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Equity valuation: Eli Lilly and Company

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ISCTE-IUL

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BUSINESS
SCHOOL

Department of Finance

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Resumo

O processo de Avaliação de uma empresa é crucial no ramo das Finanças. Este processo desempenha um papel importante para diferentes vertentes dentro da área das finanças, sendo essencial para o bom funcionamento de um negócio forte e saudável.

Para o presente projeto, utilizámos o processo de avaliação com o objetivo de estimar o preço justo das ações da empresa Eli Lilly para 31 de dezembro de 2020, comparando-o com o preço de mercado das ações para a mesma data, com a finalidade de entender se existem ou não oportunidades de investimento para os investidores, providenciando-lhes assim uma recomendação de investimento.

Durante este documento, aplicámos duas metodologias diferentes: a abordagem dos Fluxos de caixa Descontados, um modelo mais subjetivo baseado em premissas e a abordagem de avaliação por Múltiplos, um modelo mais direto e simples de aplicar.

A empresa escolhida, Eli Lilly, representa uma farmacêutica internacional que desenvolve e comercializa produtos farmacêuticos para humanos. A empresa tem vindo a crescer ao longo dos anos, tendo registado um crescimento nas receitas de 10% em 2020. A Lilly encontra-se listada na Nasdaq e a 31 de dezembro de 2020 as suas ações tinham um preço de $167,40. Usando o modelo FCFF, foi possível estimar um valor de $313,90 por ação.

Tirando as conclusões com base no modelo FCFF, este sugere que o preço das ações para a data de 31 de dezembro de 2020 encontra-se subvalorizado. Assim, a nossa recomendação final é que os investidores devem comprar as ações da empresa.

Palavras-chave: Cash Flow Descontados; Múltiplos; Avaliação de empresas; Indústria Farmacêutica

JEL Classification: G32 – Value of Firms; O22 – Project Analysis

Abstract

The process of Corporate Valuation is crucial in the financial industry. This process plays an important role for several fields within the finance area, being essential for a well-functioning of a strong and healthy business.

For the present project, we used the valuation process with the purpose to estimate the fair price of Eli Lilly's shares for the 31st December 2020, comparing it with the market price of shares for the same date in order to understand if there are or not investment opportunities for the investors and thus, provide them an investment recommendation.

During this document, we have applied two different methodologies: The Discounted Cash Flow approach which is a more subjective model based on assumptions, and the Multiples valuation approach which is a more direct and simpler model.

The chosen company, Eli Lilly, represents an international pharmaceutical that develops and sells human pharmaceutical products. The company has been growing over years, having reported a 10% increase in revenues for the year 2020. Lilly is listed on Nasdaq and as of 31st December 2020, its shares were priced at $167,40 each. Using the FCFF model, we were able to achieve a value of $313,90 per share.

Taking the conclusions based on the FCFF model, the model suggests that the share price for 31st December 2020 is undervalued. For that reason, our final recommendation is that the investors should buy the company's shares.

Keywords: Discounted Cash Flow; Multiples; Company Valuation; Pharmaceutical Industry

JEL Classification: G32 – Value of Firms; O22 – Project Analysis

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Glossary

APV - Adjusted Present Value

CAPEX- Capital Expenditure

CAGR - Compound Annual Growth Rate

CAPM - Capital Asset Pricing Model

COGS- Cost of Goods Sold

D&A- Depreciation and Amortization

EV - Enterprise Value

EBIT- Earnings Before Interest and Taxes

EBITDA- Earnings Before Interest, Taxes, Depreciation and Amortization

EMA - Europe and the Ministry of Health

FDA- Food and Drug Administration

IC- Invested Capital

WACC- Weighted Average Cost of Capital

DCF - Discounted Cash Flow

DDM- Dividend Discount Model

FCFE- Free Cash Flow to the Equity

FCFF- Free Cash Flow to the Firm

IPO- Initial Public Offering

MV- Market Value

NCA- Non-Current Assets

NOPLAT – Net Operating Profit Less Adjusted Taxes

PhRMA- Pharmaceutical Research and Manufacturers of America

PER- Price to Earnings Ratio

PPE - Property/Plant/Equipment

P/S- Price to Sales Ratio.

Re- Cost of Equity

Rd- Cost of Debt

R&D- Research and Development

ROIC- Return on the Invested Capital

SGA- Selling, General and Administrative

SWOT- Strengths, Weaknesses, Opportunities and Threats

WC- Working Capital

Introduction

The goal of the present project consists in the use of the process of valuation, to achieve an approximation for the fair value per share of the company Eli Lilly at December 31st 2020 and then, compare it with the current market price at the same date, with the final intention of making a trading recommendation for the investors, to either buy, sell or hold the shares, or in other words, decide if the company is considered undervalued or overvalued by the market.

In order to achieve the best final approximation price, we decided to apply two different valuation methods, notably, the DCF valuation approach and the relative valuation approach.

According to the DCF approach that will be applied in the project, the value of a business is computed based on its expected future cash flows discounted at a specific rate which reflects the risk and the uncertainty. Regarding the relative method, the valuation will be based on a comparison between certain ratios of different but similar companies.

The chosen pharmaceutical company, Eli Lilly, has been in existence for 145 years and with more than 34000 employees around different parts of the world, this is a big and interesting company to analyse given the actual pandemic circumstances.

Being 2020 an atypical year of losses, the pharmaceutical industry played a crucial role in the developments of the vaccine and treatments for the Covid-19.

Thus, the project is divided into five different parts. It begins with the literature review, where we analyse in more detail the different methodologies of valuation, supported by various authors and decide what are the best methodologies to apply. In the second part, we will perform a background analysis which is divided into two segments, namely, we will study the pharmaceutical industry and then, the chosen company. In the third part, we will perform a financial analysis to achieve the most important ratios and get important insights to proceed to the fourth part, the valuation. Finally, after the company valuation, where the methodologies explored in the literature review are applied, we will end the project with the conclusions.

1. Literature Review

The importance of valuation is crucial in the finance realm, in particular, in the field of corporate finance and portfolio management. By influencing the portfolio decisions, valuation also plays an important role in the performance of the capital markets.

In this way, valuation has different purposes. Regarding the field of portfolio management, valuation is especially important for active investors. Even though passive investment is the most popular, the fact that the intrinsic value can diverge from the market value, supports active investment (Damodaran, 2012). Thus, once the estimation of the fair value of a firm is determined, it allows investors to compare that value with the actual market value and, find out if there are investment opportunities.

It is important to determine the value of a company and use the information about valuation to make wiser business decisions (Copeland, Koller & Murrin, 2000). Therefore, the valuation process is important and necessary for the development of a healthier company.

In terms of evaluating corporate events, such as mergers and acquisitions, it is important to determine the fair value that satisfies both the buyer and the seller, and consequently, enables the negotiation between them (Henry, Pinto, Robinson & Stowe, 2015). Also, in terms of corporate strategies and business issues that affect the results of the firm, valuation is also important to understand questions and give answers where every decision can directly change, positively or negatively, the future of the firm.

Finally, for all of the reasons mentioned above, determining the value of a firm is a key important factor to successful investing and management.

However, determining the fair value of a company is a very subjective and uncertain task that involves a constant process with several amounts of time and dedication. As Damodaran (2012) claims, “the value will change as new information is revealed”. New information appears in the market every minute and the stock price reflects that financial effect. This makes valuation timeless (Damodaran, 2012).

The process of estimating the fair value of a business is complex and there are different techniques to compute the value of a company. Usually, there are three most popular methods (Damodaran, 2012). The first, the discounted cash flow valuation, relates to the intrinsic value where the value of an asset is computed based on its future expected cash flows. The second approach, relative valuation, estimates the value of a firm based on the comparison of common variables between identical or

"comparable" assets. The third approach, contingent claim valuation, estimates the value of an asset using option pricing.

1.1. Discounted Cash Flow Model

Damodaran (2012) states that every asset has value. According to him, (Damodaran, 2001), the value of an asset is determined by its expected future cash flows. Consequently, he also points out that "the value of a firm is based on its capacity to generate cash flows and the uncertainty associated with these cash flows."

The DCF model is the most widely used in practice and it is the most important type of valuation method since to perform the other two methods, it is important to understand the basis of the DCF model (Damodaran, 2012).

Discounted cash flow emerged in the 1970s (Luehrman,1997). Later, since 1994 the teacher and author Aswath Damodaran has written several books about equity valuation, corporate finance, and investment management that have been providing new insights into the area of finance.

According to Luehrman (1997), there are three factors which are present in the function to compute the valuation, namely, cash, timing and risk.

Since one dollar today is worth more than one dollar tomorrow, the time value of money has to be considered. Furthermore, the fact that the cash flows are estimations, makes them risky. Therefore, the discount rate should reflect all these aspects.

The DCF model is based on the present value rule. According to the model, the value of an asset is computed based on the present value of its expected future cash flows discounted at a rate that reflects the risk and the uncertainty (Damodaran, 1994). Consequently, the value of an asset today can be computed through the following formula:

$$V_0 = \sum_{t=1}^{n} \frac{CFt}{(1+r)^t} \quad (1)$$

Where:

V_0 = Present Value of the Asset

n = Number of Cash Flows During the Life of the Asset

t = Timing

CFt = Expected Cash Flow at time t

r = Discount Rate that Reflects the Riskiness of the Estimated Cash Flows

Depending on the nature of the asset, the cash flows vary between them. The three most common inputs for the DCF model are dividends, free cash flows, and residual income.

According to Damodaran (1994) the two most popular variants of this model are the equity valuation, in which only the equity portion is evaluated, and firm valuation, in which the entire firm is evaluated. For the equity valuation approach, it is possible to follow the DDM (Dividend Discount Model) and the FCFE (Free Cash Flow to Equity). Regarding firm valuation, the author suggests FCFF (Free Cash Flow to the Firm) as well as APV (Adjusted Present Value) model.

Free Cash Flows

Using free cash flows, the intrinsic value is obtained by discounting the future cash flows to the present, using a suitable discount rate. Depending on the nature of the free cash flows, usually, to compute the value of a company and its equity securities, analysts use FCFE to directly value equity or FCFF to value equity indirectly. With all the same assumptions and inputs, in the end, the two approaches should lead to identical estimates (Damodaran, 1994).

The FCFF represents all the cash available to all suppliers of capital, which include stockholders and bondholders whereas FCFE represents all the cash available only to the company's holders of common equity.

1.1.1. Equity Valuation

1.1.1.1. Dividend Discount Model

Dividends are the amount available for distribution to shareholders.

If a company pays dividends and they do not differ significantly from year to year, the DDM model is the simplest model to value equity and can be applied to predict the price per share of a firm. If a company does not pay any dividends, the DDM model is unsuitable.

Using the DDM model, the value of an asset can be computed based on the present value of all expected future dividends of the company discounted at the rate of return required by the investors of the firm.

According to Damodaran (2012), the following equation shows the value of the stock:

$$\text{Value per Share of Stock} = \sum_{t=1}^{t=\infty} \frac{E(DPSt)}{(1+r)^t} \quad (2)$$

Where:

E(DPSt)= Expected Dividends per Share at t.

r = Cost of Equity

The DDM model has different variants depending on the assumptions about the growth of the expected dividends.

Assuming that a firm reaches the steady state, that is, the dividends are growing at a constant rate for a long term, according to Damodaran (1994), The Gordon Growth Model (developed by Gordon and Shapiro in 1956 and Gordon in 1962) is the most suitable version to apply. The value of a stock will be:

$$V0 = \frac{DPS1}{r-g} \quad (3)$$

Where:

V0 = Gordon Growth Model Intrinsic Value Estimate at t=0

DPS1 = Expected Dividends in the Next Time Period

r = Cost of Equity

g = Expected Constant Dividends Growth Rate

1.1.1.2. Free Cash Flow to the Equity- FCFE

While the cash flows in the DDM are the real paid dividends, for FCFE the cash flows need to be predicted based on the potential dividends to be paid.

FCFE represents all the cash flows available to the company's equity investors after deducting all the operating expenses, interest and changes in the working capital and adding changes in debt.

Like this, (Damodaran (2012)):

FCFE = Net Income – (Capital Expenditures - Depreciation) – (Change in Non-cash WC) + (New Debt Issued - Debt Repayments) (4)

In order to evaluate a firm based on FCFE, the value of equity can be computed based on the present value of the cash flows to equity discounted at the rate of return required by the equity investor of the firm. According to the following formula:

$$\text{Equity Value} = \sum_{t=1}^{n} \frac{FCFEt}{(1+r)^t} \quad (5)$$

Where:

r = Rate of Return Required by Equity Investors of the Firm or Cost of Equity

Cost of Equity (Re)

To estimate the cost of equity, i.e., the rate of return required by equity investors of the company, the CAPM is a suitable model.

While the development of CAPM does not reach consensus, the literature usually attributes the development of CAPM to the financial economic Jack L. Treynor (1961) and William Sharpe (1964).

The model describes the relationship between the expected return and the risk when investing in risky securities. For delaying the consumption, investors require a return i.e., the required return on equity.

