the optionality of the growth opportunities available to the company. While the successive market prices are based on a two-stage valuation model that does acknowledge the optionality of the growth opportunities occurring during the continuing value period, this has been outlined by empirical studies which showed that abnormal returns up to two years after the IPO are positive while between three to five years these returns are negative.

This is why using such option pricing may be relevant in IPO pricing as this TV calculated from the European option pricing model does acknowledge the optionality of the growth opportunities available to the companies.

2.2.2.5. Weighted Average Cost of Capital (WACC)

The cash flows estimated in the DCF model must be discounted to reflect the current value of the business.

The WACC is used to estimate the appropriate discount rate for the company. The weighted average cost of capital is a way of estimating the average rate of return represented by all the actors that make up the company's capital. The actors that make up the capital of a company are the shareholders holding the equity and the holders of the debt (debt holders) (Pinto et al., 2010).

The WACC can be computed using the following formula :

$$WACC = \frac{E}{D+E}\, r_E + \frac{D}{D+E}\,(1-t)\, r_D \qquad (2.29)$$

where:

$\frac{E}{D+E}$ = the weight of equity financing

r_E = the (post-tax) cost of equity

$\frac{D}{D+E}$ = the weight of debt financing

t = the corporate tax rate

r_D = the (pre-tax) cost of debt

As we can see from the above formula, the mathematical expression of WACC is divided into two main categories.

On the one hand, the cost of equity, which is a means for the company to finance itself through the contribution of its shareholders. And on the other hand, the debts contracted with financial and banking institutions.

The actors of these two categories of the composition of the capital must be remunerated by the company according to the risk they take by investing or lending funds to it. This total remuneration is estimated using the WACC (Pinto et al., 2010).

a. The cost of equity

Investors, by investing capital in a company, will require a return adequate to the risks they bear. This return is difficult to evaluate because the expected rate is not estimated as a bank debt where the size and duration of the loan determine the rate. It depends on the return investors should receive for the risk they are bearing. The most common model among financial analysts that links risk and return on a financial asset is the Sharpe-Lintner Capital Asset Pricing Model (CAPM) (Sharpe, 1964; Lintner, 1965).

$$r_E = r_f + \beta_E \left(r_M - r_f\right) \tag{2.30}$$

where:

- r_f = the risk-free rate
- β_E = the beta of the company
- The market risk premium = $\left(r_M - r_f\right)$

1. r_f = the risk-free rate

A risk-free rate in a particular currency and for a particular period is the market interest rate for government bonds of countries considered creditworthy and intergovernmental organizations for the same currency and period.

The risk-free interest rate is the rate of return on a hypothetical investment that is expected to fulfil all payment obligations for a set period of time. Since the risk-free rate can be generated without risk, any other risky investment must have a larger rate of return to entice investors to buy it.

The risk-free rate is often considered as the 10 or 20 years government bond. For Belgium, this rate is referred to as the Belgian Government Bond 20 years (PwC, 2021).

2. The beta:

The β estimate is the central element in estimating the cost of equity. There are several ways to determine the β of a firm. The way to approach the question will depend on whether the firm is public or not.

If the firm is public the β can easily be found on any financial data provider (e.g. the Bloomberg terminal).

However, in the context of an IPO, the firm is private and there is, thus, no β provided. There are different ways to obtain the beta of a private firm. The two most used methods are (i) the "Bottoms-up" approach (ii) the approach based on an accounting beta (Feldman, 2005).

(i) The "Bottoms-up" approach

The "Bottoms-up" approach is also commonly referred to as the beta of comparable public firms. First, one must select comparable firms, these firms can emerge from the comparable technique explained beforehand (Section 2.1). Then the average beta of this sample must be taken. This will be the average levered beta (β_L) of our sample as it is not free of debt. To have a better analysis that is not influenced by the debt structure of the underlying companies, the unlevered beta (β_U) must be computed with the following formula:

$$\beta_U = \frac{\beta_L}{\left(1 + (1 - t) * \frac{D}{E}\right)} \tag{2.31}$$

Where D/E is the average debt-to-equity ratio of the comparable firms and t the average tax rate of these firms (Feldman, 2005).

Then from this unlevered beta, the beta of the private firm can be computed with the following formula:

$$\beta_{private\ firm} = \beta_U * (1 + (1 - t) * \frac{D}{E} \quad (2.32)$$

In this equation, the $\frac{D}{E}$ is the debt-to-equity ratio of the analysed firm.

However, the $\beta_{private\ firm}$ might not an adequate beta for a private firm. A further adjustment might need to be made.

The Sharpe-Lintner CAPM allows estimating the volatility of the company's cash flows. The estimated volatility will in turn make it possible to estimate the adequate remuneration awarded to the holders of the company's equity. The risk of a company comes from two different sources: the systematic risk from the market and the idiosyncratic risk (Sharpe, 1964; Lintner, 1965).

$$\sigma_{Total} = \sigma_j + \sigma_m \quad (2.33)$$

where:

- σ_{Total} = the total risk bared by the firm
- σ_j = the idiosyncratic risk (company-specific risk)
- σ_m = the systematic risk (market-specific risk)

One of the drawbacks of the CAPM is that, in this case, it considers the investment to be well-diversified and so that the idiosyncratic risk is reduced to zero, which is the case for a public company. However, a private company is generally owned by few shareholders or in some scenarios by a sole shareholder, who placed all or most of his/her wealth in the company. Therefore, the beta should be adjusted to reflect this poor diversification not accounted for by the CAPM (Feldman, 2005). This new beta will be called the total beta and can be found using the following formula:

$$Total\ beta = \frac{Market\ \beta}{\rho_{jm}} \quad (2.34)$$

Where the market β is the average beta of the peer companies mentioned beforehand. While ρ_{jm} is the correlation between these firms and the market.

However, this adjustment does not always have to be made while valuating a private firm, it depends on the purpose of this valuation. In the case of an IPO, this adjustment might not be

needed since the expected buyers of the new publicly traded firm will be market investors (Damodaran, 2012).

Livingston (2014) argues that adjustments (small size, poor diversification, and illiquidity) for the private firms' cost of equity estimated from the comparable firms might not be necessary. He established that such adjustments might not be needed if the firm is considered to be sold to a well-diversified investor. Shareholders, in the case of a firm going to be publicly traded, can be considered well-diversified. This, thus, implies that such adjustment might not be needed for firms undergoing an IPO.

Moreover, Damodaran (2009) argued that the illiquidity discount applied to firm pre-IPO might be too large, supporting our claim above that adjustments might not be necessary.

(ii) Accounting beta.

The accounting beta technique can also be used to obtain the beta of a private firm. In such a technique the change in historical accounting figure selected is regressed over the corresponding change in accounting figure of the company benchmark in which operates the company (e.g. the S&P 500 for the U.S. or the BEL20 for Belgium) (Feldman, 2005).

The regression can be expressed as follow:

$$\Delta\, Earnings_{private\ firm} = \alpha + \beta\, (\Delta\, Earnings_{S\&P500}) \qquad (2.35)$$

Note that :

- the benchmark is the benchmark of the market in which the company operates (the S&P500 is outlined as illustration purpose);
- several accounting figures can be used (the earnings are outlined for illustration purpose).

One of the major pitfalls of this technique is that private firms only disclose accounting data annually, limiting the statistical power of the regression. Moreover, accounting figures, such as earnings, are regularly smoothed out to depict the brightest possible side of the company. This can lead to error in the beta estimated.

Intrisano et al. (2017) argued while comparing the accounting beta calculated from the ROE, the Net Income, and the Operating Income, that most practitioners tend to use either the Net Income or the Operating Income. They also showed that the beta calculated from these two

techniques tend to be unstable. In addition, they argued that the beta calculated from the ROE yields the most suitable beta, although being the least used by practitioners. Nonetheless, the ROE contains net income that can be influenced by the company's management and budgetary policies.

To sum up, the accounting beta has numerous pitfalls that render its use both imprecise and inadequate in the scenario of an IPO. In addition, a company willing to make an IPO should tend towards its peers in the public market. These allow us to advise the use of the "bottom-up" approach to estimate the beta of the private firm.

3. *The market risk premium* $(r_M - r_f)$

The market risk premium represents the difference in expected returns if an investor investing in the financial market instead of keeping his investments in non-risky investments. The expected market return is estimated based on historical data of these returns. The riskier (i.e. volatile) a market is, the higher the expected return is (Sharpe, 1964; Lintner, 1965).

The market expected is commonly regarded as the return of the market benchmark (e.g. The BEL20 for Belgium or the S&P500 for the U.S.).

b. The (pre-tax) cost of debt

The pre-tax cost of debt formula is as follow:

$$r_D = r_f + default\ spread \tag{2.36}$$

where:

- r_D = the (pre-tax) cost of debt
- r_f = the risk free-rate
- The default spread being outsourced from the credit rating granted to the company

The problem with the cost of debt of a (private) company willing to make an IPO is that it does not generally have access to the publicly available debt financial option. Therefore, it does not have a credit rating and it renders the estimation of the cost of debt more difficult than a public

firm. Generally, the debt owned by a private company is sourcing from the bank and the interest rate paid by the company on these outstanding debts might not depict a comprehensive outlook of its debt financial capability today. There are, thus, several techniques to estimate to cost of debt of a private firm (Feldman, 2005). These are the two most commonly used:

(i) The first option is to consider that the studied company can contract debt at the same rate as its peers. Thus, to consider the average default rate of the peers' companies, detailed beforehand (Feldman, 2005). The cost of debt using this technique can be estimated as follow:

$$\text{Cost of Debt} = \text{Average Cost of Debt of the peers' companies} \tag{2.37}$$

(ii) The second option is to use the Interest Expense to Outstanding Debt ratio. This method might not always be accurate as some borrowing might have happened long in the past while the financial situation of the firm was different and hence the cost of debt would not be consistent with its current cost of debt (Feldman, 2005). The cost of debt using this technique can be estimated as follow:

$$\text{Cost of Debt} = \text{Interest Expense} / \text{Outstanding Debt} \tag{2.38}$$

Badertscher et al. (2017) found that the cost of debt of private firms is higher than that of public firms. This higher cost can mainly be explained by their higher difficulty in accessing debt capital market financing.

2.3. Dividend discount model

This valuation model was developed by Myron Gordon and Eli Shapiro in 1956. It is designed to value a company that pays dividends, and whose dividend increase (or decrease) follows a more or less regular pattern. According to a complete stable or multiple period patterns, two models can be used.

2.3.1. Gordon Growth Model (GGM)

a. What is the Gordon Growth Model (GGM)

The GGM follows the hypothesis that future dividends will have an infinite perpetual growth rate. It considers that the firm is in a steady business model. Therefore, this model is best suitable for mature firms, with relatively constant and large dividends as well as stable business growth and leverage; often referred to as 'blue-chip companies'. Example of such companies are regulated companies, major financial services, or real estate investment trusts (Damodaran, 2012).

$$V_0 = \frac{D_1}{(r - g)} \tag{2.39}$$

where:

- V_0 = intrinsic value of the stock at t_0
- D_1 = Forecasted/Expected dividend payment at t_1
- r = the appraised required rate of return of the equity investors (the cost of equity)
- g = the perpetual growth rate of the firm dividends

b. Limitations with this model?

A theoretical constant growth rate is possible, however, in practice, it is vastly improbable. Moreover, a slight change in one of the denominator can result in large variations (similarly to the TV estimated from the perpetual growth rate model in Section 2.2.2.4.). Therefore, it is important to obtain a precise discount and growth rate even though it was mentioned that such a rate is unlikely to be maintained constant forever.

Furthermore, the intrinsic value of the stock might result in a negative value if the growth rate is larger than the discount rate. Also, if both rates would be close to being equal the resulting value would approach infinity. Both cases scenarios are impossible.

Finally, the GGM solely includes the dividend payments and excludes other market variables, namely non-dividend considerations, which might result in the stock undervaluation using this model for example (Damodaran, 2012).

Consequently, despite the relatively accessible use of this model, it does not seem to depict a reliable picture of a company value. In addition, the discount and growth rate should be chosen wisely as they may influence the resulting value significantly.

2.3.2. Multiple-Period Dividend Discount Model

a. What is the Multiple-Period Dividend Discount Model?

This model is a variant of the GGM, it allows to take into consideration different growth rate to multiple periods within the valuation. Some inner variants are the two-period model and the three-period model. On the contrary to the GGM, the multiple-period model allows one to use multiple growth rates, that could correspond for example to the industry or the company business cycles. The most commonly used model is the two-period model valuation model which will be depicted here. This model takes into account more volatility in growth rate than the GGM. It is more suitable for companies with having in the first place variation in growth rates and a later stage a stable growth rate. As for the GGM, this model is best suited for companies with stable leverage and large dividends (Damodaran, 2012).

$$V_0 = \frac{D_1}{(1+r)} + \frac{D_2}{(1+r)^2} + \ldots + \frac{D_t}{(1+r)^t} + \frac{P_t}{(1+r)^t} \tag{2.40}$$

where :

- $P_t = \frac{P_t*(1+g_t)}{(r-g_t)}$ (2.41)
- r = the appraised required rate of return of the equity investors

- D_1 = Forecasted/Expected dividend payment at t_1
- g_t = the perpetual growth rate of the firm dividends after year t (at stage two)

b. Limitations with this model?

It may demonstrate a more proper intrinsic value of a company than the GGM. However, it similarly maintains some of the same drawbacks. On the one hand, assuming a later constant growth rate, even though it considers different stages of growth. And on the other hand, it does not take into account other factors than the dividends that might influence the value of the stock.

2.3.3. Link with IPO valuation

The dividend discount model has some flaws in its valuation in practice.
Young companies, as well as companies experiencing high growth, tend to retain their earnings rather than giving out dividends (firms experiencing an IPO are usually relatively young (Ritter, 2021)). Such firms are commonly valued with the multiple analysis of the DCF instead of the DDM. Moreover, not all firms undergoing an IPO are highly profitable (nor profitable at all; e.g. Uber), while the DDM is be suited for companies with large earnings and those paying out large (and stable) dividends. Moreover, the DCF produces the value of the company as a whole, while the DDM tends to outlines the value for the shareholders solely (Deloof et al., 2009).

