Master Thesis:

Valuation of a Startup

Zoom Case Study

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Executive Summary

This paper provides an overview of the main attributes that define a startup, laying out its stages of development and sources of financing, which are mainly through equity, allowing stakeholders to own part of the business. Also, this paper provides a view on the high-risk nature of a startup, which tends to have operational losses at early stages of development and consequently, high risk of failure. Besides, this research shows that, even though startups operate in any industry, tech and finance are the most successful sectors in the recent years in terms of number of unicorns.

The current environment of rising interest rates also affects valuations due to the increase in the risk-free rate, and consequently, the company's cost of capital, which cause valuations to fall. Also, high interest rates increase the interest expense, and thus, companies can spend less money on capital investments, which may affect future earnings growth.

The exhaustive company and market analysis of Zoom as of October 2020 shows that Zoom is the clear market leader in the videoconferencing industry, accounting for around 48% of the *Daily Active Users* in October 2020. This is thanks to the expansion driven by the pandemic lockdowns, which forced people to perform their work-related activities from home. However, competitors in the videoconferencing industry might be able to increase their market share in relation to Zoom since the big incumbent players (e.g., Google Meet, Microsoft Teams etc.) are part of larger corporations which are better capitalized and more skillful when facing a potential future slowdown of the videoconferencing paradigm.

The case study of this paper focuses on valuing Zoom on October 2020 using several valuation methodologies. The outcome of the case study provides a share value of between $344.5 and $440.6, which is aligned with the estimations made by several investment banks in that period of time. However, several elements in the case study such as a very high *EV/Revenue* multiple, indicated that Zoom was overvalued at that time due to the expansion driven by the pandemic lockdowns.

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1. Introduction

1.1. Objectives of the thesis

There is a great deal of discussion about which was the first startup created in the word. If we take the definition of startup letter by letter, we can consider a startup as any company that is in the initial stages of business and operations, founded by one or more entrepreneurs who want to develop a product or service for which they believe there is demand, and mainly funded by family, friends, venture capital, crowdfunding, and loans (Mitchell Grant & Michael Logan, 2021). However, if we add to the previously stated definition the fact that a startup is popularly known for being rooted in innovation, it is easy to see that the definition now fits with companies that used to be startups, such as Amazon, Google, Facebook or Zoom, since all of them disrupted their industries and enhanced ways of thinking and doing business. As the definition of a startup is generally not clear, the section *2.1 Definition* is aimed at detailing the main characteristics and attributes of these type of companies.

The thesis is mainly structured into three parts. The first part (*2. Startups*) is a detailed literature review of the concepts that surround the startup environment, such as its general definition, maturity stages and types of funding. The second part (*3. Valuation*) describes both traditional and alternative valuation methods for startups. Finally, the third and last part (*4. Case Study: Zoom*) is focused on the valuation of Zoom using the methods described in section *3. Valuation.* In addition, this last part intends to clarify and justify which valuation methods are more accurate for the case study selected.

1.2. Motivations

Working in a leading startup in its sector has always been one of the author's goals, mainly motivated by the search for innovation and creativity, as well as to learn first-hand how the companies that will change the world in the future work. In addition, one of the author's long-term goals is to become a founder and launch his own startup. That said, writing a thesis on how startups are valued, as well as learning about their stages of

maturity and how they are financed, is of great interest and usefulness. Moreover, this work allows the author to develop a practical part where he can test his valuation skills and to know in depth the factors that influence the valuation of startups.

There are many examples of companies that could have been chosen for this research. In fact, any startup that went public in the past three years could have been used for the case study part. However, the author wanted the following criteria to be met when choosing the company to be valued:

- The company must have gone public in the last three years. In that way, although the company is public, it still preserves many attributes that can define it as a startup. In the case of Zoom, this criterion is met since the company went public on the 18th of April of 2019.
- The business model of the company had to be a subscription-based model, since they are the type of startups in which the author is interested in mainly due to their predictable cash flow generation, stable customer base, better profitability and consequently, higher valuation. Zoom is based on a freemium model and generates revenue mainly though subscriptions.
- The service or product offered by the company must have driven a change in society habits. In the case of Zoom, it has clearly changed the way we communicate and work.

As previously mentioned, Zoom is the only company that most strictly complies with the established criteria, which makes it a fascinating learning opportunity for the author.