The model is based upon three assumptions (Berk & DeMarzo, 2017):

1- "Investors can buy and sell all securities at competitive market prices without incurring taxed and transaction costs and can borrow and lend at the risk-free interest rate."
2- "Investors hold only efficient portfolios of traded securities."
3- "Investors have homogeneous expectations regarding the volatilities, correlations and expected returns of securities."

Under these three assumptions, the expected return of an asset given the risk can be computed through the following formula:

$$Re = rf + \beta[E(rm) - rf] \quad (6)$$

Where:

Re = Cost of Equity

rf = Risk Free Rate

E(rm) = Expected Return on the Market Index

β = Systematic Risk.

Given the formula, it is possible to estimate the cost of equity.

1.1.2. Firm Valuation

1.1.2.1. Free Cash Flow to the Firm - FCFF

Through this model, it is possible to evaluate the entire business. FCFF represents all the cash flows available to the firm's suppliers of capital after deducting all the operating expenses, taxes and variations in working capital.

Like this, according to Damodaran (2012):

$$\text{FCFF} = \text{EBIT}*(1-t) + \text{Amortizations and Depreciations} - \text{CAPEX} - \text{Variations in Working Capital} \quad (7)$$

Where: t = Tax Rate

CAPEX= Capital Expenditures

To estimate the current firm value, it is necessary to compute the present value of the FCFF discounted at WACC. FCFF allows to evaluate equity value indirectly so, it is necessary an additional step. Consequently, by subtracting the market value of debt from the firm's value, it allows to value equity according to the following formulas, assuming there are no nonoperating assets:

$$\text{Firm value} = \sum_{t=1}^{n} \frac{FCFFt}{(1+WACC)^t} \quad (8)$$

$$\text{Equity value} = \text{Firm value} - \text{MV of Debt} \quad (9)$$

<u>WACC</u>

Since the FCFF refers to the cash available to all the suppliers of the capital of the firm, if the structure of the capital is stable, it makes sense that the value of a firm should be computed by discounting FCFF at the weighted average cost of capital, i.e., the cost of the two different parts of financing used by the company, namely debt and equity, weighted by their respective market value proportions.

$$\text{WACC} = \frac{E}{D+E} \text{ x Re} + (1-t) \text{ x } \frac{D}{D+E} \text{ x Rd} \quad (10)$$

Where:

E = Company's Equity

D = Company's Debt

Re = Cost of Equity

Rd = Cost of Debt

1.1.3. EVA and MVA

Another way to perform a valuation is through the economic value added (EVA) method. Joel Stern and G. Bennett Stewart became the pioneers of EVA measure when they decided to implement it in the consulting firm Stern Stewart & Co.

EVA measures the financial performance of a company. Basically, it is a profitability indicator that shows whether the company is creating or destroying the shareholder value over a specific period, according to the idea that a project is profitable and should be undertaken, only if it generates returns above its cost of capital and consequently create value for the shareholders.

EVA is based on three inputs, the capital invested, the return on the invested capital and finally, the cost of capital. The computation of EVA can be done by subtracting the cost of the invested capital from the net operating profit less adjusted taxes:

$$\text{EVA} = \text{NOPLAT} - \text{Invested Capital} \times \text{WACC} = (\text{ROIC} - \text{WACC}) \times \text{Invested Capital} \quad (11)$$

Market value added (MVA) represents how much value the company has accumulated over a while and what is expected to be created in the future. The calculation of MVA corresponds to the present value of EVA discounted at WACC:

$$MVA = \sum_{t=1}^{n} \frac{EVA\ t}{(1 + WACC)^t} \quad (12)$$

According to Damodaran (2012), MVA can be computed by subtracting the invested capital from the firm value. Like this, after the calculation of MVA, the enterprise value can be obtained by the sum between MVA and Invested capital:

$$\text{Enterprise value} = \text{MVA} + \text{Invested Capital} \quad (13)$$

Finally, by adding the non-operating assets and by subtracting the non-equity claims it is possible to obtain the equity value of the firm:

$$\text{Equity value} = \text{Enterprise value} + \text{Non-operating assets} - \text{Non-equity claims} \quad (14)$$

1.1.4. Terminal Value

Even if a company can grow for years, there will be eventually a point where it will grow less or even equal to the growth of the economy.

When using the DCF model in practice, it is necessary to predict future values. Since it is not possible to predict cash flows forever, at a certain point, the value of the estimates of all expected cash flows is combined into a single value, representing the terminal (or continuing) value.

Damodaran (2012) enumerate 3 ways to estimate the terminal value.

One of the ways to estimate the terminal value is through the stable growth model, which assumes that the company will grow at a constant rate forever. Assuming that after a certain year (the terminal year), the cash flows will grow at a constant rate forever, the terminal value can be computed based on the following equation:

$$\text{Terminal Value } t = \frac{CASH\ FLOW\ t+1}{r-g} \quad (15)$$

Where:

r = Discount Rate (WACC or Cost of Equity depending if is Firm Valuation or Equity Valuation)

g = Constant Growth Rate

Since through FCFF it is not possible to obtain directly the equity value, instead, the Enterprise Value (EV) or firm value, will be the value obtained. Assuming that after n years, the company will reach the steady state and continues to increase at a constant rate g, the enterprise value can be obtained as follows:

Firm Value or Enterprise Value =

$$EV = \sum_{t=1}^{t=n} \frac{FCFFt}{(1+wacc)^t} + \frac{[FCFFn+1/(WACC-g)]}{(1+wacc)^n} \quad (16)$$

Equity Value = PV of FCFE + PV of Terminal Price =

$$= \sum_{t=1}^{t=n} \frac{FCFEt}{(1+r)^t} + \frac{[FCFEn+1/(r-g)]}{(1+r)^n} \quad (17)$$

1.1.5. Limitations of DCF Models

DCF models are based on future predictions. To proceed with the model, some assumptions have to be done. All of those aspects add more uncertainty about the results.

According to Damodaran (2012), discount rates are difficult to estimate. Also, it is impossible to estimate all the future cash flows. Instead, to facilitate the process, the terminal value is determined. However, it is also very difficult to estimate. Finally, the author also suggests that DCF models do not reflect all the market conditions.

For all of those reasons, the model has limitations and is not perfect and that is why the DCF model can lead to mistakes when evaluating a firm.

1.2. Multiples Valuation

Valuing a firm through the relative model is a simpler and faster task, that is why most valuations are of this type. With the Multiples method, the estimation of the value involves a comparison between similar assets through common variables such as financial ratios. Thus, the value of a company can be calculated through the value of another comparable company or a peer group, usually from the same industry, and can have a similar operating and financial profile. Finally, multiples can be classified into two different groups, the enterprise value multiples or the equity multiples.

Price-to-Earnings Ratio

The P/E ratio is the most famous and used multiple and it is also described as equity or earnings multiple. This ratio tells the analysts whether a firm's stock price is overvalued or undervalued. Thus, when comparing the P/E ratio between similar companies, the firm with the highest P/E ratio usually means a higher expected growth or could mean that a company's stock price is overvalued. However, the ratio does not consider a company's level of debt and therefore the impact on the company's earnings and the share price. That is why to avoid that issue, sometimes it is more correct to use a company's enterprise value because it is not affected by the capital structure. The computation represents the ratio between the market price per share to the earnings per share:

$$PE = \frac{Market\ Price\ per\ Share}{Earnings\ per\ Share} \quad (18)$$

Enterprise Value to EBITDA

The EV to EBITDA ratio is a firm value multiple and it computes the company's return on investment. In contrast with P/E, this multiple is useful for companies that have different levels of debt. The ratio can be calculated by dividing the enterprise value by the EBITDA:

EV/EBITDA = (Market Value of Equity + Market Value of Debt – Cash)/EBITDA (19)

Price to Book Value

Usually, a lower P/BV means the stock is undervalued.

The price to book value ratio is computed by the division between the company's market price per share and its book value per share:

$$\textbf{PBV} = \frac{Market\ Price\ per\ Share}{Book\ Value\ of\ Equity\ per\ Share} \quad (20)$$

Price to Sales Ratio

The price to sales ratio compares the company's market price with its revenues. A low ratio could mean that the company's stocks are undervalued. The computation could be done either on a total basis or per share basis.

$$\textbf{P/S} = \frac{Market\ Value\ of\ Equity}{Revenues} = \frac{Company's\ Market\ Price\ per\ Share}{Revenues\ per\ Share} \quad (21)$$

Enterprise Value to Sales Ratio

The EV to sales ratio compares the enterprise value to its annual revenues or sales. Unlike the Price to sales ratio, the EV/S ratio considers not only the value of equity but also the debt value of the company. It is more complex when comparing the P/S ratio because the EV considers debt and subtracts cash. A lower EV/S ratio could mean that a firm is undervalued.

$$\textbf{EV/S} = \frac{Market\ Value\ of\ Equity + Market\ Value\ of\ Debt - Cash}{Revenues} \quad (22)$$

1.2.1. Limitations of Multiples Model

The simplicity of this method seems to be an advantage. However, there are some limitations. Even if comparable companies seem to be identical, they may not be so. Companies from the same industry can have differences in terms of risk and growth that analysts and investors ignore when evaluating a firm through this method, which can lead to inaccurate results. The assumptions behind relative valuation are less explicit than DCF models. Finally, multiples ignore important aspects which affect the value of the company such as the example of the P/E ratio that disregards the level of debt which is very important because has an impact on the financial performance and, consequently on the valuation of the company.

1.3. Contingent Claim Valuation

Regarding real investment choices, DCF approaches may seem very simplistic to deal with more complex decisions. Analysing more complex scenarios may require more dynamic approaches.

"Option pricing methods are superior to traditional DCF approaches because they explicitly capture the value of flexibility" (Copeland, Koller, & Murrin, 2000).

Real Options Valuation or also known as Contingent Claim Valuation, incorporates some degree of flexibility that exists in real life choices due to the uncertainty about the future. While DCF models evaluate the assets based on the present value of their expected cash flows, option pricing models do not.

This approach considers that the value of the firm depends not only on the value created but also on the potential growth opportunities. Thus, this model captures the value of flexibility related to real investment opportunities because that flexibility means value.

Pharmaceutical companies represent one of the most famous industries that spend the most money on R&D. On March 31 of 2019, Lilly spent 22.38% of its revenues on R&D[1].

R&D represents intangible assets, which means that when using the DCF approach, these assets are incorrectly estimated because DCF only considers the future generated cash flows. Also, R&D should be treated as a call option, making the real options valuation the suitable approach to value a firm.

[1] Average Research & Development Costs for Pharmaceutical Companies. (2021). Retrieved 10 March 2021, from https://www.investopedia.com/ask/answers/060115/how-much-drug-companys-spending-allocated-research-and-development-average.asp

Pharmaceutical R&D is very costly and has a significant level of uncertainty. For example, at Lilly, the process of new drug development has four phases. However, the risk of not succeeding in developing the product is high because there is a high complexity when creating a new product. During the different phases, depending on the results, it is possible to continue to the next phase if the results are satisfactory or abandon the plan if the results are bad and do not reach the target. According to the real options approach, this case can be treated as an option to expand or an option to abandon.

Also, in the case of pharmaceutical companies, they can patent products that provide them an exclusive right to develop and market the products. Also, this case can be seen as an option. (Damodaran, 2012).

Given the definition of this model and regarding the uncertainty about the future of the pharmaceutical companies because of all the huge expenses in R&D and the intellectual property rights, real options approaches allow investors to evaluate more accurately those firms.

1.4. Valuation Model's Choice

For the present project, two different models will be used to calculate the fair value of the company. Since there is no perfect model to perform a valuation, the goal of using more than one model is to allow the comparison between results and thus, is important to provide a more accurate valuation. According to the results of journal accounting horizons (2004), for the pharmaceutical industry, even if the conditions for valuation by comparatives are less likely to hold than for other sectors, using the relative valuation can complement the results. Also, the real options approach might be the more suitable model to apply when dealing with companies that belong to the pharmaceutical industry due to the high R&D expenses in the sector and the long waiting time until the profits appear after selling their products. The process from research until the regulatory approval can take over 10 years. However, even though the real options seem to be the suitable model to apply for pharmaceutical companies due to their characteristic, this approach is more challenging due to the complexity and trouble when comparing with the other two methods.

2. Background Analysis

2.1. Industry Analysis

2.1.1. Pharmaceutical Industry Characteristics

Companies incorporated in the pharmaceutical industry are responsible for the research, development, production and distribution of medicines for the prevention of diseases in humans and animals. Being responsible for the discovery of new medication, the remarkable impact of this industry nowadays is noticeable when it comes to improving global health. New medicines are responsible for the increase in life span, preventing health problems, slowing down and treating health problems and diseases. Also known as pharma, this is a very dynamic industry with rapid growth and high potential profits. According to Statista, this industry has experienced significant growth during the past two decades and in 2019, pharma revenues worldwide represented 1.25 trillion dollars.