In fact, the DDM presents a lower valuation outcome than the DCF or the comparable analysis (Penman & Sougiannis, 1998). Moreover, it has been outlined that of all the methods used to value an IPO the DDM is the method that undervalues the true value of the firm the most (Francis et al., 2000).

Investment bankers are aware that the DDM understates the value of the firm being valued (Deloof et al., 2009). This undervaluation might be caused by the fact that the DDM does not take into consideration non-operating assets (e.g. excess cash). Furthermore, in Belgium, as companies pay only a small portion of their Cash Flow as dividends and that the DDM considers solely the true dividends paid it is reasonable that this method understates the value of the firm and has a lower valuation outcome than the DCF. The latter method considers that all Cash

Flows are distributed to the investors while the Cash Flow dividend payout ratio is, on average in Belgium, of 38% (Erkan et al., 2016).

The Cash Flow dividend payout ratio is, on average in Belgium, 7% lower than the average ratio of the analysed countries (Erkan et al., 2016; Table 7.2). This might explain why the DDM understate the value of the firm compared to the DCF. And that this understatement is lower than other countries.
Note that this study analysis public firms. Unfortunately, the dividend payout of private firms received very little attention from academics. This is why this analysis is a good first step but has to be taken with caution as our study focuses on private firms.

Moreover, private firms tend to issue dividends shortly prior to their IPO for several reasons (e.g. saving costs in paying out dividends instead of selling secondary shares or awareness of the undervaluation of cash for public firms). This is why the dividend payout ratio for this window of time should not be considered for the valuation of the firms as it may be distorted (Martin & Zeckhauser, 2009).

In addition, according to the same study, of 4,227 firms undertaking an IPO in the U.S. between 1996 and 2006, a marginal portion pays out continuous dividends (125 firms out of 4,227 (≈ 3%)). While the DDM is best suited for companies paying continuous and constant dividends. The first does not seem to hold for most firms while the latter was not analysed but should hold for an even more marginal portion of firms.

According to Deloof, De Maeseneire, & Inghelbrech (2009), which analysed a sample of 49 IPOs on Euronext Brussels between 1993 and 2001, firms being valued with the DDM are older, larger (firm size in euro), and payout a median dividend of 30 % (dividend payout ratio). This dividend payout ratio is smaller than the one found by Erkan, Fainshmidt, & Judge (2016) (which analyzed public firms) by 10% which tends to confirm the idea that firms pursuing an IPO are not yet or not as mature as publicly-traded ones.

Moreover, this study confirmed the idea that the DDM is most suited for older firms, as the median age of the firms being valued with it is 3 times the median for the firms not using this

method. They also showed that, similarly to other studies on non-Belgian IPOs, the DDM understates the value of the firm and that the DCF and the multiple analysis gives the most accurate results.

These studies have several implications for the DDM while valuating a firm for IPO:

1. It is commonly accepted by investments bankers, in Belgium, as well as by academics, in general, that the DDM understates the value of the firms. Implying that in order to obtain the most reliable valuation outcome the DDM might not be particularly suited.
2. The DDM is best suited for companies with high constants dividends payout ratio. It has been argued that most firms undertaking an IPO do not pay out continuous dividends. This implies that the DDM might, in most cases, not be suited to value IPOs.
3. On a Belgian scope, the DDM seems to be the least used method out of the DCF and multiple analysis to value IPOs by underwriters. As outlined by academics and applied by practitioners the DDM shall rather be used for more mature firms. Similarly to other studies, the DDM was found to undervalue the firms as well as being less accurate than its two counterparts.

Therefore, the DDM might not be recommended to value an IPO. It might, however, be used in comparison with valuation outcomes yielded by other studies.

2.4. Economic Value Added (EVA)

2.4.1. Introduction EVA

a. What Is the Economic Value Added (EVA)?

Another method outlined by Roosenboom (2012) is the economic added value (EVA) valuation method.

Economic Value Added (EVA) is a metric dependent on the Residual Income methodology that acts as a gauge of a project or firm profitability. It seeks to capture a company's real economic profit. Its underlying assumption is that true profitability happens as profits are generated for shareholders and that it can generate returns that are higher than their cost of capital (Ehrbar, 1998).

There are two main methods to determine the EVA of a company (Ehrbar, 1998):

1. EVA = NOPAT - (Capital Invested * WACC) (2.42)

where:

- WACC = Weighted average cost of capital
- NOPAT = Net Operating Profit After Taxes

2. EVA = (Return on Capital - WACC) (Capital Invested) (2.43)

where:

- Return on Capital = $\frac{\text{Net operating profit after taxes (NOPAT)}}{\text{Capital Invested}}$
- Capital Invested = Book Value of Equity + Book Value of Debt

In order to compute the value of a firm using the EVA the following technique can be used (Damodaran, 2012):

Value of Firm = Value of Assets in Place + Value of Future Growth

Value of Firm = Capital Invested in Assets in Place + Present Value of EVA from Assets in Place + Sum of Present Value of EVA from new projects

$$\text{Value of Firm} = \left(I_A + \sum_{t=1}^{t=n} \frac{EVA_A}{(1 + WACC)^t}\right) + \left[\sum_{j=1}^{j=N} \left(\sum_{t=j1}^{t=jn} \frac{EVA_A}{(1 + WACC)^t}\right)\right] \quad (2.44)$$

where:

- I_A = Capital Invested in Assets in Place

Therefore, in theory, EVA and DCF should produce the same value of the firm as in their detailed development, both techniques need the same underlying data. However, in practice, some inerrant assessment renders such equality not typically the case (Damodaran, 2012).

b. Limitations of the EVA?

The EVA valuation method is not suitable for high growth companies or projects making substantial investments. In addition to companies having negative profits. Yet, some companies might have negative earnings while undergoing an IPO (e.g. Uber).

Also, two similar companies operating in two different countries with different accounting principles might have a different EVA because of their difference in capital invested. For certain comparisons, it might be difficult to obtain a "standardized" capital invested across countries.

In addition, many companies use their book value of equity and debt to measure their capital invested. However, such metric is dependant on the accounting choices made over time which may or may not accurately represent the value of their capital invested. This drawback may explain within practice the valuation with the DCF and the EVA may not be equal.

Moreover, the return on capital, measured on an accounting basis may not accurately depict the true return on capital of the company.

2.4.2. Link with IPO valuation

While valuing IPOs the economic value added method seems to be the least reliable valuation method among methods used by underwriters (among the CCA, DCF, DDM). It has the highest average absolute prediction error. It is also the method, among the four detailed beforehand,

which is the least commonly used, accounting for solely 6% of the proportion of the fair values of the firm. Additionally, the economic value-added method is identified as the method with the lowest explanatory power (Roosenboom, 2012).

Finally, the EVA valuation method seems to not be used by investment bankers to value IPOs in Belgium as it is not mentioned as a valuation method by Deloof et al. (2009).

Therefore, as this method performs poorly comparing to its peers and that it is marginally used by underwriters it seems to not be relevant to use during an IPO.

2.5. Sum-of-the-parts (SOTP)

The SOTP is a valuation technique that values a company by summing the value of its different segments valued individually. Different methods can be used to value its segment, such as the DCF or the multiple analysis explained beforehand.

This method is mainly used for companies having distinct lines of businesses or operating in multiple different industries (e.g. holdings or conglomerates). Therefore, it is not suited for companies operating in the same line of business or when the company does not disclose any information about its different segments (Demerens et al., 2016).

Although being a common method used by practitioners it has gathered very little attention from academics.
Financial analyst tends to use, in their valuation, more segment in comparison to the segment used in accordance to the IFRS 8[8]. They argued that this might be due to the analyst willingness to valuate the company at a higher price than what it would have been valued with fewer segments chosen. Moreover, if the SOTP valuation is used by the analyst it is often used as the primary method of valuation. The valuation used for each segment is usually based on earnings multiples (i.e. EBITDA). Analyst often uses other valuation methods coupled with the SOTP to value the firm entirely (Chlomou & Demirakos, 2020).

In theory, SOTP might be the best method to value a business with different distinct segments. However, they do not find empirical evidence to support this claim. In fact, Chlomou & Demirakos reported that the absolute forecast error and the missed forecast error is smaller for the DCF method used to value the company as a whole than the SOTP method.

In light of this finding, it might not be ideal to use the SOTP method. As outlined in the previously mentioned study, analysts might report too many segments which render this method less accurate than the DCF method. It might then be advised to use fewer segments than what practitioners tend to do and to use a number closer to what is reported under IFRS 8. Nevertheless, this method could be a good indicator of the company value and should, therefore, be used when deemed necessary and paired with other methods.

[8] IFRS 8 expects firms (most notably public ones) to publish information regarding their different segments of operation.

3. Valuation

3.1. Multiple Analysis

We first selected comparable firms according to Dittmann and Weiner (2005). According to this study, for Belgium, the selected firms yielding the lowest absolute prediction errors (whether the mean or median is used) are selected regarding similar ROA and from OECD countries.

However, as Multipharma does not have stable ROAs these last four years (Table 7.3), another selection criteria should be used. Therefore, the second-lowest selection criteria yielding the lowest absolute prediction errors (whether the mean or median is used) is selecting firms with similar Total Asset and operating in one of the OECD countries.
Finally, the selection criteria based on the same industry will also be used as it is commonly used by practitioners and it is also mentioned in Dittmann and Weiner (2005).
Accordingly, using the findings of Dittmann and Weiner (2005), the comparable pool yielding the lowest absolute prediction errors for the mean is the same country, while for the median it is the OECD. As no other publicly traded firms operate in the same industry in Belgium, the second-lowest absolute prediction errors for the mean will be used (OECD pool).
To sum up, we selected two pools of comparable firms from the OECD based on the same industry (as specified by the SIC code (591, Drug stores and proprietary stores)) and similar TA[9].

In addition, as mentioned in Cooper and Cordeiro (2008), we selected 10 firms as the optimal number of comparable firms to select for the retailing - goods - sector (Multipharma sector according to its Nace Code and Bureau Van Dijk) is 10. These firms can be found in Table 3.1. The first selection criterium was that the firms have to be active listed firms, this yielded 88,456 results. Then, that they have to be from an OECD country, this yielded 47,839 results. And finally, from the same industry (SIC Code 591), this yielded 42 results. From these firms, 10 firms were selected, with quite a similar asset, revenue and number of employees.

[9] The website Orbis Global from Bureau Van Dijk was used to find our pool of comparable firms.

Table 3.1

Companies Selected on the Basis of the Same Industry

	Company name	Country ISO code
1.	GREEN CROSS HEALTH LIMITED	NZ
2.	PHARMARISE HOLDINGS CORPORATION	JP
3.	MEDICAL IKKOU GROUP CO.	JP
4.	QOL HOLDINGS CO LTD	JP
5.	COSMOS PHARMACEUTICAL CORPORATION	JP
6.	CREATE SD HOLDINGS CO LTD	JP
7.	NIHON CHOUZAI CO LTD	JP
8.	CORPORATIVO FRAGUA, S.A.B. DE C.V.	MX
9.	AIN HOLDINGS INC	JP
10.	SUNDRUG CO LTD	JP

Note.
Own selection using Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global: www.orbis.bvdinfo.com

Secondly, for the selection of the firms regarding similar TA, the last step used in the previous search was replaced by a minimum TA value of 197,752,000 USD and a maximum of 201,747,000 USD. Which correspond to 99% and 101%, respectively, of Multipharma TA value in 2019. This search yielded 84 results.

We then selected the firms the closest to Multipharma TA value in 2019. Several firms were not selected for various reasons, because they had negative financial figures, or because they were operating in countries that were not yet part of the OECD at the time of study by Dittmann and Weiner (2005) (e.g. Israel).

We, thus, maintained 10 firms that can be found in Table 3.2.

Table 3.2

Companies Selected on the Basis of the Similar Total Asset

	Company name	Country ISO code
1.	APG SGA SA	CH
2.	LUDWIG BECK AM RATHAUSECK TEXTEILHAUS FELDMEIER AG	DE
3.	FOUNTAINE PAJOT	FR
4.	CAFE24 CORP.	KR
5.	CATERING INTERNATIONAL & SERVICES	FR
6.	GENIE MUSIC CORPORATION	KR
7.	DAEYANG PAPER	KR
8.	COLABOR GROUP INC.	CA
9.	DUROC AB	SE
10.	RAYENCE CO	KR

Note.
Own selection using Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global: www.orbis.bvdinfo.com

We then extracted the financial data of these firms from the Bloomberg Terminal in order to complete the comparable analysis (Table 7.4 & 7.6).

Then, we calculated the different ratios in order to perform the multiple analysis. These are (i) P/E (ii) P/E Forecasted[10] 12M (iii) P/CFO (iv) P/Revenue (v) P/Book (vi) EV/EBIT (vii) EV/EBITDA (viii) EV/Revenue (Table 7.5 & 7.7).

These ratios were then multiplied with their corresponding metric in 2019 for Multipharma.

The means and medians of the different values obtained for the P and the EV analysis of Multipharma are summarized in Table 3.3.