2. Startups

2.1. Definition

As mentioned in *1.1 Objectives of the Thesis*, due to the fact that the term startup is widely used and it has become very popular in the two last decade, many companies are referred as startups when they do not necessarily meet all the characteristics that this type of companies tend to have. According to Aswath Damodaran, young companies or startups generally fulfill the following characteristics (Aswath Damodaran, 2009):

- Equity Financed: Startups are mainly equity financed, allowing capitalists to invest in the startup in exchange of ownership in the company. On the other hand, debt is a very uncommon source of funding for startups.
- Limited financial histories: Due to its recent creation, most have a few years of data available. In addition, the financial data that they might have available is not fully reliable for venture capitalists or private equity companies, who might have difficulties while valuing the startup.
- Low chances of surviving: A large proportion of the startups do not survive. Taking as an example the U.S., approximately 20% of newly created companies fail during the first two years, 45% during the first five years, and 65% during the first 10 years. Only 25% get to 15 years or more (*Entrepreneurship and the U.S. Economy*, 2016).

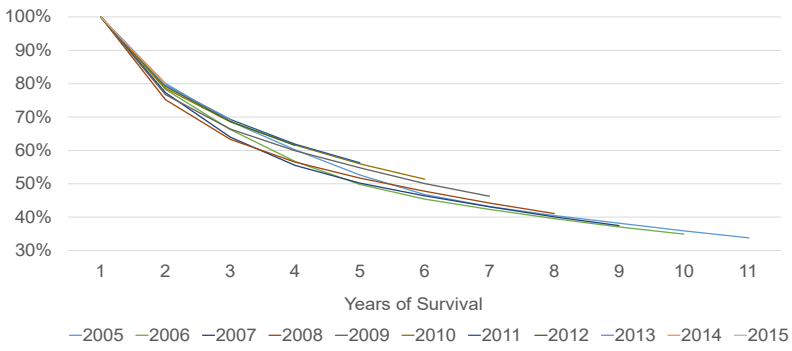

Figure 1: Survival rates of establishments, by year started (2005-2015)

Source: Entrepreneurship and the U.S. Economy, The U.S. Bureau of Labor Statistics (BLS).

- Operation losses: Revenues are usually nonexistent or very small, mainly because the general objective of a young company is to get the business stablished and operating, rather than generating a solid revenue growth. In addition, expenses in R&D and implementation costs tend to be high.
- Subject to private equity: Young businesses are mostly financed through private capital, sourced directly from the founder or his friends and family, as well as venture capitalists. This last source of capital is usually reached in more mature stages of the startup. Startups traditionally finance through equity and very little through debt, except hybrids like convertibles.
- Illiquid investments: Investments in young private companies tend to be much less liquid than investments in publicly traded comparable companies.

In general, the literature states that one of the main attributes that defines a startup is the fact that they are young growing companies with an innovative business model that are still not generating positive cashflows. From a corporate life cycle point of view, revenue and cash flow generation tend to increase as companies progress through the cycle (Aswath Damodaran, 2017). The following graph shows the corporate lifecycle expected for a potential profitable startup.

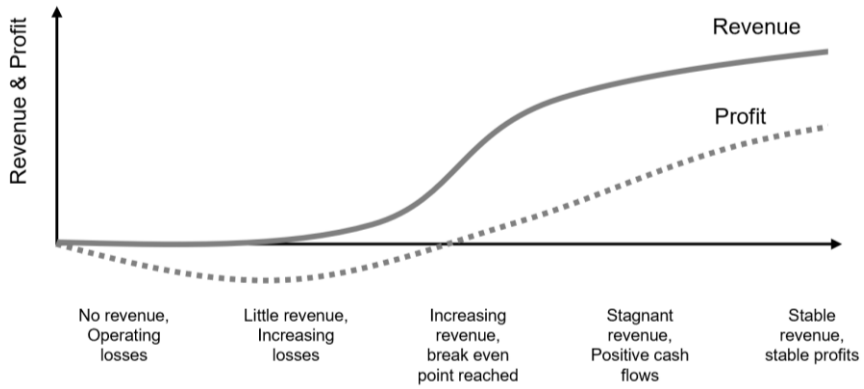

Figure 2: The corporate lifecycle of a startup company

Source: Author's own elaboration

2.2. Trends

Although startups are normally associated with the tech industry, data published by Statista shows that out of a total of 591 unicorns existing in April 2021, the 19.1% of the unicorns belong to the tech and telecommunications sector, while finance and insurance startups represent almost a 16% of the total. In fact, the six first sectors exposed in *Figure 3* account for almost three quarters of the total number of unicorns that existed in April 2021 (Statista, 2021).