The origin of this industry as it is known today, started in the second half of the nineteenth century when in 1849 Pfizer was founded and when in 1877 Eli Lilly was founded by the colonel, being him the pioneer of new methods and the first one who focused on R&D. Therefore, the emergence of this industry can be seen as an American movement. Not only these two companies but also many of the other big pharmaceutical are from the United States, being this country the largest pharmaceutical market worldwide.

However, the development of those innovative medicines, despite those global health advantages in improving patient care, required huge clinical trials, huge time and steps that represent large amounts of R&D costs for these companies.

New competition of generics, new markets and new government regulation are pressuring the global pharmaceutical companies to decrease their prices and to provide their drugs to citizens.

Currently, this industry is in the mature stage meaning little or no growth, industry consolidation and high barriers to entry.

Finally, this industry has special features, facing certain challenges such as high R&D costs, strict government regulations, difficulty in achieving federal government approvals, and intellectual property issues. All of these characteristics put Pharmaceuticals in the top 10 of the industries with the highest barriers to entry.

2.1.1.1. Drug Life Cycle

The pharmaceutical product's life cycle includes different stages that can be separated into three main phases. First, the R&D process including all the testing review and approval, second the

commercialisation including the patent protection and the oligopolistic competition and, finally, the generic competition.

Taken from the European Commission website, figure 2.1 represents a schematic of the drug life cycle and provides a more detailed timeline of the cycle.

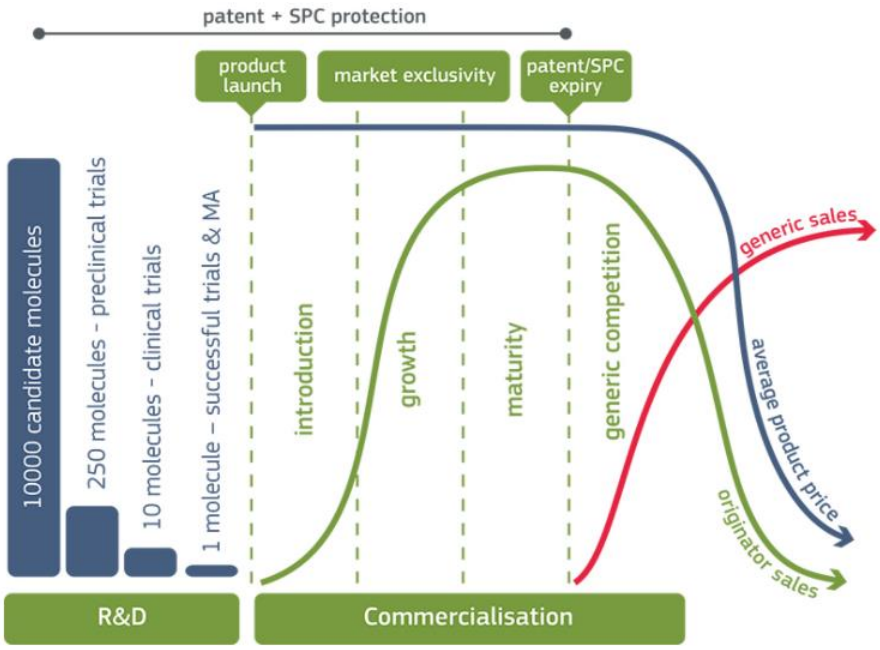

Figure 2.1: Pharmaceutical Drug Life Cycle. *Source: European Commission*

Before the product launch and its clinical approval, the process begins with the discovery of a new compound which is a rigorous process involving several molecules. Once the right molecule is designed, they patent it. After the discovery, the next step is the preclinical testing where if it is successful, the next process of clinical testing begins to verify if the pharmaceutical product would be safe and effective for the patients. If that is the case, it is necessary approval from a regulatory agency. After this, if the drug is approved for use, it is then launched in the market. Once the product is launched and with the patent protection, the company has market exclusivity and competes in an oligopolistic market with the other big pharmaceuticals. Finally, in the final stage, when the expiration of the patent protection starts, the generic competition begins leading to the decrease in the price of the branded products.

2.1.2. Marketing and R&D

The pharmaceutical industry is one of the largest R&D spenders because all the process of development and testing a new drug before it can go to the market requires high costs. In the case of Lilly, the company invests huge amounts in R&D because they believe “it is critical to its long term

competitiveness". In 2019, the largest pharmaceuticals spent around 20% on R&D which is huge (Investopedia). Eli Lilly and some of its competitors such as Pfizer, Merck&Co, Johnson & Johnson, AbbVie and other pharmaceuticals belong to the top 20 of the largest R&D spenders.[2]

Regarding marketing expenditures, according to the Journal of Economic Literature, these expenditures in this industry are also high representing between 15% and 20% of sales. The largest component of these costs is destined to physicians when sales representatives visit hospitals and doctors to promote their new products and therapies.

The R&D process when discovering new medicines is very complex, lengthy and costly with a high risk of failure. According to PhRMA, the process has several different phases that involve a substantial amount of time since it begins with several potential medicines including many preclinical and clinical trials. All the process from drug discovery through the approval by the regulatory agency takes on average 10 to 15 years. On average, the cost to bring a new drug to the market is $2.6billion[3] including the cost of several potential medicines that fail (Figure 2.2).

In the US, FDA is the federal agency responsible for protecting and promoting public health. Out of all of the medicines belonging to the clinical trials, only 12% are approved by the FDA.

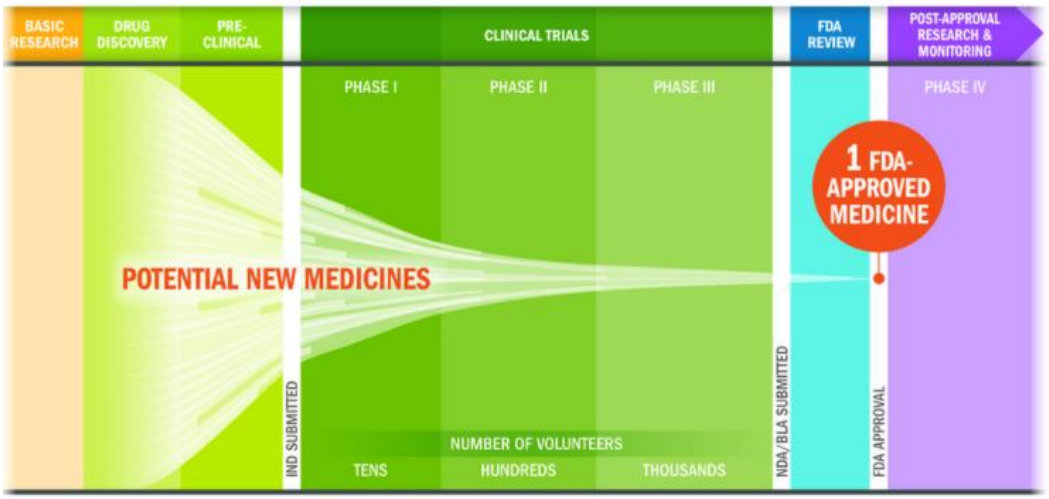

Figure 2.2: The R&D Process for New Drugs. *Source: Pharmaceutical Research and Manufacturers of America*

Acquisitions

In the pharmaceutical industry, there are significant acquisitions, collaborations and strategic alliances between companies that strengthen their competitive positions and empower the business.

[2] Average Research & Development Costs for Pharmaceutical Companies. (2021). Retrieved 20 April 2021, from: https://www.investopedia.com/ask/answers/060115/how-much-drug-companys-spending-allocated-research-and-development-average.asp

[3] In 2013 dollars.

2.1.3. Therapeutic Areas

According to Statista (2021), in 2019, the 4 therapeutic areas worldwide by sales in billion US dollars were: Oncology with $145,5B, Anti-rheumatics with $56,9B, Anti-diabetes with $51B and Anti-viral with $38,8B.

2.1.4. Major Companies

The major pharmaceutical and biotechnology companies in these industries, according to the 2020 Eli Lilly Annual Report are AbbVie Inc.; AstraZeneca; Bristol-Myers Squibb Company, GlaxoSmithKline, Johnson & Johnson, Merck & Co.; Novartis AG, Pfizer, and Sanofi S.A.

According to Investopedia, in the first quarter of 2019, the largest public drug companies by revenues in millions of U.S. dollars were:

- Johnson & Johnson with $81,593M

-Pfizer with $53,647M

-Merck with $42,294M

-AbbVie with 32,647 M

-Eli Lilly with $24,684M

-Amgen with $23,75M

-Bristol-Myers Squibb with 23,288M

2.1.5. General Environment: PESTLE Analysis

In order to have an idea about the general environment and the global economic outlook to provide important insights, there are external factors that may have a significant impact on the development and success of pharmaceutical companies.

Political

There are political factors that affect the performance of pharmaceutical companies. The government and regulatory influences are extremely high in the health care segment namely in this industry with measures that are adopted not only to ensure consumer safety but also to promote research and innovation and finally, to control the expenditures around countries.

Due to the importance of the improvement of global health, all medicines developed by the companies, before going for sale have to be approved by the national safety regulators, with the

purpose to guarantee their safety and efficiency for the consumers, which is a long process responsible for delaying the entry of new drugs for the public. For this reason, the specific government agencies are responsible for all of the regulatory frameworks that affect the sales of the companies and represent a strong barrier to entry for new competitors.

In addition, due to the expensive R&D costs when searching for new treatments, usually, as the US pharmaceuticals price their own products, sometimes they are too expensive. To prevent this, in the most recent years, government has been pressuring those firms to reduce the price of their medicines to guarantee that most of the population has access to them. This is a risk that can lead to a drop in drug prices and consequently in revenues.

Economic:

The Pharmaceutical industry is dependent on the economy. There are economic factors that affect drug demand namely consumer income and health insurance. Macroeconomic factors such as the economic cycle, the interest rate, the foreign exchange rate and the economic downturns may also affect the industry.

The actual COVID-19 pandemic has had an impact on the pharmaceutical business. If on one hand, the virus has been creating opportunities for the development of new drugs and therapies, on the other hand, it has been responsible for the decrease in new prescriptions and in demand because of strained health systems, higher unemployment and lack of clinical consultation, which lead to decreased sales.

Social

Nowadays lifestyle changes are visible. The advances in the industry are responsible for the increase of the population growth rate and older population. Older people have special needs and they are more likely to have health problems than younger people, which makes them buy more drugs. Also, the health trend is changing, there are new cases of diseases such as diabetes and obesity.

These lifestyle changes represent a big challenge for the pharmaceuticals to create new treatments and drugs for the patients according to their needs.

Technological

The technological influences in this industry are very high and can revolutionise all the health system. Since the goal of the pharmaceuticals is to create drugs and therapeutics to treat health problems, the

biotechnology industry is gathering further highlight and innovation is the main goal for the competition among companies.

Legal

Strong legislation is visible in this industry. Intellectual property law and data protection are essential guarantees for most of the revenues. The loss of intellectual property over time can be dangerous and is a risk that can result in a decline in revenues.

Environmental

Unfortunately, despite the advantages of globalization, there are also disadvantages like the case of climate change. Drug manufacturing is responsible for increased pollution due to pharmaceutical residues. In the long term, this can be an issue and affect the manufacturing and, consequently, increase costs and decrease profits. Nowadays, climate change is a big issue and it is important that companies start to recognize it in order to protect our planet.

In the case of Lilly, they have been establishing goals and one of the most recent is the "2030 climate goals" where they undertake in particular, to use renewable electricity and carbon neutral to enhance tracking and reporting of emissions from their value-chain, no plastic waste and no water pollution.

2.1.6. Porter's Five Forces Analysis

Rivalry Amongst Existing Competitors – High

The competition in the pharmaceutical market is very intense which can lead to limits in the profitability of those companies. However, most of the companies in this sector represent mature firms that have been in the market for a long term and therefore, are considered well recognized globally. These huge companies compete constantly and globally in discovering new treatments and products. In this industry, strategic alliances between companies are valuable and very likely to happen. M&A are examples of those alliances as it is important to have a larger size. This is important for a better competitive position.

Threat of New Entrants – Low

As already mentioned, the fact that barriers to entry in the sector are very high makes the threat of new entrants low. Pharmaceuticals represent mature firms with huge amounts of money and large infrastructures and large distribution network, which creates an entry for a potential rival very difficult.

Brand name Pharmaceuticals take big advantages from economies of scale. They can sell products for their global clients and have a large-scale manufacturing capacity, which makes it easy to produce large quantities with lower costs. A potential new entrant would not have enough reputation and a distribution network to operate in the industry. Also, the potential new rival would need high amounts of money to invest in R&D as well as a lot of capital to support all the heavy costs of manufacturing and distribution.

To conclude, the capital requirements, the regulation and legal framework, intellectual property, government regulation and formalities make it difficult for small businesses to enter this industry.

Bargaining Power of Suppliers - Low to Medium

There are many suppliers in this industry which makes the materials easily available for the companies from different manufactures. This makes the materials available at a moderate price and makes the power of suppliers low.

Bargaining Power of Buyers – low

In this industry, the buyers are the patients and each buyer has a different preference for the product and different inputs. In addition, they do not have any power regarding prices, which makes the power of buyers very low.