Table 3.3

Multiple Valuation Outcome using the Two Set of Comparable Firms

		Valuation firms similar TA	Valuation firms same Industry
	Thous. €	FY19	FY19
		EV	EV
Average	EV from EBIT	-33,628.76	-25,265.8
Median	EV from EBIT	-22,823.55	-19,277.5
Average	EV from EBITDA	71,696.69	58,113.5
Median	EV from EBITDA	53,636.36	52,715.8
Average	EV from Revenue	497,739.26	221,193.2
Median	EV from Revenue	294,300.98	203,400.7
		P	P
Average	P from E forecasted	107,387.2	85,775.7
Median	P from E forecasted	97,373.0	70,953.3
Average	P from CFO	6,457.9	4,444.0
Median	P from CFO	5,109.2	3,835.6
Average	P from Revenue	475,931.6	213,227.8
Median	P from Revenue	368,943.1	207,617.2
Average	P from Book	202,536.7	143,926.6
Average	P/E	118,549.7	140,847.2
Median	P/E	-129,965.5	-116,149.1

Note.
Own selection using Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global: www.orbis.bvdinfo.com

Although literature mentions the (forecasted) P/E as being the ratio yielding the most accurate value, for Multipharma it yielded a low and a negative valuation outcome respectively. This may indicate that this ratio is not constantly best suited for all firms undergoing an IPO.

[10] Also referred as Forward.

Accordingly, other ratios might be used with a greater proportion for firms with marginal or negative earnings.

3.2. DCF

3.2.1. Forecasted FCF:

In order to estimate the FCFF for next years for Multipharma, we first had to forecast its revenue. Multipharma revenue growth rate these four last years was not quite stable (Table 3.4), rendering the use of historical performances delicate.

Table 3.4

Multipharma Revenue and Revenue Growth Rate Between 2016 & 2019

Thous. €	**2016**	**2017**	**2018**	**2019**
Revenue	426,869	435,362	461,663	451,245
YoY growth %		*2.0%*	*6.0%*	*-2.3%*

Note.
Own calculation using Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global: www.orbis.bvdinfo.com

Therefore, we decided to analyse the performances of similar firms within the Belgian market. There are 98 pharmacies[11] (including Multipharma) with financials disclosed on the Orbis platform. Out of these firms, we noticed that Multipharma is a leader in the market with more or less one-third of all the market share, for a total of €1.47BN (in term of revenue).
We analysed the sum of the revenues of these 97 firms (thus excluding Multipharma) year-over-year compared to Multipharma revenue. We showed that the correlation between these firms and Multipharma revenue fluctuation was 68% (Table 7.8).

Out of these 97 pharmacies, six have financials disclosed for 2020 enabling us to estimate the industry growth rate for 2020. We calculated the average growth rate for these firms which was 3.53% between 2019 and 2020 (Table 7.9).

[11] 4773 - Dispensing chemist in specialised stores (as in Orbis)

After, we computed the correlation between the revenues fluctuations year-over-year of these six firms and of Multipharma for previous years, which was 67% (Table 7.10). This indicates that there is a fairly high correlation between these firms and Multipharma revenue fluctuations previous years and that the growth rate for 2020 might be a good indicator of Multipharma growth rate in 2020.

To estimate the growth rate after 2020 we estimated the historical growth rate of firms in the same industry. We first did the average of all companies growth rate (except Multipharma) year-over-year and the average of the 2-year growth rate (Table 7.11), which were 5.6% and 9.44% respectively.

Multipharma decrease in 2019

One of the main reasons why Multipharma revenue decreased in 2019 was because of the selling of its "magasins iU" branch which totalled 22 stores out of the 263 stores owned by Multipharma. Although Multipharma sold 22 stores, the total number of stores owned by Multipharma decreased from 272 to 263 (a decrease of 9 stores) in 2019 (Multipharma Group, 2019; Multipharma Group, 2020)

If all stores were of equal revenue, a decrease of 22 stores would be equivalent to a decrease in 8% revenue, while a decrease of 9 stores of 3.3%. However, Multipharma decrease in revenue for the fiscal year 2019 was 2.3% solely. Which seems to be fairly good compared to its decrease in total stores. This might indicate Multipharma resilience and revenue growth in general despite a decrease in locations.

General market overview

Belgium is one of the countries in Europe having the most pharmacies per inhabitants, with a growth of about 20% last 15 years (OECD, 2017).

Moreover, according to STATBEL (2018), the growth rate of the average drug's sales per inhabitant in Belgium has increased by 62.38% from 2012 until 2018, with continuous growth during this period (Table 7.12).

These might indicate that the market growth rate and opportunities in Belgium for Multipharma are quite flourishing.

Forecasted revenues:

Therefore, for 2020, the growth rate used was the growth rate found for the companies having financials disclosed for 2020, the correlation between them and Multipharma was quite high for the previous revenues fluctuations. Moreover, this lower rate (compared to those found for previous years) seems to be in line with the economic situation in 2020.

Finally, for further years we will use the average between the forecasted revenue with the one-year industry average and the two-year industry average (Table 3.5).

After 2024, a rate slightly higher than the TV growth rate will be used, namely 2%.

Table 3.5

Multipharma Forecasted Revenue Growth rate Between 2020 and 2024 and its underlying computation

Thous. €	**2020**	**2021**	**2022**	**2023**	**2024**
Revenue	**467,174.322**	**493,601.930**	**508,027.017**	**545,333.580**	**561,407.758**
YoY growth %	3.53%	5.66%	2.92%	7.34%	2.95%
Revenue 1 year growth	**467,174.322**	**493,348.395**	**520,988.905**	**550,178.013**	**581,002.479**
YoY growth %	3.53%	*5.6%*	*5.6%*	*5.6%*	*5.6%*
Revenue 2 years growth		**493,855.465**	**495,065.129**	**540,489.147**	**541,813.037**
2 years average		*9.4%*	*9.4%*	*9.4%*	*9.4%*

Note.
Own calculation using data from Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global: www.orbis.bvdinfo.com

Forecasted components of the FCFF:

The growth rate of the different components of the FCFF being unstable (Table 7.13), rendering the forecast of these figures more difficult.

We, thus, used another technique to estimate these components. We calculated the proportion of each of these underlying figure over Multipharma revenue. These proportions were more stable than their growth rate rendering the analysis more accessible.

Therefore, for each forecasted year, each of these components was calculated as a percentage of the revenue (Table 7.14).

Tax

As mentioned in Damodaran (2012), the tax rate used for the forecasted period will be the marginal tax rate, being 25% in Belgium.

3.2.2. WACC:

In order to estimate the WACC of Multipharma we first obtained certain data of our two pools of comparable firms. Their Beta, Short Term Debt, Long Term Debt, Equity, D/E ratio, Cost of debt after-tax, Effective Tax Rate, and Total Pre-Tax Cost of Debt; which can be found in Table 7.15 & 7.16.

a. The cost of equity

1. The risk-free rate : r_f & The market risk premium $(r_M - r_f)$

According to Fernandez et al. (2020), the average risk-free rate and the market risk premium used by professionals in Belgium in 2019 were 1.2% and 6.2%, respectively. While they were 0.9% and 6.2% in 2020, respectively.

In addition, PwC (2021) recommends using the Belgium 20 Year Government Bond as a risk-free rate. This rate was relatively similar to the rate expressed in Fernandez et al. (2020) (National Bank of Belgium, 2021).

Therefore, the rates mentioned in Fernandez et al. (2020) will be used in our analysis.

2. Beta

We first estimated the average Beta of our two comparable pool of firms. As some other metrics (such as the cost of debt, and several ratios) from the comparable firms selected on the basis of similar TA were depicting an imagine more analogous to Multipharma, we used the average beta from this pool of firms. We also estimated the average effective tax rate and debt to equity ratio of these firms.

This estimated, median, Leveraged Beta was 0.94, the effective tax rate of 25.77%, and the D/E ratio of 0.5 (Table 7.17).

We were, then, able to compute the Unleveraged Beta with equation (2.31), using the median tax rate and D/E ratio, being of 0.5, of these firms in 2019.

Finally, we calculated the Beta of Multipharma using equation (2.32) and Multipharma marginal tax rate (25%) as well as its D/E ratio in 2019.

We, thus, obtained a Beta of 1.24 (using the median, Table 7.18).

As mentioned, beforehand, further adjustments are not deemed necessary for a firm willing to make an IPO (Livingston, 2014; Damodaran, 2009).

Finally, using the risk-free rate and the market risk premium mentioned beforehand we calculated the cost of equity for Multipharma using the equation (2.30).
We found a cost of equity of 8.90% (Table 7.19).

b. Cost of debt

The (pre-tax) cost of debt for Multipharma was estimated using the two methods depicted beforehand.
First, we calculated the average (pre-tax) cost of debt of our two samples of comparable firms. The information about the (pre-tax) cost of debt for each firm can be found in Table 7.20 and have been summarized in table 3.6.

Table 3.6

Average and Median Cost of debt (pre-tax) in 2019 for our Two Pools of Comparable

	Cost of debt (pre-tax) 2019	
	Firms selected on the basis of the same industry	Firms selected on the basis of the similar Total Asset
Average	*0.19%*	*0.67%*
Median	*0.00%*	*0.70%*

Note.
Own calculation using data from Bloomberg L.P. (2021). Retrieved 04 03, 2021, from SFU Bloomberg Terminal.

We then estimated the cost of debt for Multipharma using equation (2.38).

Table 3.7

Interest-Expense-to-Outstanding-Debt ratio and Cost of Debt between 2016 & 2019

Thous. €	**2016**	**2017**	**2018**	**2019**
Interest Expense	174.065	196.255	391.960	552.784
Debt	63,035.250	68,792.933	101,671.435	88,481.572
	0.28%	**0.29%**	**0.39%**	**0.62%**

Note.
Own calculation using data from Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global: www.orbis.bvdinfo.com

The cost of Debt of the comparable firms selected on the basis of the TA is relatively similar to Multipharma cost of debt found in Table 3.7.
We, thus, used the median cost of debt of the firms with similar TA.

We, then, estimated the WACC of Multipharma using equation (2.29) (Table 3.8).
This estimated WACC, 8.74%, seems to be in line with PwC WACC for the retail sector of around 8.5%.

Table 3.8

Multipharma Estimated WACC in 2019

2019				
Cost of Equity			*Cost of Debt*	
Cost of equity	8.90%		Cost of debt	0.70%
Equity to Debt ratio	0.92		Debt to Equity ratio	1.09
			Tax rate	25.00%
2019				
WACC = 8.74%				

Note.
Own calculation using data from Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global: www.orbis.bvdinfo.com

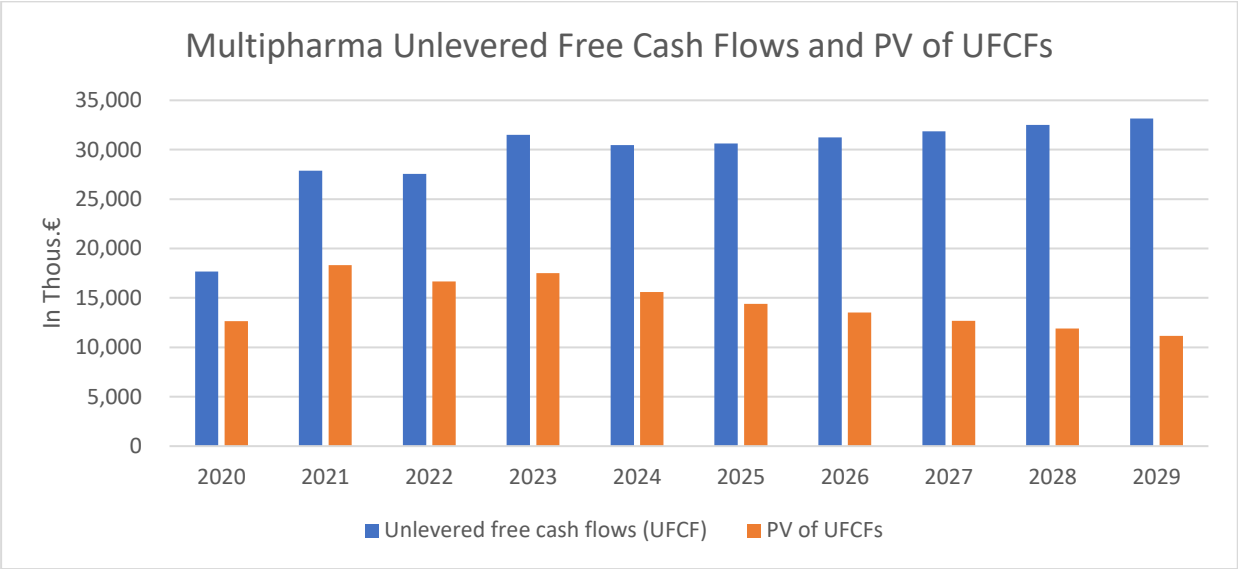
3.2.3. FCFF

Using the Forecasted financials and Multipharma WACC we estimated its FCFF[12] and its discounted FCFF between 2020 and 2029 (Table 3.1). Each underlying components used in the computation of the FCFF can be found in Tables 7.21 to 7.25.

[12] FCFF = UFCF

Figure 3.1

Multipharma Estimated Unlevered Free Cash Flow and PV of UFCFs between 2020 and 2029



Note.
PV = present value (discounted UFCFs)
Own calculation using data from Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global: www.orbis.bvdinfo.com

3.2.4. TV

a. TV growth rate

The GDP growth rate should be used as the TV growth rate. According to the National Bank of Belgium (2021), it is 1.8% in 2019, -6.3% in 2020, and -1% in Q1 2021. Regarding the current economic situation in 2020 and 2021, rendering these years quite unstable, it is more suited to use the 2019 growth rate.

The growth rate of 1.8% will, therefore, be used.

With the perpetual growth rate method, we calculated a TV of 163,591,000

We, then, performed a sensitivity analysis in order to have an idea of the total valuation with a slightly lower and high growth rate as well as WACC (Table 7.26).

b. TV exit multiple

We, also, used the exit multiple technique to estimate the TV of Multipharma. The EV/EBITDA ratio used was the average of the median for the comparable firms operating in the same industry and having similar TA[13] in 2019, namely 6.69x (Tables 7.5 & 7.7).
From this method, we obtained a TV of 47,970,000
We, then, performed a sensitivity analysis in order to have an idea of the total valuation with a slightly lower and high growth rate as well as WACC (Table 7.27).

c. TV option pricing

While applying the methodology used in Miller (2018) the first step is to determine whether the firm has a competitive advantage for existing operations and in the growth opportunities or not.