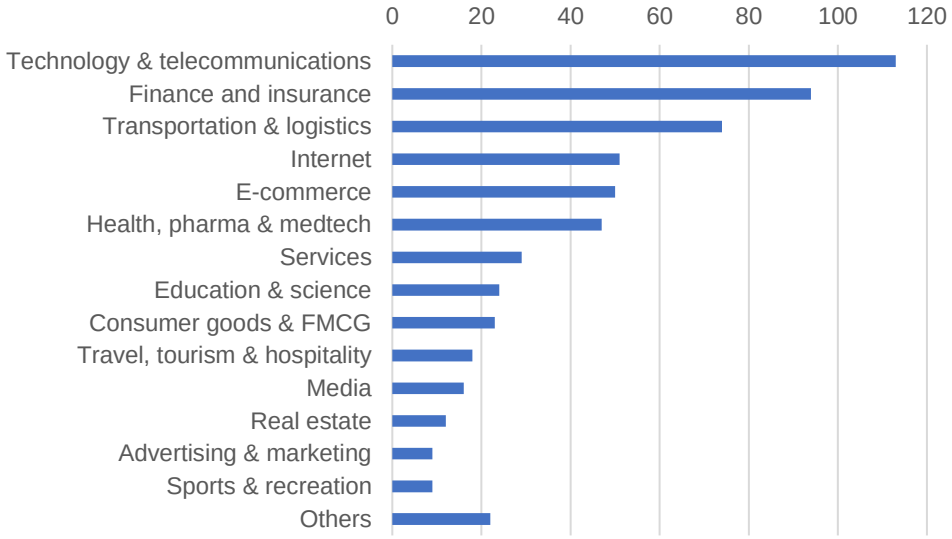

Figure 3: Number of unicorns worldwide by industry (April 20211)[1]

Source: Hurun Research Institute; CB Insights; CrunchBase; Statista estimates

Looking on the movements in the late 2021 and beginning of 2022, there is a clear trend towards startups that want to exploit the *Metaverse*, as well as any product or service powered by the blockchain technology, such as cryptocurrencies and NFTs (Non-Fungible Tokens) marketplaces. These new trends mentioned can be grouped as sub sectors within the Tech, Telecommunications and Finance industries.

1.Others: Sports & recreation, Energy & environment, Agriculture, Construction, Retail & trade, Metals & electronics, Society

Startups that want to take full advantage of the metaverse hype, also known as cyberspace, normally offer technologies such as virtual or augmented reality, with the aim of creating a virtual world for the end user. Some other startups also offer digital marketplaces, where users can create, buy, and sell goods. These marketplaces allow the exchange of NFTs, which are basically a non-interchangeable unit of data stored on a blockchain, which normally represents a real-world object like music, a video, image, or an in-game item. NFTs are bought and sold using cryptocurrencies like Ethereum. This is how the trendy concepts of metaverse, NFTs, blockchain and cryptocurrencies are linked and although it could lead to an interesting discussion, the objective of this section was simply to illustrate at a high level what are the current trends in the world of startups.

The fact that the number of startups created every year has grown exponentially in the last ten years shows that the launching of startups is also a trend in itself. *Figure 4* shows that the number of unicorns announced has multiplied by twenty from 2010 to 2020, and despite the covid slowdown, the number of unicorns announced in only the first half of 2021 is even higher that the total of 2020, reaching the average figure of two unicorns announced every day worldwide.