Threat of Substitutes – Medium

With the appearance of generics, the pharmaceutical industry has been facing more competition. The threat of substitutes in this industry used to be lower, however, as more generics will appear in the market and the companies will lose patent protection, the tendency is to continue to rise. The original companies can only see profits and recover from the R&D cost after years while generics usually invest fewer resources and all their approval processes are easier and cheaper.

To achieve a more competitive position, as already mentioned, the companies can benefit from strategic alliances such as mergers and acquisitions, which are very crucial and common in this industry. This strategy makes it difficult for the entry of new small companies.

2.1.7. Industry Trends and Outlook

Today, pharmaceuticals face many challenges and risks, in particular, high amounts invested in R&D with uncertainty about future returns, the problem of patent expirations has been causing losses in revenues, generic competition has been increasing, changes in consumer preference and needs, and new legislations and governmental regulations have been causing pricing pressures.

Regarding generic competition, after a period, when a product exclusivity expires, generic firms take that advantage and produce products that are similar to the original medicines. The R&D expenses for those companies do not exist and all the processes of clinical trials, approvals and regulations are less when comparing with the brand pharmaceuticals. Those generic companies can operate in the market with very competitive and lower prices. This is a big challenge that pharmaceuticals will have to deal for the future.

2.2. Company Analysis

2.2.1. Business Overview

Founded by Colonel Eli Lilly in 1876 with $1,300, Eli Lilly belongs to the Pharma and Healthcare sector and represents a global pharmaceutical company with the mission to "create medicines that make life better for people around the world".

The company researches, develops, manufactures and markets products in the human pharmaceutical area. Until March 2019, Lilly was responsible for all of those processes in two business areas, namely, human pharmaceutical but also in the animal health segment. However, after the animal health business, Elanco Animal Health completed an IPO of its common stock, which trades on the NYSE with the symbol "ELAN", Lilly started to operate in the single area of human pharmaceutical products.

The company sells products in more than 120 countries around the world namely for the US, Japan, China and Europe and in 2020 the company has around 34960 employees, representing an increase of 4% comparing with 2019.

2.2.2. Therapeutic Products

Lilly's human products belong to four major areas, namely, diabetes or endocrinology, oncology, immunology and neuroscience.

Regarding the area of diabetes, the company has eight products of which Trulicity and Humalog are responsible for the highest revenues. In the Oncology area, the company has six products being the Alimta, Cyramza, Tyvyt and Vernezio the most important because of the great contribution to the increase in revenues in 2020. Also, there are two products included in the Immunology area, in particular, Olumiant and Talz. Moreover, Neuroscience products include four products and, finally, there are four more other therapies, two of which represent COVID-19 treatment.

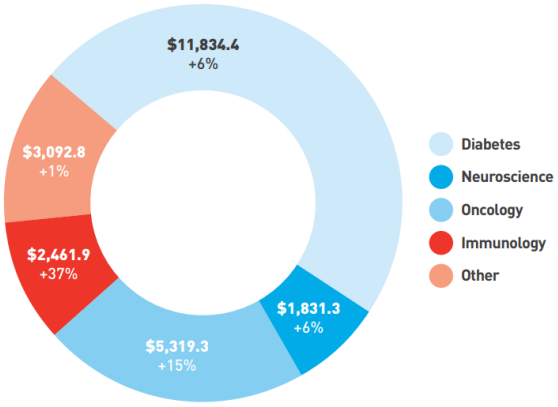

Figure 2.3: Revenue Growth across Therapeutic Areas (in millions of USD, percent growth). *Source:2020 Lilly Annual Report*

Over the past 5 years, the highest revenues have been recorded in the area of diabetes. In 2020 (figure 2.3) revenue in Diabetes increased 6% due to the increase in two main products namely, Trulicity and Jardiance. However, the area that has been responsible for the higher increases is Immunology because those products were only approved since 2016 and that is why in 2020 the greatest increase was observed in that segment, with an increase of 37% driven by Talz and Olumiant. Regarding the Oncology area, revenue increased 15% driven by the growth of Verzenio, Alimta, Tyvyt and Cyramza. Finally, the 6% increase in the neuroscience area was driven by Emgality and Cymbalta.

Trulicity, an endocrinology product for the treatment of type 2 diabetes and to reduce the risk of major adverse cardiovascular events in patients with diabetes, is responsible for the highest revenues in the last 3 years. Revenues increased 29% in 2019 and 23% in 2020 representing 5068,1 million USD in the last year. Since this product is protected by a compound patent until 2027, it is possible that the revenues will continue to increase or remain high.

Cialis belongs to the cardiovascular products and was one of the biggest responsible for the high revenues over the years. However, in 2017, after the loss of patent protection, the revenues have been dropping over the last years. In 2016, revenues from Cialis were 2471,6 million of USD comparing with 607,1 million USD in 2020 which represents a drop of around 75%.

Humalog, an injectable human insulin for the treatment of diabetes obtains a high volume of revenues, representing 2625,9 million USD in 2020.

Finally, revenues from Alimta, an oncology product for the treatment of different cancers, have been high over the years. In 2020, revenues were 2329,9 million USD. Unfortunately, this product will be protected only until May 2022. Thus, it is widely expected that its revenues will decrease, just like as happened with Cialis.

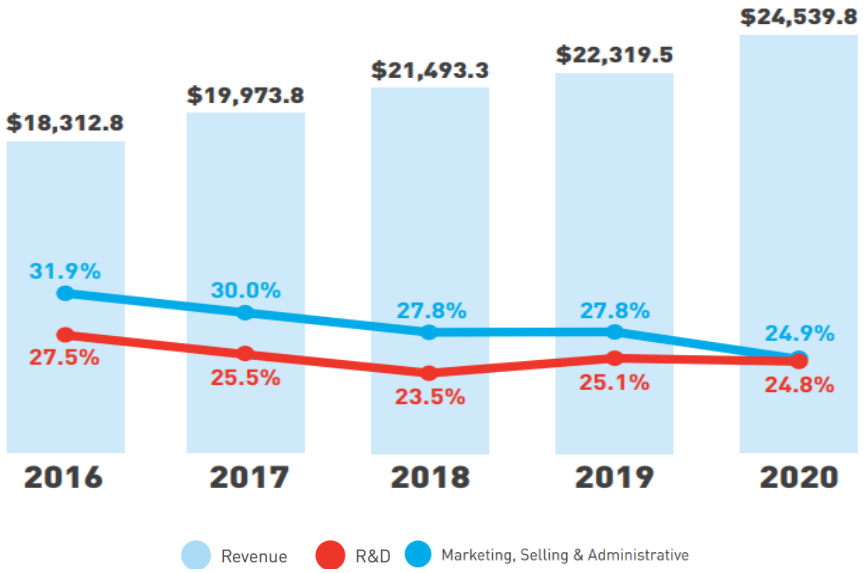

Figure 2.4: Operating Expenses in $ Millions, percent of revenue. *Source: 2020 Lilly Annual Report*

2.2.3. Marketing

During the last five years, marketing selling and administrative expenses have been reducing as a percent of revenues, although they remain above the industry average. In 2016 marketing expenses represented almost 32% of the revenues of the company while in 2020 those expenses reduced to approximately 25 % of the revenues. On the other hand, Lilly has been following a contrary strategy for R&D expenses, while marketing expenses have been reducing, the company continued to invest in R&D, which in general represents a continued improvement in the operating expenses as a percent of revenues. (Figure 2.4).

The company sells most of the products worldwide and they adapt marketing methods depending on the difference between customer needs around different regions but also depending on the countries regulations. The products are distributed to pharmacies, hospitals and physicians through three big wholesalers but also through online health care channels and sales representatives. Although customer needs differ from country to country, products belonging to the diabetes area represent the largest consolidated revenue. Regarding marketing collaborations, together with other pharmaceuticals, Lilly and other companies have agreements to develop and commercialize some products namely of the area of diabetes.

2.2.4. Competition

The competition among pharmaceutical companies is enormous. Companies compete globally in order to find and develop innovative medicines and treatments for their patients as well as improvement in their therapies. All the process includes time spent and huge amounts of costs. If Lilly's competitor can find a new product or sell a product with cost advantages, it is likely that a negative impact on Lilly's

sales and price reductions are going to happen. For this reason, innovation can be seen as the key to the competition among those firms.

Regarding competition challenges, generic pharmaceuticals, as well as biosimilar, represent the main threats for Lilly. When comparing branded products with generics, the differences in terms of costs and time spending are huge. In the US and Europe, generics are exempt from clinical trials to reveal their efficacy and safety. As a result, the prices of these products are lower when comparing with branded products, which is why they are so competitive. Since those companies do not need to spend a lot of resources and invest and R&D, they can save time and sell their products at lower prices.

Therefore, when products lose their protection, they are easily replaced by generics, which can cause losses in terms of revenues.

Almost half of the new potential medicines of Lilly represent biologics. Those products are highly regulated by specific entities. Just like generics, biologics are similar products to the innovator biologics, thereby representing a threat. If Lilly can develop an innovative biologic, after the approval of the new product, the companies that develop the biosimilar have much less effort when comparing to the "original" company that developed the original product because all the process of regulation and approval are facilitated.

2.2.5. Intellectual Property Rights

A patent represents a type of intellectual property and has a very important role not only for/to Lilly but also for/to all the pharmaceutical companies. All the ability of the company to develop and find new products depends on intellectual property protection. Usually, a company with a patent has 20 years of exclusive right to manufacture and distribute the product. However, innovative medicines have a long development and testing cycles and 20 years cannot be enough. When the patent expires, the company loses the exclusive right to produce the product.

Generics start to appear in the market to replace the original medicine after the "original" companies lose their market exclusivity. As a result, those companies can suffer losses in their sales.

As an example, when Lilly lost their patent protection for Cialis in 2017, the revenues of the medicine decreased represented a CAGR from 2016 to 2020 of -24.5%[4]. (Appendix L and M).

As already mentioned above, it is important to say that Lilly and other pharmaceutical companies depend a lot on products that have intellectual property protection. Those patents have a high important impact on most of the revenues. However, there are many products that will lose patent

[4] $(\frac{607.1}{2471.6})^{\frac{1}{5}} - 1 = -0.2448$

protection in the next years namely Alimta and Baqsimi that are protected by patents only until May and July 2022. For the correct evaluation of the company, this is a risk that has to be taken carefully because this may represent a negative impact on future revenues.

2.2.6. Government Regulation

In the US, the agency responsible for all the laws and regulations that ensure the safety of food, drugs, cosmetics and medical device is the US FDA. In the US, FDA has the legal power over all the products and devices of the company in the US and it is responsible for the requirements in activities involving testing, safety, effectiveness, manufacturing, quality control, distribution, labelling, marketing and others. The regulatory requirements outside the US are attributed to EMA (Europe and the Ministry of Health).

2.2.7. R&D

Pharmaceutical R&D is very costly, consumes time and is risky. The development of a new drug involves different phases until a new product is approved. At Lilly, there are 4 phases of the development of a new drug, namely, the discovery phase, the early development phase, the product phase and finally, the submission phase. However, the probability of success of the development of the product is very low. That is why, to do so, the development requires a high capital investment. In 2020, approximately 7600 employees entered in Lilly for the area of pharmaceutical R&D activities.

R&D Expenses

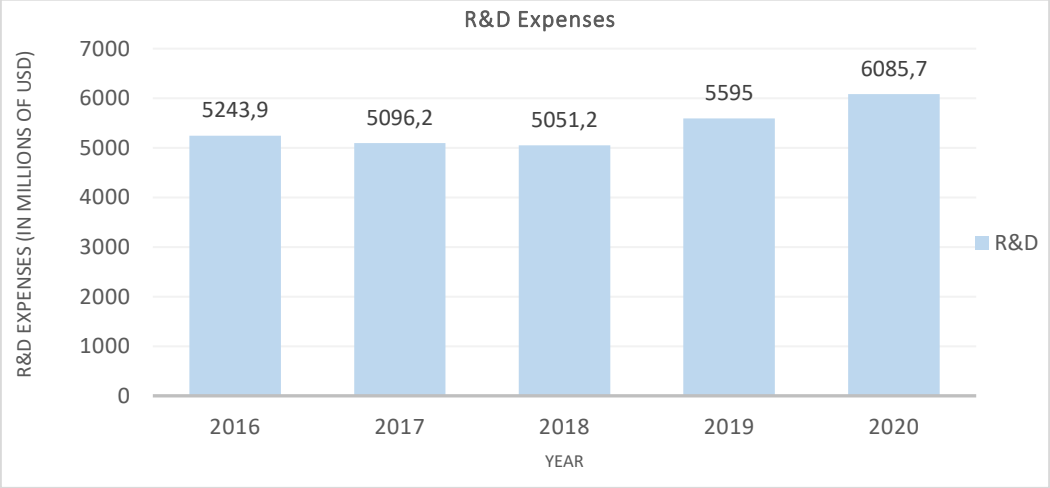

Figure 2.5: R&D Expenses from 2016-2020. *Source: Lilly's Annual Report, Own Estimates*

R&D expenses have remained relatively constant with a slight decrease in 2017 and 2018 and a slight increase in the last years.($CAGR_{2016-2020}$: 3.22%)[5]. In general, the company continued to invest more in R&D than in marketing and when comparing with the companies in the same industry, Lilly invests more of its revenues in R&D because they believe that it is necessary for their long-term competitiveness.