As mentioned in this study the firm can be in three different states:
The firm has no competitive advantage or disadvantage for existing operations and:

- has no competitive advantage or disadvantage for growth opportunities (10%)
- has a substantial competitive advantage for growth opportunities (12%)
- has a substantial competitive disadvantage for growth opportunities (8%)

With the first one having a growth rate equivalent to the market growth rate, the second one slightly higher and the last one slightly lower.

While analysing Multipharma revenue growth, operating charges and investments compared to its peers, it does not seem to have a competitive advantage nor disadvantage. Therefore, the growth rate used will be similar to the industry rate (as explained in the revenue growth section beforehand).

We can now compute each component to calculate the TV as in Miller (2018). Note that accounting figures are now expressed in Thous. EURO.

[13] As both ratio were quite similar

The explicit forecast period is assumed to be 10 years.
The (TV) book value of capital at the end of the explicit forecast period is assumed to be 47,970 for the exit multiple method and 163,591,000 for the perpetual growth rate method.
The VGO was calculated using equation (2.25) and yielded a result, in 2020, of 74,592.45
The VIC was calculated using equation (2.26) and yielded a result, in 2020, of 9,978.69
The growth rate for the continuing value period is assumed to be 1.8%.
For all of the alternatives examined, the annual risk-free rate is assumed to be 1.2% in 2019 the annual rate of return for the market portfolio is assumed to be 22.7% in 2019 for BEL20
The beta for the rate of return for each cash flow is assumed to be 1.24
WACC the cost of capital for each cash flow is 8.74%,
The standard deviation for the annual rate of return for the market portfolio is assumed to be 0.11 (11%)
The standard deviation for the annual rate of return for each cash flow is assumed to be 0.26 (26%)

Calculation annual rate of return market portfolio

We first obtained the daily price of the BEL20 in 2019 and then calculated the daily rate of return, which we averaged to obtain the average rate of return for 2019.

Calculation Volatility and correlation:

As Multipharma is not publicly traded we decided to estimate the volatility (Standard Deviation) of this firm through its comparable peers. From the historical price of the Market Benchmark (BEL20) and of the comparable firms in 2019 we estimated the annual volatility of these. We, then, averaged the volatility of the ten comparable firms to obtain the estimated volatility of Multipharma.
In addition, the beta used was the beta of the comparable firms in the same industry. We, then, were able to calculate the correlation between the rate of return for J and M.
for the market

$$\rho_{J,M} = \beta_J \left[\frac{\sigma(R_M)}{\sigma(R_J)}\right] \tag{3.1}$$

where:

- $\rho_{J,M}$ = correlation between J and the market benchmark

Note that according to this study the volatility of J (VGO) and K (VIC) is equal, so are their correlation with the benchmark (M).
We were thus able to estimate the correlation between J and the market benchmark, which was 0.194 (19.4%).
Then, we estimated the correlation between the rates of return for J and K:

$$\rho(R_j, R_k) \tag{3.2}$$

Which, we calculated by computing the correlation between the rate of return between VIC_t and VGO_t, which gave a correlation of 0.246 (24.6%) (Table 7.28).

With all these figures we then estimated the correlation between the error terms for the rates of return for cash flows J and K.

$$\rho(R_j, R_k) = \rho_{J,M} * \rho_{K,M} + \rho(e_J, e_K) * \sqrt{1 - \rho_{J,M}^2} * \sqrt{1 - \rho_{K,M}^2} \tag{3.3}$$

Which was not needed for further calculation but was useful to estimate in order to assess if it was correctly in the [-1;1] bound as specified by the study. We found a value of 0.22, which is in line with the study.

We then estimated the variance and the volatility between A_0 and X_0, which we found to be equal to 0.205 and 0.453, respectively.

$$\sigma^2 = \sigma_A^2 + \sigma_X^2 - 2\rho\sigma_A\,\sigma_X \tag{3.4}$$
$$\sigma^2 = 0.099$$
$$\sigma = 0.316$$

With all these data we were able to calculate E_0, being the value of the option with expiration in T years, which is of 64,518.88 (Table 3.9).

Table 3.9

Calculation of the Value of the Option with Expiration in T years

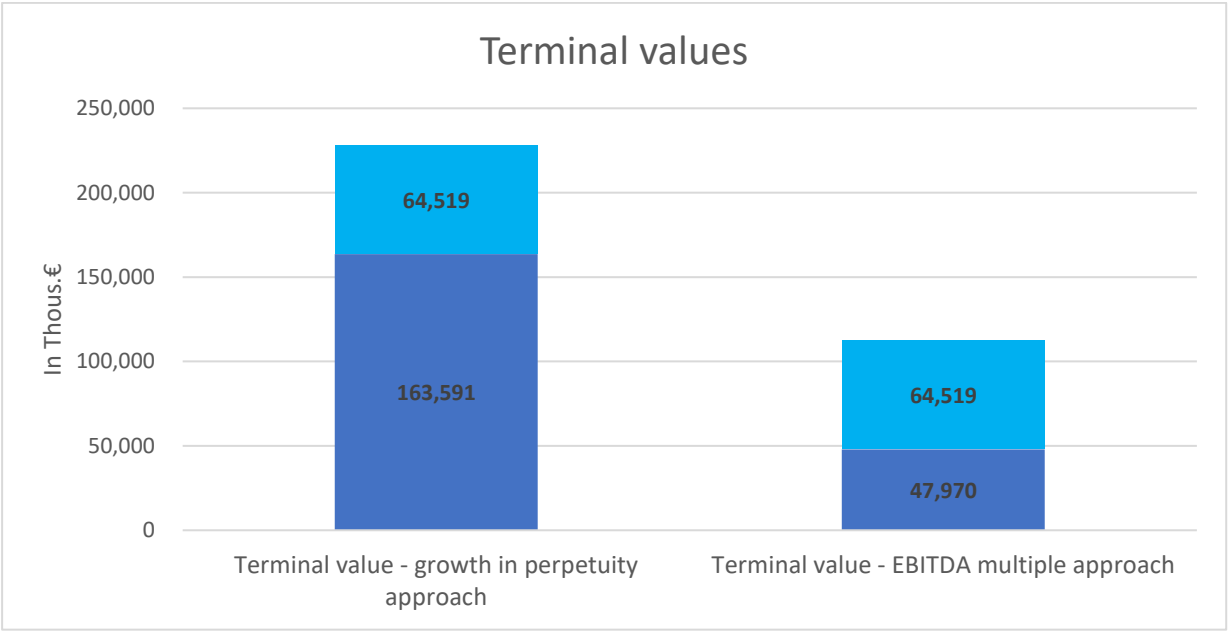
$A_0 = VGO_T$	74,592.45				
$X_0 = VIC_T$	9,978.69	$\sigma\sqrt{T}$	$\ln\left(\frac{A_0}{X_0}\right)$	$\delta_X - \delta_A + \left(\frac{1}{2}\right)\sigma^2$	$e^{-\delta_A T}$
T	10	0.99914371	2.011587	1.024961	1
σ	0.31595698				
δ_A	0		d1	2.01331114	
δ_X	0		d2	1.01416743	
σ^2	0.20499225				
σ_A	0.25731049		$N(d_1)$	0.97795905	
σ_X	0.25731049		$N(d_2)$	0.84474857	
		E_0	**€64,518.88 Thous.**		

Note.
Own calculation using data from Bloomberg L.P. (2021). Retrieved 04 03, 2021, from SFU Bloomberg Terminal & from Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global: www.orbis.bvdinfo.com

The value of the option with expiration in T years will then be summed with teach TV computed from the two previously outlined methods (Figure 3.2)

Figure 3.2

Multipharma Estimated Exit Multiple & Perpetual Growth rate TV Added With the Option Pricing



Note.
Own calculation using data from Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global: www.orbis.bvdinfo.com

3.2.5. Total value DCF

We then calculated the equity value of Multipharma from its EV from equation (2.11), by subtracting Multipharma Short-Term & Long-Term Debt and adding its Cash & Cash-Equivalents from its EV.

We, thus, obtained two distinct outcomes for the EV and Equity value calculation depending on each TV method being used (Table 3.10).

Table 3.10

Total DCF Valuation for the EV and the Equity Value

Thous. €		
Stage 1: Sum of present values	144,384	
	Terminal value - growth in perpetuity approach	**Terminal value - EBITDA multiple approache**
Stage 2: PV of TV	163,591	47,970
E_0	64,518.88	
TV_o	276,080	160,459
Enterprise value (stage 1 + 2)	307,975	192,354
Enterprise value (stage 1 + 2 + E_0)	*372,494*	*256,873*
Less: Total Debt:	87,169	
∟ *Short-Term Debt*	*63,909*	
∟ *Long-Term Debt*	*23,259*	
Plus: Cash & Cash-Equivalents:	7,578	
Equity value	228,384	112,763
Equity value with E_0	*292,903*	*177,282*

Note.
Own calculation using data from Bloomberg L.P. (2021). Retrieved 04 03, 2021, from SFU Bloomberg Terminal & from Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global: www.orbis.bvdinfo.com

3.3. DDM

Multipharma paying out no dividends, the DDM will not be used to value it.

3.4. EVA

As it is commonly not used by investment bankers in general and according to Deloof et al. (2009) not used at all by investment bankers in Belgium to value an IPO, we did not calculate the EVA of Multipharma. Moreover, as mentioned in Damodaran (2012), the company valuation outcome should be equal to the DCF (in theory). These render the use of the EVA both in a practical and theoretical view fruitless.

3.5. Sum-of-the-parts (SOTP)

The SOTP valuation method tends to be used for companies operating in multiple segments, which according to its financial statements does not appear to be the case for Multipharma. In addition, as mentioned beforehand, this method does not seem to yield better valuation result than other techniques. It will, therefore, not be used.

3.6. Total valuation

We first estimated the EV of Multipharma using the CCA, with different ratios, and the DCF method (Table 3.11).

Table 3.11

Multipharma EV Estimated Using the CCA & DCF Methods

Thous. €	EV from EBIT	EV from EBITDA	EV from Revenue	DCF Perpetual growth rate	DCF exit multiple
Average	-33,628.76	71,696.69	497,739.26	292,903	177,282
Median	-22,823.55	53,636.36	294,300.98		

Note.
Both DCF methods include the option pricing value
Own calculation using data from Bloomberg L.P. (2021). Retrieved 04 03, 2021, from SFU Bloomberg Terminal & from Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global: www.orbis.bvdinfo.com

We, then, estimated the EV of Multipharma using the CCA, with different ratios, and the DCF method (Table 3.12).

Table 3.12

Multipharma Equity Value (P) Estimated Using the CCA & DCF Methods

Thous. €	P from E forecasted	P from CFO	P from Revenue	P from Book	P/E	DCF Perpetual growth rate	DCF exit multiple
Average	113,461.9	6,457.9	475,931.6	202,536.7	-129,965.5		
Median	102,881.3	5,109.2	368,943.1	118,549.7	-93,547.0	*292,903*	*177,282*
Average of median	**196,791.34**						

Note
Both DCF methods include the option pricing value.
The average median is the average of the medians of the P from E forecasted, P from Revenue, and P from Book.
Own calculation using data from Bloomberg L.P. (2021). Retrieved 04 03, 2021, from SFU Bloomberg Terminal & Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global: www.orbis.bvdinfo.com

The ratio using the earnings and the CFO will not be used as they are unstable (large fluctuations for previous years earnings and CFO for Multipharma). However, we noticed that the value given by the average of the medians of the three other ratios used (P/E forecasted, P/Revenue, and P/B) is similar to the value obtained from the DCF using the Exit multiple approaches and the Option pricing value. This might confirms what Wagner (2004) outlined, that the market acknowledges the optionality of the growth opportunities available to the company and that using the option pricing proposed by Miller (2018) allows an analyst to price this optionality while valuation a firm through the DCF method.

Finally, taking the percentage used in Roosenboom (2012), we were able to estimate Multipharma total Equity Value and EV (Table 3.13).

Table 3.13

Multipharma Equity Value (P) and EV estimated

Thous. €	P					
	P from E forecasted	P from Revenue	P from Book	DCF exit multiple		
Median	102,881.3	368,943.1	118,549.7	*177,282*		
Percentage used	29.62%	20%	9.52%	40.41%	**Total Equity Value**	**188,847.79**
					Plus: Total Debt:	87,169
					Less: Cash & Cash-Equivalents:	7,578
					EV	**268,438.84**

Note.
The DCF method includes the option pricing value
The percentage use is as referred in Roosenboom, P. (2012, February 8). Valuing and pricing IPOs. *Journal of Banking & Finance, 36*, p. 1657.
Own calculation using data from Bloomberg L.P. (2021). Retrieved 04 03, 2021, from SFU Bloomberg Terminal & from Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global: www.orbis.bvdinfo.com

We started our valuation estimate using the Equity Value (P) instead of the EV as the CAA valuation method accounts for a large portion of the valuation and that more ratios were available to be used to estimate P rather than EV which would tend to render its valuation more accurate. We found Multipharma Equity Value to be equal to 188,847.79.

Then using equation (2.11) we estimated Multipharma EV which we found to be equal to 268,438.84. this value is found to be quite similar to the EV obtained through the DCF method using the Exit Multiple and the Option pricing value.

This valuation outlined several facts:

1. For an investor willing to value an IPO, with no additional financial data than the financials publicly available, the DCF valuation is rendered difficult (i.e. the forecasting of each component).
2. The value found with CCA & the DCF seems to be quite similar at the end while accounting for the option pricing model detailed by Miller (2018). This might indicate

that the market acknowledges the optionality of the growth opportunities available to the company.

3. The DDM is not suited for this valuation and might not be the best-suited option for an IPO valuation.
4. The EVA & SOTP methods are not suited for this valuation and might not be the best-suited option for an IPO valuation.
5. Although the (Forecasted) P/E is mainly used in literature, it might be difficult to implement it as many companies undergoing an IPO have negative, marginal or unstable earnings. We, also, noticed that the P/E forecasted was in our case more suited than the P/E as outlined in the literature.
6. Selecting firms on the basis of similar TA rather than the same industry seemed to yield a better result as mentioned in the literature.