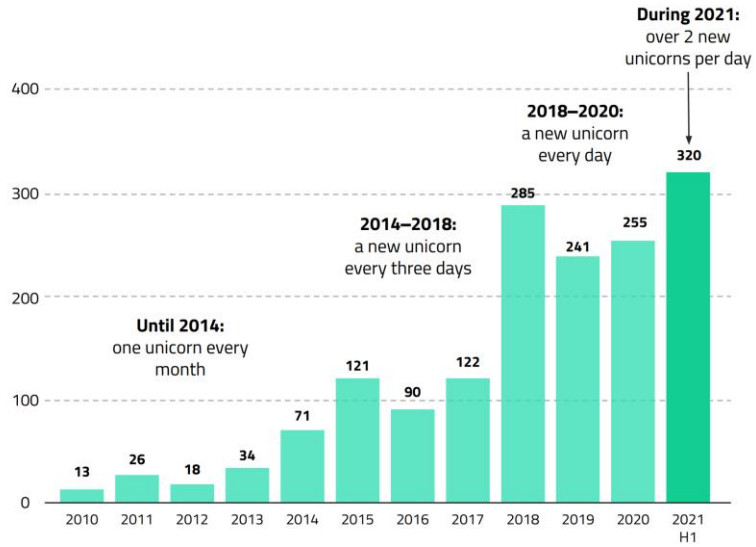

Figure 4: New unicorns announced by year

Source: Startup cities in the Entrepreneurial Age, Dealroom.co, (July 2021)

Finally, after seeing main trends by industry, the new trends expected for the coming few years and the impressive growth in terms of unicorns announced every year, it is key to mention where these startups are located. Almost half of the unicorns existing in the world in April 2021 were from the United States of America. The second most powerful country in these terms is China, with 133 unicorns out of a total of 591, representing a 22.5%. The European continent just accounted for 69 unicorns, a 11.6% of the total, being the United Kingdom the leader in the region. If we take only the countries that belong to the European Union, this number is reduced to 37 unicorns, representing only a 6.2% of the total share.

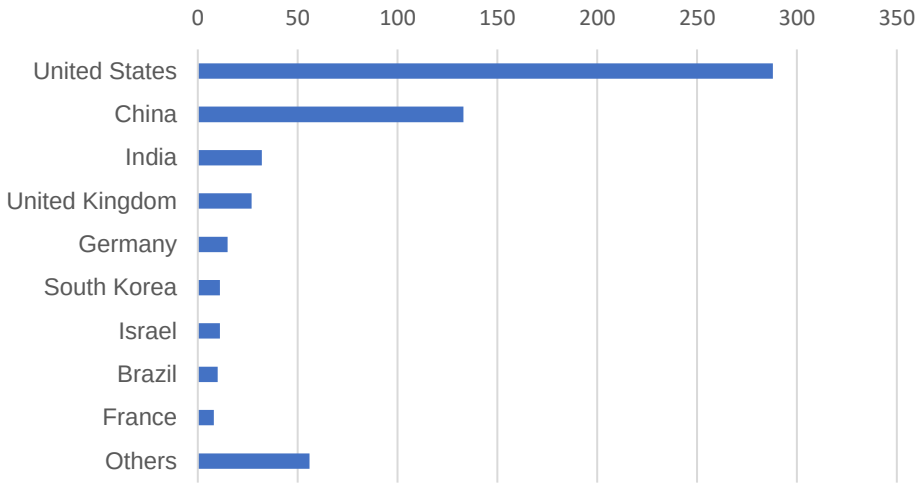

Figure 5: Number of global unicorns by country (April 2021)

Source: Hurun Research Institute; CB Insights; CrunchBase; Statista estimates

2.3. Stages of a startup: Maturity Stages

There are many ways in which startups can be classified: by country, by industry, by firm value etc. However, one of the most popular ways to classify startups is depending on their maturity stage. Literature in the filed describes that there are six defined maturity stages in which the startup goes through during its lifecycle.

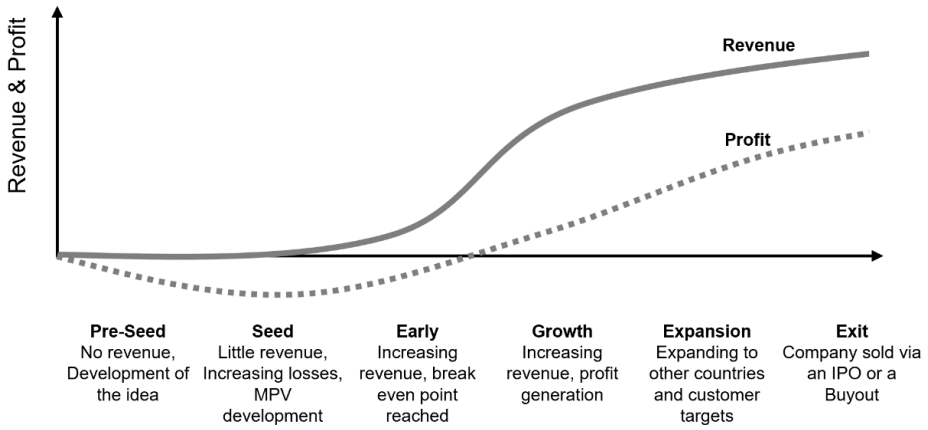

Figure 6: The Lifecycle of a Startup

Source: Author's own elaboration and (Aswath Damodaran, 2009)