In 2019, 45 potential new drugs were in human testing or under regulatory review. As a result of the higher late state development expenses, R&D expenses increased around 11% in 2019. Moreover, due to the development of COVID-19 therapies, R&D expenses increased around 9% in the last year.

Table 2.1: R&D as a Percentage of Revenue

	2016	2017	2018	2019	2020
Revenue (in millions of USD)	18312,8	19973,8	21493	22319,5	24539,8
R&D[6]	-	5096,2	5051,2	5595	6085,7
R&D as a percentage of Revenue	27,5%	25,5%	23,5%	25,1%	24,8%

Source: *Lilly's Annual Reports, Own estimates*

During those five years, on average, approximately 25.28% of Lilly's total revenues represent R&D expenses.

2.2.8. Future Expectations

According to the 2020 report of Evaluate pharma (table 2.2), comparing 2019 with the expectations for 2026, shows that the two main therapeutic areas based on worldwide prescription and sales, will be the area of oncology and anti-diabetes. In 2018 and 2019, Oncology was already ranked in the top 1 and the expectations point out that sales in this area will continue to rise which is good for Lilly since they market drugs in this area. The rise of the area of diabetes is also good for the company since they already have treatments for diabetes and they are developing more new treatments and drugs for this disease. Actually, according to the report of the Evaluate Pharma, at the moment, the most valuable R&D project in the pharmaceutical industry is Eli Lilly's anti-diabetic and obesity drug tirzepatite with an NVP of 7.8 billion dollars.

[5] $(\frac{6085.7}{5243.9})^{\frac{1}{5}} - 1$=0.03022

[6] Note: the information about 2016 is not updated for R&D expenses. However, the revenues and R&D as a % of Revenue were updated in the 2020 Annual Report

Table 2.2: Worldwide Prescription Drug and Sales by Therapeutic Area in billion $ (2018, 2019 & 2026)

	2018	2019	2026
Oncology	123,8	145,4	311,2
Anti-diabetes	48,5	51	66,9
Vaccines	30,5	32,5	56,1
Anti-Rheumatics	58,1	56,9	49,7

***Source**: Evaluate Pharma (June 2019 and June 2020)*

Over the years, lifestyle changes have been increasing the cases of new diseases. Namely, the increasingly sedentary nature of new forms of work, the changing ways of transportation and the increasing urbanization and globalization have been the main causes for obesity which is directly related to the risk of cardiovascular diseases, diabetes and cancers. According to the world health organization, since 1975 worldwide obesity has nearly tripled.

According to the International Diabetes Federation, in 2019 there were approximately 463 million adults with Diabetes and the expectations for the future indicate that in 2045, cases should rise to 700 million. This is a huge health problem that creates an opportunity for the development of new therapies not only in the diabetes segment but also in the Oncology area because of the new cases of cancers.

3. Financial Statement Analysis of the Last 5 Years

3.1. Revenues

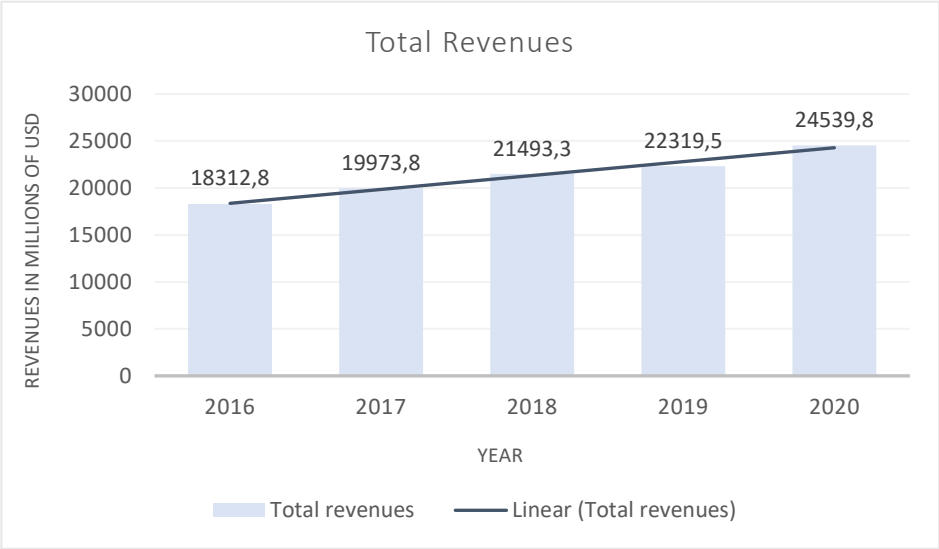

Figure 3.1: Total Revenues. *Source: Annual Reports, Own Estimates*

Over the past five years, the tendency of the revenues has been following an upward trend. In 2020, revenues increased around 10% and the CAGR of revenues from 2016 until 2020 is 6.03%[7] (Figure 3.1).

3.2. Operating Expenses

Regarding the operating expenses, according to figure 2.4, it is possible to conclude that over the last five years, while the Marketing, Selling & Administrative expenses have been following a downward trend, by the other side, the company has so far opted to invest continuously in R&D. In general, operating expenses have remained relatively stable with a slight increase in 2020 driven by around $450 million of development expenses for the treatment of COVID-19.

Regarding EBITDA margin, over the last 5 years, it has been relatively stable with an average of 31.78% (Figure 3.2).

[7] $\left(\frac{24539.8}{18312.8}\right)^{\frac{1}{5}} - 1 = 0.0603$

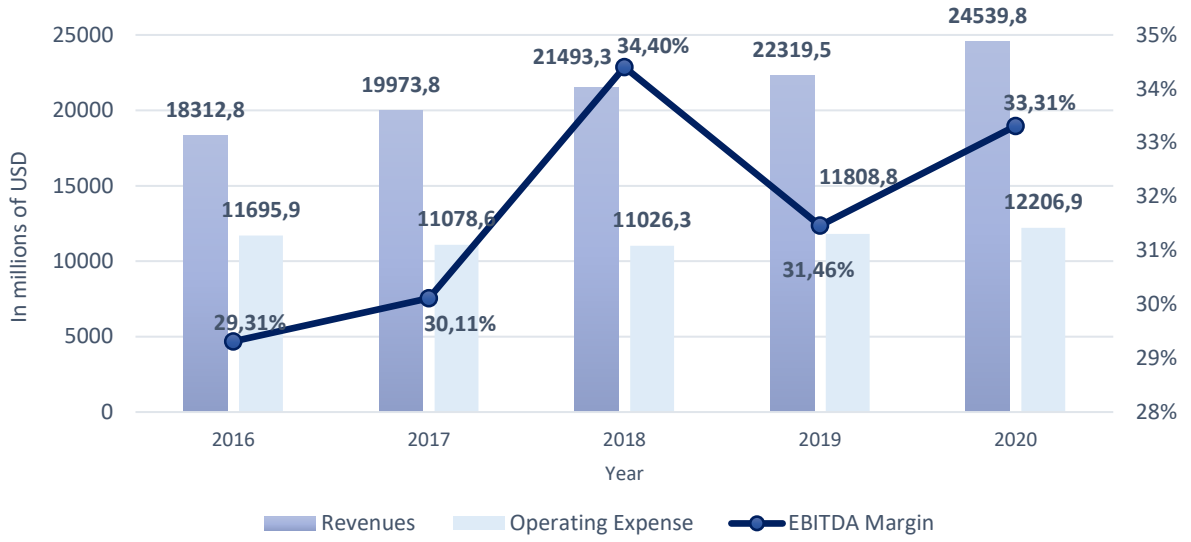

Figure 3.2: EBITDA Margin, Revenues and Operating Costs (in millions $). *Source: Lilly's Annual Reports, Own Estimates*

Table 3.1: Profitability Ratio

	2016	2017	2018	2019	2020
ROIC	11,6881	0,6421	12,6281	22,3021	25,1755

Source: *Bloomberg*

ROIC has been increasing (except in 2017) which can be associated with an improvement in the ability to invest its capital and having a better return. In 2017 ROIC was very low which can be associated with the negative net income of that year. In 2017, the president of USA implemented the 2017 Tax Act. As a result, tax expense was higher than income before income taxes thereby resulting in a net income loss.

3.3. Liquidity Analysis

Table 3.2: Liquidity Ratios

	2020	2019	2018	2017	2016	Average
Quick Ratio	1,080	0,893	1,468	1,014	1,05	1,101
Current Ratio	1,399	1,164	1,729	1,321	1,370	1,397

Source: *Lilly's Annual Reports*

The current ratio compares the company's current assets with its current liabilities and measures the company's ability to pay its short term debt. Over the last 5 years, the ratio has remained relatively stable and higher than 1 which is a good indicator of the health of the company, telling that they do not have difficulties in paying their short term debt.

Regarding the Quick ratio, over the last years this ratio has been also higher than 1, which is good, but decreased in 2019 as cash decreased, which may represent difficulties in paying debt.

3.4. Capital Structure

Table 3.3: Capital Structure

	2020	2019	2018	2017	2016
Total Equity	5641,6	2606,9	9828,7	11592,2	14007,7
Net Debt	13097,6	12970,9	3970,1	5688,7	4339,4
Total Assets	46633,1	39286,1	43908,4	44981	38805,9
Total Liabilities	40991,5	36679,2	34079,7	33388,8	24798,2
Debt to Equity ratio	7,27	14,07	3,47	2,88	1,77
Long Term Debt	16586,6	13817,9	9196,4	9931,8	8358,8

Source: *Lilly's Annual Reports, Own Estimates*

Over the last years, total equity has shown a decreasing tendency to $14007,7M in 2016 comparing with 5641,6M in 2020, representing a CAGR equal to approximately -16,63%[8]. On the other hand, debt levels followed an upward trend during the same period.

Despite this trend, when evaluating the company's financial leverage, by looking at the debt to equity ratio, in the last two years the level was higher when comparing with the years 2016-2018.

Table 3.4: Interest Coverage Ratio Computation

	2016	2017	2018	2019	2020
EBIT	3871,3	4447,5	5785,3	5789,5	6849,6
Interest Expense	185,2	225	242,5	400,6	359,6
Interest Coverage Ratio	20,90	19,77	23,86	14,45	19,05

Source: *Lilly's Annual Reports, Own Estimates*

3.5. Dividend Analysis

Table 3.5: Dividends

	2016	2017	2018	2019	2020
DPS	2,05	2,08	2,25	2,58	2,96
EPS	2,58	-0,19	3,31	8,89	6,79
Dividend Payout Ratio	79,46%	-1094,74%	67,98%	29,02%	43,59%

Source: *Lilly's Annual Reports, Own Estimates*

[8] $(\frac{5641.6}{14007.7})^{\frac{1}{5}} - 1 = -0.1663$

Excluding the year of 2017 when Net Income was negative, in the last 5 years, the payout ratio has oscillated between 29,02% and 79,46% with an average of 55,01% which is attractive to the shareholders.

3.6. Conclusion: SWOT Analysis

After analysing internal and external factors regarding the company, in order to provide insights about the competitive position of the company it is important to perform a brief SWOT analysis.

Strengths

-Products are available in more than 120 countries and more than 34000 employees worldwide

-The interest coverage ratio has remained high over the last 5 years which indicates that the company has the ability to pay its current interest payment with its earnings.

-Important recognitions over the years, such as one of the world's most ethical companies, America's Best Employers for Diversity and Global 100 Most Sustainable Corporations in the World.

-Strong financial indicators

- Covid-19 treatments and Diabetes treatments

Weaknesses

-negatively impact due to COVID-19

- Pricing pressure

Opportunities

-Rising demand for COVID treatment

-Rising demand for Diabetes treatments

-Mergers and Acquisitions of smaller companies

Threats

-Potential competition due to generics pharmaceuticals, Biosimilar and new diseases such as cancers and diabetes.

-loss of intellectual property protection for many products in the next years

-Increasing in the government price controls and other public and private restrictions on pricing.

-COVID-19 represents both opportunity but also risk.

-negative effect on revenues and loss of reputation due to unexpected efficacy concerns.

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4. Corporate Valuation

4.1. Assumptions and Projections for the Valuation

In order to use the DCF method and to decide which will be the estimates for the next periods, it is necessary to make some assumptions. In this regard, the background analysis was an important step that provided us with some important insights about the industry and the company necessary for the definition of these assumptions.

Before explaining the assumptions for the items of the results, the going concern assumption is taken into account, i.e. the company will not be liquidated. Instead, it will stay in business and continue the operations for the near future. Thus, to achieve the final share price, the DCF model is estimated based on the next five years (2021-2025) and, in the end, the terminal value for the next years is going to be assumed.