4. Conclusion

Throughout this thesis, we analysed several methods in order to assess the value of a firm willing to make an IPO. We outlined the different drawbacks of each of them and the solutions offered by the literature to overcome them as well as using the best technique in each underlying method in order to yield the most accurate value of the firm.

We outlined that the CCA, DCF, and the DDM are the most commonly used methods. We also argued that the CCA yields the most accurate result and that the DDM is the method yielding the largest biases (as well as a persistent undervaluation).

We argued that the CCA is the most reliable method followed by the DCF method. Although the literature argues that the (Forecasted) P/E ratio is the ratio yielding the less biased results, we argued that this ratio might be unsuitable for many firms willing to make an IPO (in case of negative, marginal or unstable earnings). Therefore, in practice, this ratio should be used with various other ratios outlined in this thesis.

Moreover, although being the method the most commonly used by underwriters in Belgium, the DCF has several pitfalls that might render its use delicate in practice. Various techniques have been outlined to, in practice, being able to exploit the DCF method to value a firm willing to make an IPO (e.g. cost of capital and TV calculations). Most notably, we introduced the use of the option pricing model to value the optionality of the growth opportunities that are not accounted for by common DCF models. In the valuation of Multipharma, we noticed that the use of this technique yielded a value relatively closer to the CCA valuation outcome. This might indicate that the use of the option pricing model might, indeed, account for this opportunity that is priced by the market.

Moreover, in addition to undervaluing the true value of a firm, the DDM seems to be unsuitable for most firms willing to make an IPO.

Finally, the use of the EVA and SOTP methods have been outlined to be fruitless or yielding unreliable valuation outcomes, rendering their use fruitless and imprecise in such a scenario.

5. Limitations

Several limitations are to be outlined in this present thesis.

First, numerous other ratios might have been incorporated in the CCA valuation methods. Their use might generate a better or worse outcome in a firm valuation. Such industry-specific ratios might be extremely important to use for certain firms valuations.

In addition, the valuation of the firm was pursued with no information from its management, rendering its valuation for the DCF method delicate. This, however, enables us to outline the difficulty for an analyst willing to value a firm, with the DCF method, with no more information than publicly available ones.

Moreover, in addition to the difficulties in the intrinsic valuation of a firm, various regulatory challenges arise from an IPO which might place a larger burden upon the underwriters or the company.

Finally, this thesis limited to the challenges in valuating the intrinsic value of a firm that wants to make an IPO. As highlighted in the beginning, this intrinsic value will not be the final pricing of an IPO. The challenges in pricing determination of an IPO might be relevant to analyse in order to help firms obtain the largest profit from their IPO as well as the highest short and long term returns.

6. Bibliography

Andreas, A. (2017). Analysis of Operating Cash Flow to Detect Real Activity. *International Journal of Economics and Financial Issues, 7*(1), pp. 524-529.

Badertscher, B. A., Givoly, D., Katz, S. P., & Lee, H. (2017, August 3). Private Ownership and the Cost of Public Debt: Evidence from the Bond Market. *Columbia Business School Research Paper No. 17-80*. Retrieved from https://ssrn.com/abstract=3012015

Black, F., & Scholes, M. (1973, May - Jun.). The Pricing of Options and Corporate Liabilities. *Journal of Political Economy, 81*(3), pp. 637-654. Retrieved from https://www.jstor.org/stable/1831029

Bloomberg L.P. (2021). Retrieved 04 03, 2021, from SFU Bloomberg Terminal.

Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global: www.orbis.bvdinfo.com

Cervellati, E. M. (2012). ANALYSTS' DISTORTED VALUATION OF HI-TECH STOCKS. *Corporate Ownership & Control, 10*(1), pp. 380-395.

Chipeta, C. (2016, June 30). Post IPO dynamics of capital structure on the Johannesburg Stock Exchange. *South African Journal of Business Management, 47*(2). doi:https://doi.org/10.4102/sajbm.v47i2.57

Chlomou, G., & Demirakos, E. (2020). How do financial analysts implement the Sum-of-the-Parts (SOTP) valuation framework? *International Review of Financial Analysis, 70*. doi:https://doi.org/10.1016/j.irfa.2020.101514

Cooper, I. A., & Cordeiro, L. (2008). *Optimal Equity Valuation Using Multiples: The Number of Comparable Firms.*

Credit Suisse. (2016, August 4). Global Airlines. *Equity Research*. Retrieved from https://plus.credit-suisse.com/rpc4/ravDocView?docid=V6eBJr1AF-WElY95

Damodaran, A. (2006). *Damodaran on Valuation : Security Analysis for Investment and Corporate Finance* (2nd ed.). New York, United States: John Wiley & Sons Inc.

Damodaran, A. (2009, June 12). Valuing Young, Start-Up and Growth Companies: Estimation Issues and Valuation Challenges. Retrieved from https://ssrn.com/abstract=1418687

Damodaran, A. (2012). *Investment Valuation: Tools and Techniques for Determining the Value of Any Asset.* New York: Wiley.

Deloof, M., De Maeseneire, W., & Inghelbrecht, K. (2009, January/March). How Do Investment Banks Value Initial Public Offerings (IPOs)? *Journal of Business Finance & Accounting, 36*(1 & 2), pp. 130–160.

Demerens, F., Delvaille, P., Le Manh, A., & Paré, J.-L. (2016, December 14). The Use of Segment Information by Financial Analysts and Forecast Accuracy: A Study on European Intermediate-Size Companies. pp. 595-612. doi:https://doi.org/10.1002/tie.21881

Dittmann, I., & Weiner, C. (2005, January 6). *Selecting Comparables for the Valuation of European Firms.* Berlin: Humboldt University.

Dudley, E., & James, C. M. (2013, November 11). Capital-structure changes around IPOs. doi:http://dx.doi.org/10.2139/ssrn.2334795

Ehrbar, A. (1998). *EVA: the real key to creating wealth.* New York: Wiley.

Engelen, P.-J. (2003). Underpricing of IPOs : Belgian evidence. *European review of economics and finance, 2*(1), pp. 53-69.

Engelen, P.-J., & van Essen, M. (2010). Underpricing of IPOs: Firm-, issue- and country-specific characteristics. *Journal of Banking & Finance, 34*(8), pp. 1958–1969. doi:https://doi.org/10.1016/j.jbankfin.2010.01.002

Erkan, A., Fainshmidt, S., & Judge, W. Q. (2016, April 13). Variance decomposition of the country, industry, firm, and firm-year effects on dividend policy. *International Business Review, 25*, pp. 1309–1320.

Feldman, S. J. (2005). *Principles of Private Firm Valuation.* Hoboken, New Jersey: John Wiley & Sons.

Fernandez, P., de Apellániz, E., & Acín, J. F. (2020, Mar. 25). Survey: Market Risk Premium and Risk-Free Rate used for 81 countries in 2020. *IESE Business School Working Paper No. WP-1244-E*. Retrieved from https://ssrn.com/abstract=3560869

Francis, J., Olsson, P., & Oswald, D. R. (2000, Spring). Comparing the Accuracy and Explainability of Dividend, Free Cash Flow, and Abnormal Earnings Equity Value Estimates. *Journal of Accounting Research, 38*(1), pp. 45-70.

Frank, R., & Volker, H. (2003, 07). Pricing with Performance-Controlled Multiples. *Schmalenbach business review, 4*(3), pp. 194-219. Retrieved from https://ssrn.com/abstract=312129

How, J., Lamb, J., & Yeoc, J. (2007). The use of the comparable firm approach in valuing Australian IPOs. *International Review of Financial Analysis, 16*(2), pp. 99-115. doi:https://doi.org/10.1016/j.irfa.2006.09.003

Intrisano, C., Palomba, G., Di Nallo, L., & Calce, A. (2017, December). Accounting Beta: Which Measure Is the Best? Findings from Italian Market. *European Journal of Economics, Finance and Administrative Sciences*. Retrieved from http://www.europeanjournalofeconomicsfinanceandadministrativesciences.com

Kapla, S. N., & Ruback, R. S. (1995). The valuation of cash flow forecasts: an empirical analysis. *Journal of Finance, 50*(4), pp. 1059–1093. Retrieved from https://www.jstor.org/stable/2329344

Kim, M., & Ritter, J. R. (1999, September). Valuing IPOs. *Journal of Financial Economics, 53*(3), pp. 409-437. doi:https://doi.org/10.1016/S0304-405X(99)00027-6

Lintner, J. (1965, Dec.). Security Prices, Risk, and Maximal Gains From Diversification. *The Journal of Finance, 20*(4), pp. 587-615. Retrieved from https://www.jstor.org/stable/2977249

LIU , K. (2002). *CAPITAL STRUCTURE OF FIRMS AFTER AN INITIAL PUBLIC OFFERING (IPO).* Bielefeld : Universität Bielefeld.

Liu, J., Nissim, D., & Thomas, J. K. (2000, August). Equity Valuation Using Multiples. doi:https://dx.doi.org/10.2139/ssrn.241266

Livingston, L. S. (2014). Finding The Discount Rate For a Private Firm Using Public Comparables . *Review of Business and Finance Studies, 5*(1), pp. 37-49.

Martin, J., & Zeckhauser, R. J. (2009). Pre-IPO Dividend Puzzle. *Finance International Meeting AFFI - EUROFIDAI*.

McInnis, J., & Collins, D. W. (2011, April). The effect of cash flow forecasts on accrual quality and benchmark beating. *Journal of Accounting and Economics, 19*(1), pp. 219-239. doi:https://doi.org/10.1016/j.jacceco.2010.10.005

McLaney, E., & Atril, D. (2019). *Financial Accounting for Decision Makers* (9th ed.). Pearson.

Miller, T. W. (2018, June). Terminal values for firms with growth opportunities: explaining valuation and IPO price behavior. *Studies in Economics and Finance, 35*(2), pp. 244-272. doi:10.1108/SEF-03-2016-0078

Mills, R. W. (2005, April 08). Assessing Growth Estimates in IPO Valuations—A Case Study. *Journal of Applied Corporta Finance, 17*(1), pp. 73-78. doi:https://doi.org/10.1111/j.1745-6622.2005.021_1.x

MULTIPHARMA. (2016). *COMPTES ANNUELS ET AUTRES DOCUMENTS À DÉPOSER EN VERTU DU CODE DES SOCIÉTÉS.* Bruxelles: Registre des personnes morales (RPM) - Tribunal de Commerce de Bruxelles.

MULTIPHARMA. (2017). *COMPTES ANNUELS ET AUTRES DOCUMENTS À DÉPOSER EN VERTU DU CODE DES SOCIÉTÉS.* Bruxelles: Registre des personnes morales (RPM) - Tribunal de Commerce de Bruxelles.

MULTIPHARMA. (2018). *COMPTES ANNUELS ET AUTRES DOCUMENTS À DÉPOSER EN VERTU DU CODE DES SOCIÉTÉS.* Bruxelles: Registre des personnes morales (RPM) - Tribunal de Commerce de Bruxelles.

MULTIPHARMA. (2019). *COMPTES ANNUELS ET AUTRES DOCUMENTS À DÉPOSER EN VERTU DU CODE DES SOCIÉTÉS.* Bruxelles: Registre des personnes morales (RPM) - Tribunal de Commerce de Bruxelles.

Multipharma Group. (2019). *Rapport Annuel 2018.* Anderlecht .

Multipharma Group. (2020). *Rapport Annuel 2019.* Anderlecht.

National Bank of Belgium. (2021, 04 12). *Quarterly and annual aggregates : GDP growth*. Retrieved from National Bank of Belgium Online Statistics : https://stat.nbb.be/index.aspx?queryid=3038

National Bank of Belgium. (2021). *Yield of Belgian loans on the secondary market*. Retrieved 04 10, 2021, from National Bank of Belgium Online Statistics : https://stat.nbb.be/Index.aspx?DataSetCode=IROLOBE2

OECD. (2017). Pharmacists and pharmacies. In *Health at a Glance 2017: OECD Indicators.* Paris: OECD. doi:https://doi.org/10.1787/health_glance-2017-69-en

Penman, S. H., & Sougiannis, T. (1998). Comparison of Dividend, Cash Flow, and Earnings. *Contemporary Accounting Research, 15*(3), pp. 343–383.

Pinto, J. E., Henry, E., Robinson, T. R., Stowe, J. D., & Rath, R. D. (2010). *Equity Asset Valuation* (2nd ed.). (C. Institute, Ed.) Hoboken, New Jersey: John Wiley & Sons, Inc.

Purnanandam, A. K., & Swaminathan, B. (2004, Autumn). Are IPOs Really Underpriced? (O. U. Press, Ed.) *The Review of Financial Studies, 17*(3), pp. 811-848.

PwC. (2021). *Documentation Costs of Capital*. Retrieved April 03, 2021, from PwC eValuation Data: https://evaluation-data.pwc.be/documentation/

Reis, P. M., & Augusto, M. G. (2013, December). The Terminal Value (TV) Performing in Firm Valuation: The Gap of Literature and Research Agenda. *Journal of Modern Accounting and Auditing, 9*(12), pp. 1622-1636.

Ritter, J. R. (2021). *Initial Public Offerings: Updated Statistics.* University of Florida, Warrington College of Business. Gainesville: Cordell Eminent Scholar, Eugene F. Brigham Department of Finance, Insurance, and Real Estate.

Roosenboom, P. (2007, December 01). How do underwriters value IPOs? An empirical analysis. *Contemporary Accounting Research, 24*(4), pp. 1217-1243. doi:https://doi.org/10.1506/car.24.4.7

Roosenboom, P. (2012, February 8). Valuing and pricing IPOs. *Journal of Banking & Finance, 36*, pp. 1653–1664.