In the Pre-Seed Stage, the startup still does not generate any revenue since the idea of the product is still under development. Then, in the next stage, the idea of the product starts to take shape. Once the startup reaches the Early Stage, normally an MVP (Minimum Viable Product) is launched to gather feedback from the customers and further develop and improve the product. In the Growth and Expansion Stages, the main company's goal is to generate solid profits and expand to other markets and customer audiences. Finally, in the Exit Stage, the company is normally sold via an IPO or a Buyout.

The following sections describe more detailly each one of the maturity stages and their main characteristics.

2.3.1. Pre-Seed Stage

Pre-seed is the earliest stage of funding for a new company and its normally not considered among the funding rounds. It is where the main idea of the business is originated, and the product or service prototype is still not developed. However, at this stage, the startup needs money to develop the product and define the business model. This money comes from the founders themselves or their families and friends.

2.3.2. Seed Stage

The Seed Stage is the first stage that can be included in the funding rounds, and it is where the general idea of the product of service that the startup pretends to offer starts to take shape, in line with the business model, which is more developed than in the Pre-Seed stage, but it is still pending to be validated. This product prototype is generally referred as MVP, which is a version of a new product which allows a team to collect the maximum amount of validated learning about customers with the least effort (Eric Ries, 2009).

Same as in the Pre-Seed Stage, the capital raised comes from the founders themselves or FFF (Family, Friends, Fools), although it can involve seed venture capital funds, angel funding, and crowdfunding. Seed funding involves a higher risk than more advanced maturity stages. Hence, the investments made are lower, of the order of tens of thousands to the hundreds of thousands of dollars.

2.3.3. Early Stage

The early stage is where the idea evolves until it becomes a product or service that is ready to be tested as a previously mentioned MVP, with the idea to analyze if the product meets the needs of customers and providing feedback to improve future product development.

Early-stage startups have a team to cover the initial operations and tasks of the company. Regarding the business model, it is being finalized, pending potential finishing touches, but is already strongly defined. The business model validation is a key point for the survival of the startup, as many of them fail to do so in this stage mainly due to failing in rising new capital or overestimation of the market needs. Regarding the sources of capital, investors are generally venture capitalists or business angels.

2.3.4. Growth Stage

When a startup reaches the Growth Stage, it means that there is a considerable market demand. This translates to a growth in number of new and recurring clients. A solid positive cash flow generation becomes a key metric and the principal goal at this stage.

The risk of failure at this stage is very high and in terms of the product, it is already finalized and perfectly defined, although it is not fixed and can be adjusted to attract new target markets. Regarding the funding, at this phase investors are venture capitalists and apart from their objective to generate a financial return in the future, they are also looking for the generation of strategic value.

2.3.5. Expansion Stage

Although the Literature sometimes presents this stage within the Growth Stage, the Expansion Stage refers to the phase in which the startup starts to expand to new geographies and new target customers. There are many ways of doing so, such as through an acquisition of a similar player that operates in a different market, through a partnership or a joint venture, or also via a greenfield investment. This normally requires generous funding, provided by venture capitalists.

Even though startups are mainly finance through equity, at such advanced point, startups at the Expansion Stage normally finance through a combination of equity and debt.

2.3.6. Exit

The last stage, referred as Exit, IPO, or Buyout Stage, is when the company is sold. This sale can be performed via an IPO, i.e., the company goes public through its sale at a stock market, or via a Buyout, i.e., when a controlling interest of the startup is acquired by another company. It is true that in some cases, the founders prefer to keep a controlling stake on the company in order to further develop the business.

2.4. Financing a startup

Each maturity stage of a startup is associated with different funding sources: From FFF in the earliest stages of maturity, to venture capital, business angels and crowdfunding, as well as financing from the capital markets or commercial banks. As any other company, startups can finance through equity or debt. However, this paper is mainly focused on equity financing since startups traditionally finances through equity and very little through debt.