4.1.1. Revenues

The following table shows how much the revenues increased, in percentage, from year to year:

Table 4.1: Revenues Growth.

2017	2018	2019	2020
9%	8%	4%	10%

Source: *Lilly's Annual Reports, Own Estimates*

The revenues did not follow a constant growth pattern, as the tendency was to rise and the rates were high, it is quite likely that the revenues will continue to increase. However, as already mentioned, due to COVID-19, patent expiration and generic competition, revenues are expected to grow more slowly. It is also important to remember that Lilly represents a mature firm. That means that the overall demand does not change significantly from year to year.

Regarding the terminal growth rate, it is necessary to predict what the perpetuity rate will be taking into account inflation and GDP rates. In 2020, inflation was 1.20% (Damoradan) and the real GDP was negative. However, due to the pandemic, such values are likely to be atypical. Most Central Banks consider that the optimal inflation rate is around (or less) than 2% and the optimal GDP is around 2% - 3%. Given the above-mentioned reasons, and assuming that inflation will remain stable and real GDP is going to be positive and around 1% according to the forecasts (Statista), we assumed a perpetual growth rate of 2% from 2025, inclusive, which appears to be a good forecast in line with the real growth of the economy.

Regarding the last five years, the $CAGR_{2016-2020}$ of revenues was 6.03%. Therefore, we decided to consider an increase of 6%, 5%, 4%, 3% and, finally, 2% respectively for the next years, as shown in table 4.2.

Table 4.2: Revenue's Projections

In Millions of $	2020	2021F	2022F	2023F	2024F	2025F
Revenues	24539,80	26012,19	27312,78	28405,31	29257,47	29842,62
Growth		6%	5%	4%	3%	2%

***Source**: Lilly's Annual Reports, Own Estimates*

For the remaining income statement items, they are projected based on the historical average method as a percentage of revenues.

4.1.2. Cost of Goods Sold

For the next few years, the cost of goods sold is projected based on its historical average as a percentage of revenues from 2017-2020. The cost of sales/revenues ratio ranged from 21% and 22% from 2017 up to 2020, whereas for 2016, the value was much higher (around 30%). For this reason, we use a rate of 22% based on the historical average only for the last four years. (Appendix F).

4.1.3. Operating Expenses

Since selling, general and administrative expenses as a percentage of revenues have been decreasing during the last five years, fluctuating between 24% and 35%, the SGA/Revenues ratio are computed based only on last year's performance. On the other hand, during the last 4 years, the R&D/Revenues ratio has fluctuated between 23% and 25%, which demonstrates some stability, and thus, for the computation of the R&D/Revenues ratio, the last 4 years' performance is taken into account. For these reasons, it is assumed an R&D/Revenues ratio of 24.7% and an SGA/Revenues ratio of 24.9% (appendix G).

4.1.4. EBIT

According to the Lilly's Annual reports, the computation of EBIT is based on the following equation:

$$\textbf{EBIT = Revenues – Cost of Revenues – R\&D expenses- SG\&A expenses - other operating Expenses} \quad (23)$$

Now that we have already projected the items belonging to the EBIT, table 4.3 shows the computation:

Table 4.3: Computation of the EBIT

(In millions of $)	2021F	2022F	2023F	2024F	2025F
Revenue	26012,19	27312,8	28405,31	29257,47	29842,62
- Cost of Revenue	5722,68	6008,81	6249,17	6436,64	6565,37
-SG&A Expenses	6477,03	6800,89	7072,92	7285,11	7430,81
-R&D Expenses	6425,01	6746,26	7016,11	7226,59	7371,13
other operating expenses	0	0	0	0	0
EBIT	7387,46	7756,83	8067,11	8309,12	8475,30

***Source**: Lilly's Annual Reports, Own Estimates*

4.1.5. Effective Tax Rate (t)

Excluding 2017, the income tax rate has remained relatively stable over the past years. For this reason, in table 4.4, the average of the last years is applied for the forecasting period. Also, according to the 2020 Lilly's annual report, the 2021 effective tax rate is expected to be approximately 15 percent, which is in accordance with the 2016-2020 average (except 2017). For these reasons, we use a tax rate of 15%.

Table 4.4: Effective Tax Rate

	2016	2017	2018	2019	2020	Average (except 2017)
Effective Tax Rate	18,90%	109,3%	14,40%	11,90%	14,30%	**14,90%**

***Source:** Lilly's Annual Reports, Own Estimates*

4.1.6. Depreciation and Amortization

Since the value of D&A as a percentage of revenues has been decreasing, the projections for these values will be based only on the historical 2019-2020 average, which was equal to 5.46% (appendix H). Table 4.5 shows the projections for the D&A.

Table 4.5: Depreciation and Amortization Forecast

(In millions of $)	2021F	2022F	2023F	2024F	2025F
Revenues	26012,2	27312,8	28405,3	29257,5	29842,6
Average D&A/Revenues	5,46%	5,46%	5,46%	5,46%	5,46%
Depreciation & Amortization	**1419,932**	**1490,928**	**1550,566**	**1597,083**	**1629,024**

***Source**: Lilly's Annual Reports, Own Estimates*

4.1.7. Capital Expenditures (CAPEX)

Firstly, for the computation of the CAPEX in table 4.6, it is necessary to predict the value of the non-current assets. Thus, the items that we include in the NCA re "PPE", "Goodwill", "intangibles", "long-term investments" and "other long-term investments" as shown in the following formula:

Non-current assets= Property/Plant/Equipment + Goodwill Net
+ Net intangibles + LT investments + Total other LT investments (24)

After determining the value of the NCA, it is necessary to predict the value of the Net Capex that is, nothing less than the difference between the non-current assets from one year to another. It can be computed based on the following formula:

$$\textbf{Net CAPEX}_n = \text{Non-Current Assets}_n - \text{Non-Current Assets}_{n-1} \quad (25)$$

After knowing the Net CAPEX, the final computation of the CAPEX can be done by adding the D&A to the Net CAPEX, as the following formula demonstrates:

$$\textbf{CAPEX}_n = \text{Net CAPEX}_n + \text{D\&A}_n \quad (26)$$

Since the majority of the items that belong to the CAPEX are decreasing as a percentage of the revenues, the method used to forecast them is the last 2-year average over revenues ratio. (Appendix I).

Table 4.6: Computation of the CAPEX

(In millions of $)	2019	2020	2021F	2022F	2023F	2024F	2025F
Non-Current Assets							
Property/Plant/Equipment	8405	8681,90	9499,2	9974,2	10373,1	10684,3	10898,0
Goodwill	3679,4	3766,50	4140,3	4347,3	4521,2	4656,9	4750,0
Intagibles	6618	7450,00	7803,7	8193,8	8521,6	8777,2	8952,8
LT investments	1962,4	2966,80	2715,9	2851,7	2965,8	3054,8	3115,9
Other LT investments	4911,7	6305,80	6204,2	6514,4	6775,0	6978,3	7117,8
Total	25576,5	29171,00	30363,347	31881,51	33156,775	34151,48	34834,508
Net Capex		**3594,50**	**1192,35**	**1518,17**	**1275,26**	**994,70**	**683,03**
D&A	**1232,6**	**1323,9**	**1419,9**	**1490,9**	**1550,6**	**1597,1**	**1629,0**
Capex		**4918,40**	**2612,28**	**3009,10**	**2825,83**	**2591,79**	**2312,05**

***Source**: Lilly's Annual Reports, Own Estimates*

4.1.8. Working Capital

For the computation of the working capital in table 4.7, it is necessary to consider the values of the current assets and the current liabilities. The items that we consider for the current assets are "Accounts receivable", "Other receivable", "Total inventory" and "Prepaid expenses". For the current liabilities, the items that we include are "Accounts payable", "Accrued expenses", "Income taxes payable" and "Other current liabilities". Once more, these forecasts are based on the same method of the historical 5-year average as the weighted average of revenues. (Appendix J)

Table 4.7: Working Capital

(In millions of $)	2020	2021F	2022F	2023F	2024F	2025F
Current Assets						
Accounts receivable	5875,3	6032,6	6334,2	6587,6	6785,2	6920,9
Other receivable	1053,7	850,9	893,5	929,2	957,1	976,2
Total inventory	3980,3	4510,5	4736,1	4925,5	5073,3	5174,8
Prepaid Expenses	2871,5	2279,2	2393,2	2488,9	2563,6	2614,9
Total	13780,8	13673,3	14357,0	14931,3	15379,2	15686,8
Current Liabilities						
Accounts payable	1606,7	1711,1	1796,7	1868,5	1924,6	1963,1
Accrued expenses	997,2	1170,8	1229,4	1278,5	1316,9	1343,2
Income taxes payable	495,1	787,0	826,3	859,3	885,1	902,8
Other current liabilities	2750,3	2955,0	3102,7	3226,8	3323,6	3390,1
Total	5849,3	6623,84	6955,03	7233,231	7450,23	7599,233
Net Working Capital	7931,5	7049,5	7402,0	7698,0	7929,0	8087,6
Changes in NWC	1331,2	**-882,0**	**352,5**	**296,1**	**230,9**	**158,6**

***Source**: Lilly's Annual Reports, Own Estimates*

Since the previous computation of EBIT was done based on the 3 items of expenses that already included depreciation and amortization, that is why the following cash flow that we use in table 4.8 is the Net Capex instead of Capex. For the perpetuity value that is necessary for the computation of the EV, we assume that EBIT, Net CAPEX, and variation in the WC will grow at a terminal rate of 2%. In table 15, it is possible to see the final computation of the FCFF necessary for the computation of the EV.

Table 4.8: FCFF

	2020	2021F	2022F	2023F	2024F	2025F	Perpetuity
EBIT	6849,6	7387,5	7756,8	8067,1	8309,1	8475,3	8644,81
Tax Rate	0,15	0,15	0,15	0,15	0,15	0,15	0,15
EBIT (1-t)	5822,2	6279,3	6593,3	6857,0	7062,8	7204,0	7348,1
Net Capex	3594,5	1192,3	1518,2	1275,3	994,7	683,0	696,69
Δ in Working Capital	1232,1	-898,4	313,1	263,0	205,2	140,9	143,69
FCFF	**995,6**	**5985,4**	**4762,0**	**5318,8**	**5862,9**	**6380,1**	**6507,70**

***Source**: Lilly's Annual Reports, Own Estimates*

4.1.9. Re - Cost of equity

To estimate the cost of equity (table 4.9), it is necessary to first estimate three different outputs that were directly taken from Damodaran's website and from the Bloomberg platform. First, the 10-year US Government Bonds on the 31st of December 2020, is the proxy that we assumed for the risk-free rate, which, according to the Damodaran website, is 0.93%. After this, we use the adjusted beta from Bloomberg, in the final year of 2020 that represents 0.58. Finally, for the third output, also from Bloomberg, we use the equity risk premium of 5.72% and we determine a cost of equity equal to 4.25%.

Table 4.9: Cost of Equity

CAPM	Estimations
Rf (Damodaran 2020)	0,93%
Equity Risk Premium (Bloomberg)	5,72%
β (Bloomberg)	0,58
Re	4,25%

***Source**: Own Estimates, Bloomberg, Damodaran*

4.1.10. WACC - Weighted-Average Cost of Capital

For the computation of the WACC, more inputs are needed. By multiplying the closing share price of the 31st of December 2020 by the number of shares outstanding at the same date, it was possible to compute the market value of equity equal to 160133.2 million USD.

Regarding the calculation of debt value, we assume a value of 26226.4 million USD as a result of the sum between the 2020 long-term debt plus the other total liabilities (appendix K). After this step, the computation of the cost of debt (Rd) was obtained by dividing the interest expense by the value of the debt obtained above.

Finally, given all the outputs, a value of WACC equal to 3.81% was computed (table 4.10).

Table 4.10: WACC

WACC	Estimations
Debt	26226,4
Market value of Equity	160133
E/(E+D)	0,86
D/(E+D)	0,14
T	15%
Re	4,25%
Rd	1,37%
WACC	3,81%

***Source:** Own Estimates, Bloomberg, Damodaran*

4.2. DCF-FCFF Valuation

Now, we already have all the inputs necessary for the computation of the enterprise value.

In table 4.11, we started to compute the terminal value according to formula 15 from the literature review. After this, in order to compute the equity value, we use formula 9 from the literature review, where it is necessary to make some adjustments, such as subtracting the market value of debt that we already previously computed when calculating the WACC. Also, it is necessary to take an additional step to add the value of cash and the value of the other non-operating assets. For the calculation of

the non-operating assets, the assumption that we use consists of considering all short-term financial investments.

Table 4.11: DCF-FCFF Valuation

(In million USD)	2020	2021	2022	2023	2024	2025	Perpetuity
FCFF	995,56	5985,3556	4762,015	5318,7544	5862,8889	6380,1013	6507,7
WACC							3,81%
G							2%
Terminal Value							358778,15
Present Value of FCFF		5765,4692	4418,5539	4753,8343	5047,6643	5291,1622	297542,82
EV	322819,51						
(-) Debt	26226,4						
(+) Cash	3657,1						
(+) NOA	24,2						
Equity Value	300274,41						
Number of shares outstanding	956,59						
Value per share	**313,90**						

***Source**: Lilly's Annual Report, Own Estimates*

4.3. Sensitivity Analysis

During this project, until now, different assumptions were considered when evaluating the price. When we were estimating certain rates and ratios, the assumptions that we made cannot always be the most accurate since we are constantly in a scenario of uncertainty. For that reason, to get an idea of how much these assumptions can affect the final price, we decided to perform a sensitivity analysis for the WACC and the terminal growth rate.