Roychowdhury, S. (2006, December). Earnings management through real activities manipulation. *Journal of Accounting and Economics, 42*(3), pp. 335-370. doi:https://doi.org/10.1016/j.jacceco.2006.01.002

Rubinstein, M., Cox, J. C., & Ross, S. A. (1979, September). Option pricing: A simplified approach. *Journal of Financial Economics, 7*(3), pp. 229-263. doi:https://doi.org/10.1016/0304-405X(79)90015-1

Service public fédéral Finance. (2017, July 27). *Réforme de l'impôt des sociétés.* Brussels: Service public fédéral Finance. Retrieved from PwC: https://finances.belgium.be/sites/default/files/downloads/121-reforme-isoc-2018.pdf

Sharpe, W. F. (1964). Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk. *The Journal of Finance, 19*(3), pp. 425-442. Retrieved from https://www.jstor.org/stable/2977928

STATBEL. (2018). *BUDGET DES MÉNAGES - PLUS DE CHIFFRES.* Brussels: Service Public Fédéral Belge. Retrieved 04 12, 2021, from https://statbel.fgov.be/fr/themes/menages/budget-des-menages/plus

Vismara, S., Signori, A., & Paleari, S. (2014, April 28). How Do Underwriters Select Peers When Valuing IPOs? *Financial Management Association International, 43*(4), pp. 731-755. doi:https://doi.org/10.1111/fima.12060

Wagner, N. (2003, December). Time-Varying Moments, Idiosyncratic Risk, and an Application to Hot-Issue IPO Aftermarket Returns. *Research in International Business and Finance, 18*(1), pp. 59-72. Retrieved from https://ssrn.com/abstract=280356

7. Appendix

Table 7.1

The Optimal Number of Comparable Firms to Select Across Various Industries

	The optimal number of comparable firms to select
Finance & Loans	10
Financial Services	10
Savings & Loans	5
Banking	5
Insurance	10
Investments	10
Drugs	10
Hospital Supplies	10
Hospitals	10
Biotechnology	10
Medical Supplies	10
Services to Medical Prof.	10
Clothing	All
Cosmetics	All
Food Processors	All
Beverages	All
Communications	10
Leisure	All
Retailing - Foods	10
Retailing - Goods	10
Industrial Services	10
Undesignated Cons. Serv.	10
Auto Part Manufacturing	10
Home Building	All
Home Furnishings	10
Airlines	10
Trucking	All
Computer Manufacturers	10
Electronics	5
Software & EDP Services	5
Other Computers	5
Semiconductors - Components	5
Electronic Systems - Devices	5
Office/Comm. Equip	10
Building & Related	All
Chemicals	10
Forest Products	10
Steel	All

Precious Metals	All
Defence Cap. Goods	10
Electrical	10
Machinery	5
Building Materials	All
Multi-Ind Cap. Goods	10
Defence Electronics	10
Electrical Utilities	10
Gas Utilities	All
Telephone Utilities	All

Note. The optimal value was selected on the basis of the most optimal mean absolute deviation (MAD) (as the mean-squared error (MSE) gave similar results).
All = all industry (in the same pool of comparable (e.g. same industry or similar TA)
Reproduced from Cooper, I. A., & Cordeiro, L. (2008). *Optimal Equity Valuation Using Multiples: The Number of Comparable Firms.* p. 22.

Table 7.2

Mean Dividend Payout Ratios by Country & the Percentage Deviation From the Average

Country	N	Cash-flow (%)	% higher/lower than average
Korea (South)	6679	18	-40%
India	1206	18	-40%
Bulgaria	62	18	-40%
Russia	225	19	-37%
Croatia	37	20	-33%
France	2359	21	-30%
Denmark	318	21	-30%
United States	5494	21	-30%
Switzerland	584	23	-23%
Spain	311	25	-17%
Sri Lanka	438	25	-17%
Germany	1385	25	-17%
Norway	150	25	-17%
Netherlands	317	25	-17%
Indonesia	922	26	-13%
Italy	631	26	-13%
Poland	471	27	-10%
Philippines	194	27	-10%
Pakistan	753	27	-10%
Malaysia	3350	28	-7%
Mexico	163	28	-7%
Belgium	**267**	**28**	**-7%**
United Kingdom	3585	28	-7%

Singapore	2084	29	-3%
South Africa	346	29	-3%
Vietnam	1533	30	0%
Hong Kong	335	30	0%
Nigeria	142	31	3%
Canada	953	32	7%
Sweden	884	33	10%
Thailand	2267	34	13%
Taiwan	7311	34	13%
China	14,407	34	13%
Turkey	442	34	13%
Kuwait	173	35	17%
Peru	184	35	17%
United Arab Emirates	91	35	17%
Finland	598	37	23%
Australia	1922	38	27%
Israel	527	39	30%
Kenya	63	39	30%
Oman	97	40	33%
Jordan	196	43	43%
Egypt	477	44	47%
Morocco	149	45	50%
New Zealand	172	46	53%
Saudi Arabia	242	48	60%
Grand Mean	65,496	30	

Note.
Sample of public firms between 2001-2011
Reproduced from Erkan, A., Fainshmidt, S., & Judge, W. Q. (2016, April 13). Variance decomposition of the country, industry, firm, and firm-year effects on dividend policy. *International Business Review*, 25, p. 1312

Table 7.3

Multipharma ROA Using Net income (%) Between 2016 and 2019

	2016	2017	2018	2019
ROA using Net income (%)	1.89	-33.55	1.40	-3.35

Note.
From Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global: www.orbis.bvdinfo.com

Table 7.4

Market and Financial Data of Firms Selected on the Basis of Similar Total Asset in 2019

				Market Data		Financial Data					
	Company name	Company code	Currency	**Market Cap**	**EV**	**Revenue**	**Earnings (Net income)**	**EBITDA**	**EBIT**	**Cash from Operations (CFO)**	**Book value**
				FY19	***FY19***	***FY19***	***FY19***	***FY19***	***FY19***	***FY19***	***FY19***
1	APG SGA SA	APGN SW	M CHF	852.000	810.588	320.187	41.835	61.409	51.318	49.837	77.143
2	LUDWIG BECK	ECK GR Equity	M€	100.504	206.607	80.077	3.456	12.928	6.998	7.874	61.640
3	FOUNTAINE PAJOT	ALFPC FP Equity	M€	162.691	164.567	216.349	13.173	29.625	20.760	28.404	52.504
4	CAFE24 CORP.	042000 KS Equity	BN KRW	482.847	478.774	217.245	6.470	23.091	9.837	20.287	152.268
5	CATERING INTERNATIONAL & SERVICES	CTRG FP Equity	M€	104.234	89.622	265.725	5.467	16.841	10.130	14.677	59.380
6	GENIE MUSIC CORPORATION	043610 KS Equity	BN KRW	203.558	125.315	230.469	7.040	12.872	8.127	2.916	152.686
7	DAEYANG PAPER	006580 KS Equity	BN KRW	71.498	105.654	259.450	24.487	41.443	32.720	32.239	147.174
8	COLABOR GROUP INC.	GCL CN Equity	M CAD	57.956	133.876	665.959	8.328	27.859	18.254	31.456	100.103
9	DUROC AB	DURCB SS Equity	M SEK	1,088.100	1,182.600	2,974.400	90.030	148.800	97.200	70.800	950.000
10	RAYENCE CO	228850 KS	BN KRW	208.508	134.663	126.175	17.555	30.495	22.836	9.453	194.275

Note.

Own calculation using data from Bloomberg L.P. (2021). Retrieved 04 03, 2021, from SFU Bloomberg Terminal & from Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global: www.orbis.bvdinfo.com

Table 7.5

Ratios of Firms Selected on the Basis of Similar Total Asset in 2019

	Company name	P/E	P/E Forward 12M	P/CFO	P/Revenue	P/Book	EV/EBIT	EV/EBITDA	EV/Revenue
		FY19	***FY19***	***FY19***	***FY19***	***FY19***	***FY19***	***FY19***	***FY19***
1	APG SGA SA	852.000	810.588	320.187	41.835	61.409	51.318	49.837	77.143
2	LUDWIG BECK	100.504	206.607	80.077	3.456	12.928	6.998	7.874	61.640
3	FOUNTAINE PAJOT	162.691	164.567	216.349	13.173	29.625	20.760	28.404	52.504
4	CAFE24 CORP.	482.847	478.774	217.245	6.470	23.091	9.837	20.287	152.268
5	CATERING INTERNATIONAL & SERVICES	104.234	89.622	265.725	5.467	16.841	10.130	14.677	59.380
6	GENIE MUSIC CORPORATION	203.558	125.315	230.469	7.040	12.872	8.127	2.916	152.686
7	DAEYANG PAPER	71.498	105.654	259.450	24.487	41.443	32.720	32.239	147.174
8	COLABOR GROUP INC.	57.956	133.876	665.959	8.328	27.859	18.254	31.456	100.103
9	DUROC AB	1,088.100	1,182.600	2,974.400	90.030	148.800	97.200	70.800	950.000
10	RAYENCE CO	208.508	134.663	126.175	17.555	30.495	22.836	9.453	194.275
	Average	***21.82x***	***24.31x***	***17.78x***	***1.05x***	***2.53x***	***15.48x***	***9.02x***	***1.10x***
	Median	***15.71x***	***22.04x***	***14.07x***	***0.82x***	***1.48x***	***10.51x***	***6.75x***	***0.65x***

Note.

Own calculation using data from Bloomberg L.P. (2021). Retrieved 04 03, 2021, from SFU Bloomberg Terminal & from Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global: www.orbis.bvdinfo.com

Table 7.6

Market and Financial Data of Firms Selected on the Basis of the Same Industry in 2019

				Market Data		Financial Data					
	Company name	Company code	Currency	**Market Cap**	**EV**	**Revenue**	**Earnings (Net income)**	**EBITDA**	**EBIT**	**Cash from Operations (CFO)**	**Book value**
				FY19	***FY19***	***FY19***	***FY19***	***FY19***	***FY19***	***FY19***	***FY19***
1	GREEN CROSS HEALTH LIMITED	GXH NZ Equity	M NZD	140.290	182.247	567.236	16.105	36.930	28.499	29.451	133.943
2	PHARMARISE HOLDINGS	2796 JP Equity	BN JPY	4.740	4.403	51.728	0.135	1.863	0.640	0.895	5.619
3	MEDICAL IKKOU GROUP CO.	3353 JP Equity	BN JPY	17.270	23.118	31.222	0.672	1.893	1.043	0.517	9.552
4	QOL HOLDINGS CO	3034 JP Equity	BN JPY	58.067	67.009	144.783	3.937	11.167	7.050	5.773	39.017
5	COSMOS PHARMACEUTICAL CORPORATION	3349 JP Equity	BN JPY	339.761	334.614	611.137	18.873	37.733	24.775	34.379	126.289
6	CREATE SD HOLDINGS CO LTD	3148 JP Equity	BN JPY	148.627	117.043	286.299	10.108	17.687	14.241	13.435	76.889
7	NIHON CHOUZAI CO	3341 JP Equity	BN JPY	56.224	107.779	245.687	3.458	14.524	6.733	13.572	41.073
8	CORPORATIVO FRAGUA	FRAGUAB MM Equity	M MXN	23,862.064	24,960.168	61,884.200	1,707.256	3,751.468	3,027.628	2,157.195	13,929.266
9	AIN HOLDINGS INC	9627 JP Equity	BN JPY	313.184	277.434	275.596	9.437	24.153	16.067	14.788	103.922
10	SUNDRUG CO LTD	9989 JP Equity	BN JPY	356.527	286.480	588.069	24.196	43.475	35.233	31.091	171.055

Note.

Own calculation using data from Bloomberg L.P. (2021). Retrieved 04 03, 2021, from SFU Bloomberg Terminal & from Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global: www.orbis.bvdinfo.com

Table 7.7

Ratios of Firms Selected on the Basis of the Same Industry in 2019

	Company name	P/E	P/E Forward 12M	P/CFO	P/Revenue	P/Book	EV/EBIT	EV/EBITDA	EV/Revenue
		FY19	***FY19***	***FY19***	***FY19***	***FY19***	***FY19***	***FY19***	***FY19***
1	GREEN CROSS HEALTH LIMITED	8.71x	N.A.	4.76x	0.25x	1.05x	6.39x	4.93x	0.32x
2	PHARMARISE HOLDINGS	35.01x	N.A.	5.30x	0.09x	0.84x	6.88x	2.36x	0.09x
3	MEDICAL IKKOU GROUP CO.	25.71x	N.A.	33.44x	0.55x	1.81x	22.16x	12.21x	0.74x
4	QOL HOLDINGS CO	14.75x	15.46x	10.06x	0.40x	1.49x	9.50x	6.00x	0.46x
5	COSMOS PHARMACEUTICAL CORPORATION	18.00x	25.16x	9.88x	0.56x	2.69x	13.51x	8.87x	0.55x
6	CREATE SD HOLDINGS CO LTD	14.70x	N.A.	11.06x	0.52x	1.93x	8.22x	6.62x	0.41x
7	NIHON CHOUZAI CO	16.26x	11.29x	4.14x	0.23x	1.37x	16.01x	7.42x	0.44x
8	CORPORATIVO FRAGUA	13.98x	12.23x	11.06x	0.39x	1.71x	8.24x	6.65x	0.40x
9	AIN HOLDINGS INC	33.19x	35.69x	21.18x	1.14x	3.01x	17.27x	11.49x	1.01x
10	SUNDRUG CO LTD	14.73x	16.66x	11.47x	0.61x	2.08x	8.13x	6.59x	0.49x
	Average	***19.5x***	***19.42x***	***12.23x***	***0.47x***	***1.80x***	***11.63x***	***7.31x***	***0.49x***
	Median	***15.5x***	***16.06x***	***10.56x***	***0.46x***	***1.76x***	***8.87x***	***6.64x***	***0.45x***

Note.
Own calculation using data from Bloomberg L.P. (2021). Retrieved 04 03, 2021, from SFU Bloomberg Terminal & from Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global: www.orbis.bvdinfo.com

Table 7.8

Revenue of Multipharma and Other Pharmacies in Belgium and Their Correlation between 2016 & 2019

	FY16	FY17	FY18	FY19
	Multipharma			
Revenue	426,869,174	435,362,851	461,663,791	451,245,361
	Without Multipharma			
Revenue	885,083,642	898,300,249	942,517,320	1,018,786,608
Correlation	**68%**			

Note.
Own selection and calculation using data from Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global: www.orbis.bvdinfo.com

Table 7.9

Revenue and Revenue Growth Rate between 2019 and 2020 of Six Pharmacies in Belgium

Company name	Revenue 2019	Revenue 2020	Revenue growth	
LES PHARMACIES RURALES	6,383,897	6,498,644	1.80%	
ENVERGURE INVEST	1,243,997	1,802,977	44.93%	
PHARMACIE DUFRASNE	1,209,469	1,290,504	6.70%	
PHARMACIE D'ARENBERG	788,765	743,127	-5.79%	
APOTHEEK VERONIQUE DOCHY	644,570	662,404	2.77%	
MONSOON	109,021	77,149	-29.23%	
Sum	10,379,719	11,074,805	***3.53%***	***Average***

Note.
Pharmacies in Belgium having financials disclosed in 2020 and being available on Orbis Global
Own selection and calculation using data from Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global: www.orbis.bvdinfo.com

Table 7.10

Revenue and Revenue Growth Rate between 2016 and 2019 for Multipharma and Six Pharmacies

	FY16	FY17	FY18	FY19
	Multipharma			
Revenue	426,869,174	435,362,851	461,663,791	451,245,361
	Six firms			
Revenue	8,762,013	2,770,917	12,681,731	10,379,719
Correlation revenue	**67%**			

Note.
The six pharmacies represent the pharmacies in Belgium having financials disclosed in 2020 and being available on Orbis Global
Own selection and calculation using data from Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global: www.orbis.bvdinfo.com

Table 7.11

Revenue Growth Rate of Pharmacies in Belgium Between 2012 and 2019

	FY12	**FY13**	**FY14**	**FY15**	**FY16**	**FY17**	**FY18**	**FY19**
YoY growth rate	*-5.56%*	*2.71%*	*7.31%*	*3.39%*	*11.30%*	*1.49%*	*4.92%*	*8.09%*
Average	**5.60%**							
	2013-2011	2014-2012	2015-2013	2016-2014	2017-2015	2018-2016	2019-2017	
2 years growth	*-3.01%*	*10.21%*	*10.95%*	*15.08%*	*12.96%*	*6.49%*	*13.41%*	
Average	**9.44%**							

Note.
Pharmacies in Belgium having financials disclosed in 2020 and being available on Orbis Global.
Own selection and calculation using data from Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global : www.orbis.bvdinfo.com

Table 7.12

Average Drugs Expenditure per Person per Year in Belgium (€)

	Average expenditure per person per year (€)			
	2012	2014	2016	2018
Drugs	121	123	193	197
YoY growth		*1.45%*	*56.77%*	*2.09%*
2012-2018 growth				***62.38%***

Note.
Own calculation using data from STATBEL. (2018). *BUDGET DES MÉNAGES - PLUS DE CHIFFRES*. Brussels: Service Public Fédéral Belge. Retrieved 04 12, 2021, from https://statbel.fgov.be/fr/themes/menages/budget-des-menages/plus

Table 7.13

Various Financial Metrics for Multipharma and Their Growth rate Between 2016 & 2019

	FY16	**FY17**	**FY18**	**FY19**
Depreciation and amortisation	13,845.60	14,426.25	6,503.55	10,116.80
YoY growth rate		4.19%	-54.92%	55.56%
Change in Net Working Capital	40,623.84	- 2,024.23	- 3,043.74	- 4,071.84
YoY growth rate		-104.98%	50.37%	33.78%
Gross Capex	108,420.45	- 28,863.13	35,842.42	9,579.45
YoY growth rate		-126.62%	-224.18%	-73.27%

Note.
Own calculation using data from Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global: www.orbis.bvdinfo.com

Table 7.14

Various Financial Metrics for Multipharma and Their Proportion over Revenue Between 2016 & 2019

	FY16	**FY17**	**FY18**	**FY19**	Average
Depreciation & Amortization	13,845,603.22	14,426,245.87	6,503,546.28	10,116,800.68	
% of revenue	*3.24%*	*3.31%*	*1.41%*	*2.24%*	*2.55%*
Current assets	102,228,290.31	100,025,976.46	112,610,658.75	97,721,061.27	
% of revenue	*23.95%*	*22.98%*	*24.39%*	*21.66%*	*23.24%*
Current liabilities	60,589,609.70	60,411,530.54	76,039,955.32	65,222,200.51	
% of revenue	*14.19%*	*13.88%*	*16.47%*	*14.45%*	*14.75%*
Fixed assets	94,575,173.50	51,285,800.78	80,624,678.63	80,087,325.57	
% of revenue	*22.16%*	*11.78%*	*17.46%*	*17.75%*	*17.29%*

Note.
Own calculation using data from Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global: www.orbis.bvdinfo.com

Table 7.15

Beta, Debt, Equity, and Cost of Debt Analysis in 2019 for Comparable Firms Selected on the Basis of the Similar Total Asset

Firms selected on the basis of the similar Total Asset										
			Debt & Equity					Cost of debt 2019		
Company Name	Currency	**β 2019**	ST Debt 2019	LT Debt 2019	Debt 2019	Equity 2019	**D/E 2019**	Cost of debt after tax (%)	Effective Tax rate (%)	**Total Pre-Tax Cost of Debt (%)**
APG SGA SA	BN KRW	**0.412**	0.0	0.4	0.4	77.1	**0.45%**	-0.5%	18.07%	**-0.47%**
LUDWIG BECK	M€	**-0.039**	16.6	90.2	106.7	61.6	**173.17%**	-0.2%	25.96%	**-0.15%**
FOUNTAINE PAJOT	BN KRW	**0.623**	0.0	41.8	41.8	52.5	**79.61%**	-0.40%	32.85%	**-0.40%**
CAFE24 CORP.	BN KRW	**1.064**	12.1	14.9	27.0	152.3	**17.73%**	1.70%	19.58%	**1.52%**
CATERING INTERNATIONAL & SERVICES	M CAD	**0.083**	13.1	23.4	36.5	61.5	**59.36%**	0.00%	39.40%	**0.01%**
GENIE MUSIC CORPORATION	M SEK	**0.834**	1.0	6.4	7.4	152.7	**4.87%**	1.80%	21.96%	**1.63%**
DAEYANG PAPER	BN KRW	**11.162**	27.2	26.6	53.8	147.2	**36.54%**	1.70%	19.80%	**1.34%**
COLABOR GROUP INC.	BN KRW	**2.262**	8.4	67.5	75.9	100.1	**75.84%**	1.70%	25.77%	**1.61%**
DUROC AB	M€	**0.305**	370.9	104.8	475.7	950.0	**50.07%**	0.10%	1.91%	**0.05%**
RAYENCE CO	BN KRW	**1.042**	5.7	9.7	15.4	194.3	**7.90%**	1.40%	34.25%	**1.55%**

Note.
Own selection and calculation using data from Bloomberg L.P. (2021). Retrieved 04 03, 2021, from SFU Bloomberg Terminal.

Table 7.16

Beta, Debt, Equity, and Cost of Debt Analysis in 2019 for Comparable Firms Selected on the Basis of the Same Industry

Firms selected on the basis of the same industry										
			Debt & Equity					Cost of debt 2019		
Company Name	Currency	**β 2019**	ST Debt 2019	LT Debt 2019	Debt 2019	Equity 2019	**D/E 2019**	Cost of debt after tax (%)	Effective Tax rate (%)	**Total Pre-Tax Cost of Debt (%)**
GREEN CROSS HEALTH LIMITED	M NZD	**-0.376**	25.556	23.563	49.119	133.943	**36.67%**	1.80%	26.76%	**1.80%**
PHARMARISE HOLDINGS	BN JPY	**0.67**	2.959	8.224	11.183	5.619	**199.02%**	0.00%	60.00%	**-0.06%**
MEDICAL IKKOU GROUP CO.	BN JPY	**-0.441**	3.724	7.43	11.154	9.552	**116.77%**	0.00%	39.07%	**0.00%**
QOL HOLDINGS CO	BN JPY	**1.425**	9.442	19.461	28.903	39.017	**74.08%**	0.00%	44.60%	**-0.04%**
COSMOS PHARMACEUTICAL CORPORATION	BN JPY	**0.54**	3.177	10.698	13.875	**126.3**	**10.99%**	-0.10%	29.31%	**-6.00%**
CREATE SD HOLDINGS CO LTD	BN JPY	**0.945**	0	0	0.000	76.889	**0.00%**	0.00%	30.23%	**0.00%**
NIHON CHOUZAI CO	BN JPY	**0.191**	17.045	64.255	81.300	41.073	**197.94%**	0.00%	44.04%	**-0.05%**
CORPORATIVO FRAGUA	M MXN	**-0.047**	1,784.2	1,668.7	3452.966	**13,929.3**	**24.79%**	6.10%	35.15%	**6.82%**
AIN HOLDINGS INC	BN JPY	**0.44**	5.888	6.386	12.274	103.922	**11.81%**	0.00%	42.01%	**0.00%**
SUNDRUG CO LTD	BN JPY	**0.883**	0.038	0.154	0.192	171.055	**0.11%**	-0.10%	31.76%	**-0.06%**

Note.

Own selection and calculation using data from Bloomberg L.P. (2021). Retrieved 04 03, 2021, from SFU Bloomberg Terminal.

Table 7.17

Levered Beta, Debt-to-Equity Ratio and Effective Tax rate for the Two Pools of Comparable

	Comparable Pool Regarding the Industry				Comparable Pool Regarding TA			
	Company Name	**βL**	**D/E**	**Effective Tax rate**	**Company Name**	**βL**	**D/E**	**Effective Tax rate**
1	GREEN CROSS HEALTH LIMITED	-0.38	36.67%	26.76%	APG SGA SA	0.41	0.45%	18.07%
2	PHARMARISE HOLDINGS	0.67	199.02%	60.00%	LUDWIG BECK	-0.04	173.17%	25.96%
3	MEDICAL IKKOU GROUP CO.	-0.44	116.77%	39.07%	FOUNTAINE PAJOT	0.62	79.61%	32.85%
4	QOL HOLDINGS CO	1.43	74.08%	44.60%	CAFE 24 CORP.	1.06	17.73%	19.58%
5	COSMOS PHARMACEUTICAL CORPORATION	-0.05	100.90%	20.93%	CATERING INTERNATIONAL & SERVICES	0.08	59.36%	39.40%
6	CREATE SD HOLDINGS CO LTD	0.95	0.00%	30.23%	GENIE MUSIC CORPORATION	0.83	4.87%	21.96%
7	NIHON CHOUZAI CO	0.19	197.94%	44.04%	DAEYANG PAPER	n.a.	n.a.	n.a.
8	CORPORATIVO FRAGUA	-0.05	0.00%	n.a.	COLABOR GROUP INC.	2.26	75.84%	25.77%
9	AIN HOLDINGS INC	0.44	11.81%	42.01%	DUROC AB	0.31	50.07%	1.91%
10	SUNDRUG CO LTD	0.88	0.11%	31.76%	RAYENCE CO	1.04	7.90%	34.25%
	Average	**0.36**	**0.74**	37.71%	**Average**	**0.93**	**0.52**	24.42%
	Median	**0.32**	**0.55**	39.07%	**Median**	**0.94**	**0.50**	25.77%

Note.
Own selection and calculation using data from Bloomberg L.P. (2021). Retrieved 04 03, 2021, from SFU Bloomberg Terminal.

Table 7.18

Unlevered and Private Firm Beta Computation Using the Comparable Firms Based on Similar TA

	2019	
	βU 2019	**β_(private firm)**
Average	0.67	**1.21**
Median	0.68	**1.24**

Note.
Own selection and calculation using data from Bloomberg L.P. (2021). Retrieved 04 03, 2021, from SFU Bloomberg Terminal.

Table 7.19

Cost of Equity Computation for 2019

	Cost of equity	Risk free rate	Beta	Risk premium
2019	**8.90%**	1.20%	1.24	6.20%

Note.
Own selection and calculation using data from Bloomberg L.P. (2021). Retrieved 04 03, 2021, from SFU Bloomberg Terminal.