Therefore, we decided to perform the analysis assuming that the WACC will vary by +/- 0.4%, while the TGR will vary by +/- 0.2%.

Table 4.12: Sensitivity Analysis – WACC and Terminal Growth Rate

		WACC				
		3,01%	3,41%	**3,81%**	4,21%	4,61%
TGR	1,60%	417,84	319,76	257,19	213,81	181,97
	1,80%	487,28	359,79	283,05	231,79	195,14
	2%	584,22	411,17	**313,90**	253,03	210,32
	2,20%	729,03	479,55	354,04	278,49	228,03
	2,40%	968,81	575,00	404,64	309,58	248,95

***Source:** Own Estimates*

From table 4.12, it is possible to verify how different the share price will be and how it changes substantially if we make small variations of only 0.2% in the TGR and 0.4% in the WACC. Also, we can verify that the two rates have different effects on the price, i.e., the price reaches its maximum

($968.81) when the value of TGR is the maximum and the value of the WACC is the minimum. In contrast, the lower price is reached ($181.97) when the WACC increases and the TGR decreases. Moreover, since the lower price is the closest to the market value, if we had used different assumptions and obtained a higher value for WACC and a lower value for TGR, maybe our estimate for the share price would be closer to the market price.

Finally, it is important to mention that this analysis is crucial to understand the differences when comparing the prices from the two different methods and when drawing conclusions. All the uncertainty behind the assumptions contributed to the determination of the final price and table 4.12 proofs that the choice between different rates can lead to different final share prices.

4.4. Relative Valuation

In order to predict the fair value of the company's shares at 31st December 2020, a relative valuation analysis is also performed, to complement the DCF valuation results. For this purpose, we selected three different multiples that we already mentioned in the literature review, namely, the P/R, P/S ratio and EV/EBITDA ratio.

All the values from table 4.13 were collected from Bloomberg and are relative to the date of 31st December 2020.

Regarding table 20, first, we tried to identify the potential outliers and, based on that, the average for each multiple was computed. For the next step, we also decided to compute the median to eliminate the effect of some possible outliers. This allows us to compare the median with the average without the potential outliers, and, finally, we found out that these two values do not differ significantly between them, so we chose to use the median for the computations in table 4.14.

Table 4.13: Peer Group and Multiples

Peer Group	Price to Earnings Ratio	Price to Sales Ratio	Enterprise Value to EBITDA
AbbVie	10,77 (outlier)	3,87 (outlier)	11,84 (outlier)
Astrazeneca	97,52 (outlier)	6,65	21,67
Bristol-Myers Squibb	26,07	4,25	125,08 (outlier)
Merck	15 (outlier)	4,58	19,57
Novartis	26,83	4,32	16,17 (outlier)
Johnson & Johnson	23,28	5,02	15,74 (outlier)
Pfizer	26,33	4,88	17,56
Eli Lilly	22,29	6,24	23,650
Average	**24,96**	**5,13**	**20,61**
Median	**26,07**	**4,88**	**20,62**

***Source**: Bloomberg, Own Estimates*

By using the median of the peer group for each multiple, it was possible to achieve three different values for the fair value of the shares.

By multiplying the earnings per share by the median of the P/E, we get the first target price of $206.74. Secondly, we get an equity value of 119754.22 by multiplying the sales of Lilly by the median of the P/S ratio and we reach a target price of $125.19. Finally, using Lilly's EBITDA and the adjustments for debt, cash and NOA, we reach a value of $152.62 per share. Using these three prices, we obtain an average of $161.51.

Table 4.14: Relative Valuation

In millions of $ (except per share)		PER	P/S	EV/EBITDA
Peers Multiple		26,07	4,88	20,62
Earnings per share	7,93			
Sales	24539,8			
EBITDA	8173,5			
EV				168537,57
(-) Debt	26226,4			
(+)Cash	3657,1			
(+)NOA	24,2			
Equity value			119754,22	145992,47
Number of shares outstanding	956,59			
Value per Share		206,74	125,19	152,62
Average of Value per Share	**161,51**			

***Source**: Lilly's Annual Reports, Own Estimates*

4.5. Valuation Results

On the one hand, with the DCF-FCFF, we reached a final share price of $313.90, well above the market value of $167.40. In contrast, through the multiples approach, we obtained a price of $161.51 which demonstrates a large discrepancy.

The discrepancy between values can be explained by different reasons.

As we already have seen in the sensitivity analysis, the assumptions that we made have a significant impact on the determination of the price since even the small variations can change significantly the results.

Also, it is important to mention that since the beginning of the year 2021, the share price has been increasing. Actually, according to Nasdaq, since the final of May, the share price has been always bigger than $200, and in August, it was even higher than $250, which is more in line with the value that we obtained. If this trend continues, it is more likely to achieve the results that we obtained through the FCFF valuation.

Regarding the relative valuation, as we already mentioned in the literature review, this method is simpler and thus can be misleading. Also, it is important to refer that Lilly has more and different competitors than the ones we used in the multiples valuation, which can lead to incorrect results and conclusions. Moreover, it is important to remember that 2020 was a very atypical year which had a significantly negative impact on the performance of large companies, making the values of the multiples different from the "normal" reality. To achieve the values of Rd and Re, we also used data from 2020, namely the risk-free rate, the equity risk premium and the Beta that influenced the final results. Since those values refer to that atypical year, the values may reflect the effect of the pandemic.

5. Conclusion

The goal of this project is to determine an approximation for the fair value of Lilly's share price. For that purpose, all the different parts of the project were extremely important to understand how the business of the firm works and how it has evolved over the years. All this information gave us important insights to build the assumptions.

To pursue our goal, we applied two different methods, FCFF and Relative Valuation with the intention to have two values to sustain the results. However, we achieved different results which is not a problem. It is, in fact, normal and it can happen since those methods are different and the fact that they are based on different assumptions and methodologies or even, since with the relative method we achieved to a value below the stock price, maybe the market values this company above the pharmaceutical sector.

The FCFF method uses subjective assumptions that were developed under uncertainty. For this reason, the sensitivity analysis was an important step to study the different scenarios in case of different assumptions. If we decide to modify the values of WACC or for the TGR, as we can see from the sensitivity analysis, the values will continue to be above the market price regardless of the other assumptions that we consider during the calculations. The impact of small changes in the assumptions can actually have a big impact on the final share price.

One of the things that we could improve in our project consists in using an additional method. It is important to remember that there are many different models to evaluate a company, and how we suggested in the literature review, one of that ways consists in using real options valuation. For future research, it may be interesting to use the options pricing method to estimate the price and compare it with the values that we obtained and with the market price. Also, it can also be interesting to make another valuation for the year 2021, because the values of rd, re, rf and multiples are different and the values can be more in line with the different methods and not reflect the initial effect of covid. Finally, since the price that we estimated from the FCFF was almost the double when comparing with the market price, we recognize that it could have been interesting if we had established different assumptions in order to obtain a lower price.

For the reasons that we already mentioned, even though the two methods suggest different conclusions, the FCFF method is widely used in practice and has more complexity and, for these reasons we decided to take the final conclusions based on this method.

We can conclude that based on the DCF model it was possible to achieve a final price of $313.90. Since the market price on 31st December of 2020 was $167.40, the model suggests that Lilly's shares

were undervalued at that date. Finally, our final recommendation to the investors is that they should buy Eli Lilly's shares or, in other words, the model suggests that the market shares are undervalued.

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7. Appendixes

Appendix A: Income Statement 2016-2020

Income Statement					
In Millions of USD except Per share	**FY 2020**	**FY 2019**	**FY 2018**	**FY 2017**	**FY 2016**
Revenue	24539,8	22319,5	21493,3	19973,8	18312,8
Cost of Revenue	5483,3	4721,2	4681,7	4447,7	5654,9
Gross Profit	19056,5	17598,3	16811,6	15526,1	15567,2
+ Selling/General/Administrative Expense	6121,2	6213,8	5975,1	5982,4	6452,0
+ Research & Development	6085,7	5595	5051,2	5096,2	5243,9
Purchased R&D Written-Off	660,4	239,6	1983,9	1112,6	30,0
Restructuring Charge	151,2	77,8	127,8	601	126,7
Impairment-Assets Held for Use	-20	497,8	139,1	730,6	255,8
Other Unusual Expense (Income)	0	-57,3	0	0	0
Unusual Expense (Income)	791,6	757,9	2250,8	2444,2	412,5
Total Operating Expense	18481,8	17287,9	17958,8	17970,5	17763,3
Operating Income	6058	5031,6	3534,5	2003,3	3458,8
Interest Expense	-359,6	-400,6	-242,5	-225	-185,2
Interest Income - Non-Operating	33	80,4	159,3	166,4	108,7
Interest Inc (Expense) Net- Non-Op Total	-326,6	-320,2	-83,2	-58,6	-76,5
Other Non-Operating Income (Expense)	1498,5	554,5	228,8	360,1	-8,3
Net Income Before Taxes	7229,9	5265,9	3680,1	2304,8	3374,0
Provision for Income Taxes	1036,2	628	354,2	-2188,8	636,4
Net Income After Taxes	6193,7	4637,9	3325,9	4493,6	2737,6
Net Income Before Extra, Items	6193,7	4637,9	3325,9	4493,6	2737,6
Discontinued Operations	0	3680,5	81,4	-117,7	0
Extraordinary Item	0	0	-175,3	-4580	0
Total Extraordinary Items	0	3680,5	-93,9	-4697,7	0
Net Income, GAAP	6193,7	8318,4	3232	-204,1	2737,6

***Source**: Lilly's Annual Reports*

Appendix B: Balance Sheet 2016-2020

Balance Sheet					
In Millions of USD except Per Share	**FY 2020**	**FY 2019**	**FY 2018**	**FY 2017**	**FY 2016**
Cash & Equivalents	3657,1	2337,5	7320,7	6536,2	4582,1
Short Term Investments	24,2	101	88,2	1497,9	1456,5
Cash and Short Term Investments	3681,3	2438,5	7408,9	8034,1	6038,6
Accounts Receivable - Trade, Gross	5901,2	4569,7	1207	4585	4069,7
Provision for Doubtful Accounts	-25,9	-22,4	-24,1	-38,7	-40,3
Accounts Receivable - Trade, Net	5875,3	4547,3	5776,8	4546,3	4029,4
Receivables – Other	1053,7	994,2	0	715,9	736,9
Total Receivables, Net	6929	5541,5	5776,8	5262,2	4776,3
Inventories - Finished Goods	758,9	647,3	0	1211,4	987,3
Inventories - Work In Progress	2535,4	2067,6	0	2697,7	2117,2
Inventories - Raw Materials	651,2	424,6	0	488,8	435,3
LIFO Reserve	34,8	51,2	0	60,4	22,1
Total Inventory	3980,3	3190,7	3098,1	4458,3	3561,9
Prepaid Expenses	2871,5	2538,9	2036,7	1447,5	734,6
Discountinued Operations - Current Asset	0	0	2229,1	0	0
Total Current Assets	**17462,1**	**13709,6**	**20549,6**	**19202,1**	**15101,4**
Buildings – Gross	7326,1	7067,3	0	7425,6	6917,8
Land/Improvements - Gross	226,8	169,5	0	192,7	197,6
Machinery/Equipment - Gross	8560,9	7913,3	0	8689	7864,7
Construction in Progress - Gross	2138,8	1884,4	0	1783,8	1797,5
Other Property/Plant/Equipment – Gross	0	532,1	16663	0	0
Property/Plant/Equipment, Total-Gross	18252,6	17566,6	16663	18091,1	16777,6
Accumulated Depreciation, Total	-9570,7	-9161,6	-8666,9	-9264,6	-8525
Property/Plant/Equipment, Total-Net	8681,9	8405	7996,1	8826,5	8252,6
Goodwill, Net	3766,5	3679,4	1366,6	4370,1	3972,7
Intangibles – Gross	9177,8	7914,4	2166,7	7950,4	7731,1
Accumulated Intangible Amortization	-1727,8	-1296,4	-1098,7	-3921,2	-3373,2
Intangibles, Net	7450	6618	1068	4029,2	4357,9
LT Investment - Affiliate Companies	471,8	289,2	289,2	584,8	568,7
LT Investments - Other	2495	1673,2	1716,2	5094	4638,8
Long Term Investments	2966,8	1962,4	2005,4	5678,8	5207,5
Defered Income Tax - Long Term Asset	2830,4	2572,6	2613,7	0	0
Discontinued Operations - LT Asset	0	0	6484,1	0	0
Restricted Cash - Long Term	0	0	0	0	0
Other Long Term Assets	3475,4	2339,1	1824,9	2874,3	1913,8
Other Long Term Assets, Total	6305,8	4911,7	10922,7	2874,3	1913,8
Total Assets	**46633,1**	**39286,1**	**43908,4**	**44981**	**38805,9**
Accounts Payable	1606,7	1405,3	1207,1	1410,7	1349,3
Accrued Expenses	997,2	915,5	955,6	997,9	896,9
Notes Payable/Short Term Debt	0	1494,2	498,9	2696,8	1299,3
Current Port, of LT Debt/Capital Leases	8,7	5,1	603,3	1009,8	638,1
Dividends Payable	770,6	671,5	650,8	590,6	548,1
Income Taxes Payable	495,1	160,6	393,4	532,9	119,1
Other Payables	5853	4933,6	4849,5	4465,1	3914,9
Discontinued Operations - Curr Liability	0	0	692,8	0	0
Other Current Liabilities	2750,3	2189,4	2036,7	2832,1	2220,9
Other Current liabilities, Total	9869	7955,1	8623,2	8420,7	6803
Total Current Liabilities	**12481,6**	**11775,2**	**11888,1**	**14535,9**	**10986,6**