Table 7.20

Cost of debt in 2019 for our Two Pools of Comparable

	Firms selected on the basis of the same industry		**Firms selected on the basis of the similar Total Asset**	
	2019			
	Company Name	**Cost of debt (pre-tax)**	**Company Name**	**Cost of debt (pre-tax)**
1	GREEN CROSS HEALTH LIMITED	1.76%	APG SGA SA	-0.47%
2	PHARMARISE HOLDINGS	-0.06%	LUDWIG BECK	-0.15%
3	MEDICAL IKKOU GROUP CO.	0.00%	FOUNTAINE PAJOT	-0.40%
4	QOL HOLDINGS CO	-0.04%	CAFE24 CORP.	1.52%
5	COSMOS PHARMACEUTICAL CORPORATION	0.13%	CATERING INTERNATIONAL & SERVICES	0.01%
6	CREATE SD HOLDINGS CO LTD	0.00%	GENIE MUSIC CORPORATION	1.63%
7	NIHON CHOUZAI CO	-0.05%	DAEYANG PAPER	1.34%
8	CORPORATIVO FRAGUA	n.a.	COLABOR GROUP INC.	1.61%
9	AIN HOLDINGS INC	0.00%	DUROC AB	0.05%
10	SUNDRUG CO LTD	-0.06%	RAYENCE CO	1.55%
	Average	***0.19%***		***0.67%***
	Median	***0.00%***		***0.70%***

Note.
Own calculation using data from Bloomberg L.P. (2021). Retrieved 04 03, 2021, from SFU Bloomberg Term

Table 7.21

Multipharma Income Statement (1) for Historical, Forecasted, and Extrapolations Years

Income statement (1)															
	Historical				Forecasted case					Extrapolations					
Th €	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Total revenue	426,869	435,362	461,663	451,245	467,174	493,601	508,027	545,333	561,407	572,635	584,088	595,770	607,685	619,839	630,996
% growth		*1.99%*	*6.04%*	*-2.26%*											
% forecast growth					*3.5%*	*5.7%*	*2.9%*	*7.3%*	*2.9%*	*2.0%*	*2.0%*	*2.0%*	*2.0%*	*2.0%*	*1.8%*
EBITDA	23,673	(19,773)	12,800	7,944	16,054	16,962	17,458	18,740	19,292	19,678	20,072	20,473	20,883	21,300	21,684
% growth		*-183.5%*	*-164.7%*	*-37.9%*											
% forecast growth					*3.5%*	*5.7%*	*2.9%*	*7.3%*	*2.9%*	*2.0%*	*2.0%*	*2.0%*	*2.0%*	*2.0%*	*1.8%*
Operating Charges	417,041	469,562	455,367	453,417	460,829	486,898	501,127	537,927	553,783	564,859	576,156	587,679	599,432	611,421	622,427
% growth		*12.6%*	*(3.0%)*	*(0.4%)*	*1.6%*	*5.7%*	*2.9%*	*7.3%*	*2.9%*	*2.0%*	*2.0%*	*2.0%*	*2.0%*	*2.0%*	*1.8%*
% forecast of revenue					*98.6%*	*98.6%*	*98.6%*	*98.6%*	*98.6%*	*98.6%*	*98.6%*	*98.6%*	*98.6%*	*98.6%*	*98.6%*
D&A	13,845	14,426	6,50	10,116	9,709	10,259	10,550	11,334	11,668	11,901	12,139	12,382	12,630	12,882	13,114
% growth		*4.2%*	*(54.9%)*	*55.6%*	*(4.0%)*	*5.7%*	*2.9%*	*7.3%*	*2.9%*	*2.0%*	*2.0%*	*2.0%*	*2.0%*	*2.0%*	*1.8%*
% forecast of revenue					*2.1%*	*2.1%*	*2.1%*	*2.1%*	*2.1%*	*2.1%*	*2.1%*	*2.1%*	*2.1%*	*2.1%*	*2.1%*

Note.
Own and calculation using data from Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global: www.orbis.bvdinfo.com & from Bloomberg L.P. (2021). Retrieved 04 03, 2021, from SFU Bloomberg Terminal.

Table 7.22

Multipharma Income Statement (2) for Historical, Forecasted, and Extrapolations Years

Income statement (2)															
	Historical				Forecasted case					Extrapolations					
Th €	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
EBIT	9,827	(34,199)	6,296	(2,172)	6,344	6,703	6,899	7,406	7,624	7,776	7,932	8,091	8,252	8,418	8,569
% growth		(448%)	(118%)	(134%)	(392%)	5.7%	2.9%	7.3%	2.9%	2.0%	2.0%	2.0%	2.0%	2.0%	1.8%
% tax rate	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Net Income	3,720	(50,761)	2,702	(5,955)	4,418	4,667	4,804	5,157	5,309	5,415	5,523	5,634	5,746	5,861	5,967
% growth		(1464%)	(105%)	(320%)	(174%)	5.7%	2.9%	7.3%	2.9%	2.0%	2.0%	2.0%	2.0%	2.0%	1.8%
Interest	174.1	196.3	392.0	552.8	340.5	359.7	370.3	397.4	409.2	417.3	425.7	434.2	442.9	451.7	459.9
% growth		12.7%	99.7%	41.0%	(38.4%)	5.7%	2.9%	7.3%	2.9%	2.0%	2.0%	2.0%	2.0%	2.0%	1.8%
% forecast of revenue					0.07%	0.07%	0.07%	0.07%	0.07%	0.07%	0.07%	0.07%	0.07%	0.07%	0.07%

Note.
Own and calculation using data from Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global: www.orbis.bvdinfo.com & from Bloomberg L.P. (2021). Retrieved 04 03, 2021, from SFU Bloomberg Terminal.

Table 7.23

Multipharma Cashflow Statement for Historical, Forecasted, and Extrapolations Years

Cashflow statement															
	Historical				Forecasted case					Extrapolations					
Th €	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Gross Capex	108,420	(28,863)	35,842	9,579	10,382	14,827	13,052	17,783	14,447	13,842	14,119	14,402	14,690	14,983	15,043
% growth		*(126%)*	*(224%)*	*(73.3%)*	*8.4%*	*42.8%*	*(12.0%)*	*36.2%*	*(18.8%)*	*(4.2%)*	*2.0%*	*2.0%*	*2.0%*	*2.0%*	*0.4%*
% forecast of revenue	*(25.4%)*	*6.6%*	*(7.8%)*	*(2.1%)*	*(2.2%)*	*(3.0%)*	*(2.6%)*	*(3.3%)*	*(2.6%)*	*(2.4%)*	*(2.4%)*	*(2.4%)*	*(2.4%)*	*(2.4%)*	*(2.4%)*
Net Working Capital	41,638	39,614	36,570	32,498	39,683	41,928	43,153	46,322	47,687	48,641	49,614	50,606	51,618	52,651	53,598
% growth		*(4.9%)*	*(7.7%)*	*(11.1%)*	*22.1%*	*5.7%*	*2.9%*	*7.3%*	*2.9%*	*2.0%*	*2.0%*	*2.0%*	*2.0%*	*2.0%*	*1.8%*
Change in Net Working Capital	40,623	(2,024)	(3,043)	(4,071)	7,184	2,244	1,225	3,168	1,365	953	972	992	1,012	1,032	947
% growth		*(105%)*	*50.4%*	*33.8%*	*(276%)*	*(68.8%)*	*(45.4%)*	*158.6%*	*(56.9%)*	*(30.1%)*	*2.0%*	*2.0%*	*2.0%*	*2.0%*	*(8.2%)*

Note.
Own and calculation using data from Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global: www.orbis.bvdinfo.com & from Bloomberg L.P. (2021). Retrieved 04 03, 2021, from SFU Bloomberg Terminal.

Table 7.24

Multipharma Balance Sheet for Historical, Forecasted, and Extrapolations Years

Balance Sheet												
	Historical	Forecasted case					Extrapolations					
Th €	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Fixed asset	80,087	80,759	85,328	87,822	94,271	97,049	98,990	100,970	102,990	105,050	107,151	109,079
% growth		*0.8%*	*5.7%*	*2.9%*	*7.3%*	*2.9%*	*2.0%*	*2.0%*	*2.0%*	*2.0%*	*2.0%*	*1.8%*
% forecast of revenue		*17.3%*	*17.3%*	*17.3%*	*17.3%*	*17.3%*	*17.3%*	*17.3%*	*17.3%*	*17.3%*	*17.3%*	*17.3%*
Current Asset	97,721	108,585	114,727	118,080	126,751	130,487	133,097	135,759	138,474	141,244	144,069	146,662
% growth		*11.1%*	*5.7%*	*2.9%*	*7.3%*	*2.9%*	*2.0%*	*2.0%*	*2.0%*	*2.0%*	*2.0%*	*1.8%*
% forecast of revenue		*23.2%*	*23.2%*	*23.2%*	*23.2%*	*23.2%*	*23.2%*	*23.2%*	*23.2%*	*23.2%*	*23.2%*	*23.2%*
Current Liabilities	65,222	68,902	72,799	74,927	80,429	82,800	84,456	86,145	87,868	89,625	91,418	93,063.
% growth		*5.6%*	*5.7%*	*2.9%*	*7.3%*	*2.9%*	*2.0%*	*2.0%*	*2.0%*	*2.0%*	*2.0%*	*1.8%*
% forecast of revenue		*14.7%*	*14.7%*	*14.7%*	*14.7%*	*14.7%*	*14.7%*	*14.7%*	*14.7%*	*14.7%*	*14.7%*	*14.7%*

Note.
Own and calculation using data from Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global: www.orbis.bvdinfo.com & from Bloomberg L.P. (2021). Retrieved 04 03, 2021, from SFU Bloomberg Terminal.

Table 7.25

Multipharma FCFF for Historical, Forecasted, and Extrapolations Years

FCFF														
	Historical				Forecasted case					Extrapolations				
Th €	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
EBIT	9,827.4	(34,199.5)	6,296.6	(2,172.2)	6,345	6,704	6,899	7,406	7,624	7,777	7,932	8,091	8,253	8,418
Tax rate	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%
EBIT (1-t)	7,370.5	(25,649.6)	4,722.5	(1,629.2)	4,758	5,028	5,175	5,555	5,718	5,833	5,949	6,068	6,190	6,313
D&A	13,845.6	14,426.2	6,503.5	10,116.8	9,710	10,259	10,559	11,334	11,668	11,902	12,140	12,383	12,630	12,883
Δ NWC	40,623.8	(2,024.2)	(3,043.7)	(4,071.8)	7,184	2,245	1,225	3,169	1,365	954	973	992	1,012	1,032
Gross Capex	108,420.5	(28,863.1)	35,842.4	9,579.4	10,382	14,828	13,053	17,783	14,447	13,843	14,120	14,402	14,690	14,984
UFCF	89,013	(38,062)	50,112	22,139	17,667	27,870	27,561	31,503	30,469	30,624	31,236	31,861	32,498	33,148
Discount rate (r)		8.74%	8.74%	8.74%	8.74%	8.74%	8.74%	8.74%	8.74%	8.74%	8.74%	8.74%	8.74%	8.74%
PV of UFCFs		(35,003)	42,380	17,218	12,635	18,331	16,671	17,524	15,586	14,406	13,513	12,675	11,890	11,153

Note.
Own calculation using data from Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global: www.orbis.bvdinfo.com & from Bloomberg L.P. (2021). Retrieved 04 03, 2021

Table 7.26

Sensitivity Analysis Using the Perpetual Growth Rate Method

Perpetuity growth rate	1.8%	**Perpetuity growth rate step-up**	0.25%
WACC	8.7%	**WACC step-up**	0.25%

Perpetuity growth rate analysis

Enterprise value (€Th)

WACC (%)	Perpetuity growth rate (%)				
307,975	1.30%	1.55%	1.80%	2.05%	2.30%
8.24%	322,784	329,685	337,122	345,160	353,874
8.49%	309,032	315,278	321,991	329,225	337,043
8.74%	296,232	301,899	307,975	314,505	321,542
8.99%	284,290	289,444	294,958	300,869	307,221
9.24%	273,124	277,823	282,838	288,202	293,953

Note.
Own calculation using data from Bloomberg L.P. (2021). Retrieved 04 03, 2021, from SFU Bloomberg Terminal & from Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global: www.orbis.bvdinfo.com

Table 7.27

Sensitivity Analysis Using the Exit Multiple Method

EBITDA multiple	6.69x	**EBITDA multiple step-up**	0.25x
WACC	8.7%	**WACC step-up**	0.25%

EBITDA multiple analysis

Enterprise value (€Th)

WACC (%)	Exit EBITDA multiple (x)				
###########	6.19x	6.44x	6.69x	6.94x	7.19x
8.24%	200,877	200,877	200,877	200,877	200,877
8.49%	196,559	196,559	196,559	196,559	196,559
8.74%	192,354	192,354	192,354	192,354	192,354
8.99%	188,258	188,258	188,258	188,258	188,258
9.24%	184,268	184,268	184,268	184,268	184,268

Note.
Own calculation using data from Bloomberg L.P. (2021). Retrieved 04 03, 2021, from SFU Bloomberg Terminal & from Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global: www.orbis.bvdinfo.com

Table 7.28

VIC and VGO calculation with their underlying components and their growth rate correlation calculation between 2016 and 2030

Thous. €	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
G		1.99%	6.04%	-2.26%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
R=WACC	8.7%	8.7%	8.7%	8.7%	8.7%	8.7%	8.7%	8.7%	8.7%	8.7%	8.7%	8.7%	8.7%	8.7%	8.7%
Capex	108,420	(28,863)	35,842	9,579	10,382	14,828	13,053	17,783	14,447	13,843	14,120	14,402	14,690	14,984	15,043
D&A	13,846	14,426	6,504	10,117	9,710	10,259	10,559	11,334	11,668	11,902	12,140	12,383	12,630	12,883	13,115
$NINV_{T+1}$		94,575	(43,289)	29,339	(537)	673	4,569	2,494	6,449	2,779	1,941	1,980	2,019	2,060	2,101
VIC_T		**(641,283)**	**1,087,011**	**(4,886)**	**9,979**	**67,780**	**36,997**	**95,682**	**41,226**	**28,797**	**29,373**	**29,961**	**30,560**	**31,171**	**28,615**
YoY growth			-269.51%	-100.45%	-304.21%	579.25%	-45.42%	158.62%	-56.91%	-30.15%	2.00%	2.00%	2.00%	2.00%	-8.20%
NOPAT		(25,650)	4,722	(1,629)	4,758	5,028	5,175	5,555	5,718	5,833	5,949	6,068	6,190	6,313	6,427
VGO_T		**69,958**	**(60,361)**	**43,271**	**74,592**	**76,772**	**82,410**	**84,839**	**86,536**	**88,267**	**90,032**	**91,833**	**93,669**	**95,355**	
YoY growth			-186.28%	-171.69%	72.38%	2.92%	7.34%	2.95%	2.00%	2.00%	2.00%	2.00%	2.00%	1.80%	

$\rho_{J,M}$	**0.246**

Note.
Figures in brackets indicates negative values
Own selection and calculation using data from Bureau van Dijk. (2021). *Orbis Global Online*. Retrieved from Orbis Global: www.orbis.bvdinfo.com & from Bloomberg L.P. (2021). Retrieved 04 03, 2021, from SFU Bloomberg Terminal.

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