Long Term Debt	16586,6	13817,9	9196,4	9931,8	8358,8
Capital Lease Obligations	0	0	0	8,7	9
Total Long Term Debt	16586,6	13817,9	9196,4	9940,5	8367,8
Total Debt	16595,3	15317,2	10298,6	13647,1	10305,2
Deferred Income Tax - LT Liability	2099,9	2187,5	1312,7	0	0
Deferred Income Tax	2099,9	2187,5	1312,7	0	0
Minority Interest	183,6	92,2	1080,4	75,7	72,8
Pension Benefits – Underfunded	4094,5	3698,2	2802,2	3513,9	2453,9
Other Long Term Liabilities	5545,3	5108,2	5057,6	5322,8	2917,1
Discontinued Operations – Liabilities	0	0	2742,3	0	0
Other Liabilities, Total	9639,8	8806,4	10602,1	8836,7	5371
Total Liabilities	**40991,5**	**36679,2**	**34079,7**	**33388,8**	**24798,2**
Total Common Stock	598,2	598,8	661	687,9	688,5
Additional Paid-In Capital	6778,5	6685,3	6583,6	5817,8	5640,6
Retained Earnings (Accumulated Deficit)	7830,2	4920,4	11395,9	13894,1	16046,3
Treasury Stock – Common	-55,7	-60,8	-69,4	-75,8	-80,5
Unrealized Gain (Loss)	14,8	4,9	0	113,5	224
Translation Adjustment	-1427,5	-1678	0	-1233,4	-1867,3
Other Equity	-3013,2	-3013,2	-3013,2	-3013,2	-3013,2
Minimum Pension Liability Adjustment	-4751	-4638,6		-4340,7	-3371,6
Other Comprehensive Income	-332,7	-211,9	-5729,2	-258	-259,1
Other Equity, Total	-9524,4	-9541,7	-8742,4	-8845,3	-8511,2
Total Equity	**5641,6**	**2606,9**	**9828,7**	**11592,2**	**14007,7**
Total Liabilities & Shareholders' Equity	**46633,1**	**39286,1**	**43908,4**	**44981**	**38805,9**

***Source**: Lilly's Annual Reports*

Appendix C: Computation of EBITDA

In Millions of $	2016	2017	2018	2019	2020
Revenue	21222,1	19973,8	21493,3	22319,5	24539,8
Cost of Revenue	5654,9	4447,7	4681,7	4721,2	5483,3
Gross profit	15567,2	15526,1	16811,6	17598,3	19056,5
Research and Development	5243,9	5096,2	5051,2	5595	6085,7
Selling/General/Administrative Expense	6452	5982,4	5975,1	6213,8	6121,2
Operating expenses	11695,9	11078,6	11026,3	11808,8	12206,9
other operating expense	0	0	0	0	0
EBIT	3871,3	4447,5	5785,3	5789,5	6849,6
amortization and depreciation	1496,6	1567,3	1609	1232,6	1323,9
EBITDA	5367,9	6014,8	7394,3	7022,1	8173,5

Note: In the Lilly's website, for 2016, the only result that are updated are the revenues. That is why we are going to assume revenues of 21222,1 instead of 18312,8

***Source**: Lilly's Annual Reports*

Appendix D: EBITDA Margin

	2016	2017	2018	2019	2020
Revenues	18312,8	19973,8	21493,3	22319,5	24539,8
Operating costs	5367,9	6014,8	7394,3	7022,1	8173,5
EBITDA Margin	29,31%	30,11%	34,40%	31,46%	33,31%

Source: *Lilly's Annual Reports, Own Estimates*

Appendix E: Interest Coverage Ratio computation

	2016	2017	2018	2019	2020
EBIT	3871,3	4447,5	5785,3	5789,5	6849,6
Interest Expense	185,2	225	242,5	400,6	359,6
Interest Coverage Ratio	20,90	19,77	23,86	14,45	19,05

Source: *Lilly's Annual Reports, Own Estimates*

Appendix F: Historical cost of revenues as a percentage of Revenues average

	2016	2017	2018	2019	2020
Revenue	18312,8	19973,8	21493,3	22319,5	24539,8
COGS	5654,9	4447,7	4681,7	4721,2	5483,3
COGS/Revenue	0,3087949	0,2226767	0,2178214	0,211528	0,2234452
2017-2020 average	**21,89%**				

Source: *Lilly's Annual Reports, Own Estimates*

Appendix G: Historical Operating expenses as a percentage of Revenues Average

	2016	2017	2018	2019	2020	Average
R&D/Revenues	0,2863516	0,2551442	0,2350128	0,2506777	0,2479931	(2017-2020) **24,7%**
SGA/Revenues	0,3523219	0,2995124	0,2779983	0,2784023	0,2494397	(2020) **24,9%**

***Source**: Lilly's Annual Reports, Own Estimates*

Appendix H: 2019-2020 historical average of D&A/Revenues

(In millions of $)	2016	2017	2018	2019	2020
Revenues	18312,8	19973,8	21493,3	22319,5	24539,8
D&A	1496,6	1567,3	1609	1232,6	1323,9
D&A/Revenues	0,082	0,078	0,075	0,055	0,054
Average(2019-2020)	5,46%				

***Source**: Lilly's Annual Reports, Own Estimates*

Appendix I: Computation of historical 2019-2020 average of capex items over Revenues

	In millions of $	2016	2017	2018	2019	2020	**2021F**	**2022F**	**2023F**	**2024F**	**2025F**
Average (2019-2020)	Revenues	18312,8	19973,8	21493,3	22319,5	24539,8	**26012,2**	**27312,8**	**28405,3**	**29257,5**	**29842,6**
	PPE	8252,6	8826,5	7996,1	8405	8681,9	**9499,2**	**9974,2**	**10373,1**	**10684,3**	**10898,0**
	Goodwill	3972,7	4370,1	1366,6	3679,4	3766,5	**4140,3**	**4347,3**	**4521,2**	**4656,9**	**4750,0**
	Intagibles	4357,9	4029,2	1068	6618	7450	**7803,7**	**8193,8**	**8521,6**	**8777,2**	**8952,8**
	LT investments	5207,5	5678,8	2005,4	1962,4	2966,8	**2715,9**	**2851,7**	**2965,8**	**3054,8**	**3115,9**
	Other LT investments	1913,8	2874,3	10922,7	4911,7	6305,8	**6204,2**	**6514,4**	**6775,0**	**6978,3**	**7117,8**
0,365	PPE/Revenues	0,45	0,44	0,37	0,38	0,35					
0,159	Goodwill/Revenues	0,22	0,22	0,06	0,16	0,15					
0,300	Intagibles/Revenues	0,24	0,20	0,05	0,30	0,30					
0,104	LT investments/R	0,28	0,28	0,09	0,09	0,12					
0,239	Other LT Inv/R	0,10	0,14	0,51	0,22	0,26					

Source: *Lilly's Annual Reports, Own Estimates*

Appendix J: Computation of historical average of WC items over Revenues

	In millions of $	2016	2017	2018	2019	2020	2021F	2022F	2023F	2024F	2025F
Average	Revenue	18312,8	19973,8	21493,3	22319,5	24539,8	26012,2	27312,8	28405,3	29257,5	29842,6
	Accounts receivable	4029,4	4546,3	5776,8	4547,3	5875,3	6032,6	6334,2	6587,6	6785,2	6920,9
	Other receivable	736,9	715,9	0	994,2	1053,7	850,9	893,5	929,2	957,1	976,2
	Total inventory	3561,9	4458,3	3098,1	3190,7	3980,3	4510,5	4736,1	4925,5	5073,3	5174,8
	Prepaid Expenses	734,6	1447,5	2036,7	2538,9	2871,5	2279,2	2393,2	2488,9	2563,6	2614,9
	Total	9062,8	11168	10911,6	11271,1	13780,8	13673,3	14357,0	14931,3	15379,2	15686,8
0,23	AR/revenues	0,22	0,23	0,27	0,20	0,24					
0,03	Other Receivable /R	0,04	0,04	0,00	0,04	0,04					
0,17	Total inventory/R	0,19	0,22	0,14	0,14	0,16					
0,09	Prepaid Expenses/R	0,04	0,07	0,09	0,11	0,12					
	Accounts payable	1349,3	1410,7	1207,1	1405,3	1606,7	1711,1	1796,7	1868,5	1924,6	1963,1
	Accrued expenses	896,9	997,9	955,6	915,5	997,2	1170,8	1229,4	1278,5	1316,9	1343,2
	Income taxes payable	119,1	532,9	393,4	160,6	495,1	410,3	430,8	448,0	461,4	470,7
	Other Current liabilities	2220,9	2832,1	2036,7	2189,4	2750,3	2955,0	3102,7	3226,8	3323,6	3390,1
	total	4586,2	5773,6	4592,8	4670,8	5849,3	6247,14	6559,498	6821,878	7026,53	7167,065
0,07	Accounts Payable/R	0,07	0,07	0,06	0,06	0,07					
0,05	Accrued Expenses/R	0,05	0,05	0,04	0,04	0,04					
0,02	Income taxes payable/R	0,01	0,03	0,02	0,01	0,02					
0,11	Other Current liabilities/R	0,12	0,14	0,09	0,10	0,11					

***Source**: Lilly's Annual Reports, Own Estimates*

Appendix K: Capital Structure

Capital Structure	FY 2020
Number of Shares outstanding (in million)	956,59
Share price of the 31st of December 2020	$167,4
Market Value of Equity (in million $)	160133,2
Value of Debt (in million $)	26226,4

Source: *Lilly's Annual Reports, Own Estimates*

Appendix L: Revenue by Product 2016

	Year Ended December 31,		
	2016		
Product	**U.S.[1]**	**Outside U.S.**	**Total**
Humalog	$ 1,685.2	$ 1,083.6	$ 2,768.8
Cialis	1,469.5	1,002.1	2,471.6
Alimta	1,101.0	1,182.3	2,283.3
Forteo®	770.5	729.4	1,500.0
Humulin®	861.8	504.1	1,365.9
Cymbalta	269.3	661.2	930.5
Trulicity	737.6	187.9	925.5
Strattera	534.9	319.8	854.7
Zyprexa	69.8	655.5	725.3
Erbitux	581.1	105.9	687.0
Cyramza	270.1	344.0	614.1
Effient	465.6	69.6	535.2
Trajenta®[2]	165.9	270.7	436.6
Other human pharmaceutical products	959.4	1,006.1	1,965.4
Animal health products	1,564.5	1,593.7	3,158.2
Revenue	$ 11,506.2	$ 9,715.9	$ 21,222.1

***Source**: Lilly's Annual Report from 2016*

Appendix M: Revenue by Product 2020

	Year Ended December 31,		
	2020		
Product	**U.S.**	**Outside U.S.**	**Total**
Trulicity	$ 3,835.9	$ 1,232.2	$ 5,068.1
Humalog[(1)]	1,485.6	1,140.3	2,625.9
Alimta	1,265.3	1,064.7	2,329.9
Taltz	1,288.5	500.0	1,788.5
Humulin®	866.4	393.2	1,259.6
Jardiance[(2)]	620.8	533.0	1,153.8
Basaglar®	842.3	282.1	1,124.4
Forteo	510.3	536.0	1,046.3
Cyramza®	381.9	650.8	1,032.6
Verzenio	618.2	294.4	912.7
Bamlanivimab[(3)]	850.0	21.2	871.2
Cymbalta	42.1	725.6	767.7
Olumiant	63.8	575.0	638.9
Cialis®	61.8	545.4	607.1
Erbitux®	480.1	56.3	536.4
Zyprexa®	46.1	360.5	406.5
Emgality®	325.9	37.0	362.9
Trajenta®[(4)]	95.6	263.0	358.5
Other products	548.7	1,099.8	1,648.8
Revenue	$ 14,229.3	$ 10,310.5	$ 24,539.8

Source: *Lilly's Annual Report from 2020.*