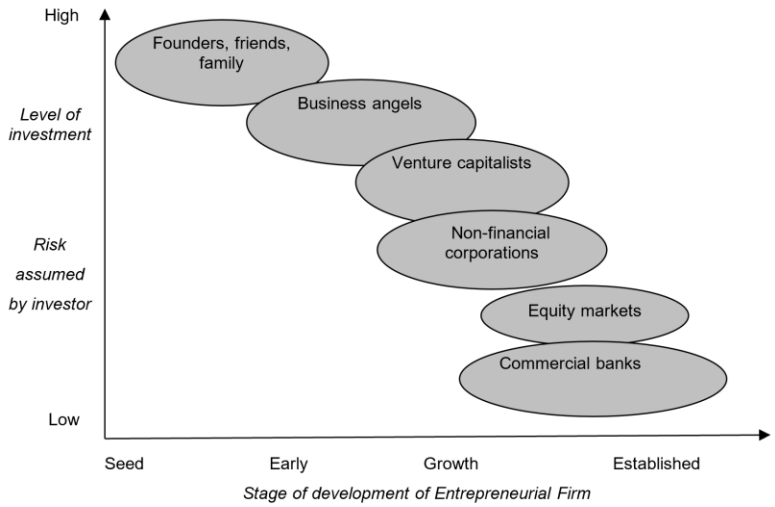

Figure 7: Founding sources of a startup throughout its stage of development

Source: Author's own elaboration and (Laura Giurca Vasilescu, 2009)

Figure 7 illustrates at a very high level the main sources of funding for startups. Before getting into detail of each source of equity financing, it is important to note that the more advanced or established the stage of development of the startup is, the lower level of investment and risk assumed by the investors. As explained in section *2.3. Stages of a startup: Maturity Stages,* in the early stages of maturity is when the risk of failure is higher and thus, the risk taken by the investor is also higher, as well as his expected return on the investment.

2.4.1. Equity

The main way in which startups are financed is though equity financing, allowing capitalists to invest in the startup in exchange of ownership in the company. The funding rounds can be classified into five main phases, depending on the maturity stages described.

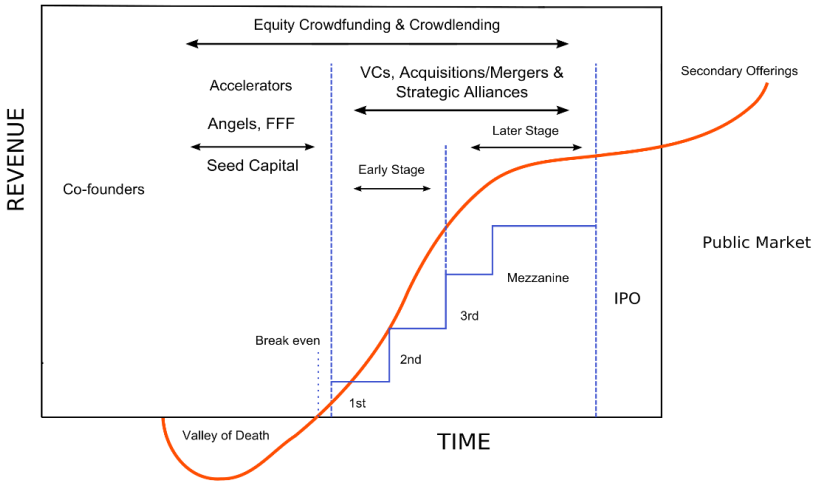

Figure 8: Startup Financing Cycle

Source: (Startup Financing Cycle, 2016)

Before detailing the funding stages, it is interesting to look at *Figure 8,* which shows the same investment sources stated in *Figure 7* but adding the revenue and the time perspective in it. At the very beginning, the founders are the ones that finance the startup operations, followed by FFF, business angels, accelerators and seed capital later in the Seed Stage. When the startup enters the Early Stage, there are usually two to three rounds of financing usually sourced from venture capitalists, followed by the Expansion Stage where the company keeps growing until the Exit Stage is reached, in which an IPO or a Buyout are considered as potential exit options.

2.4.1.1. Self-funding

Founders are usually the ones who finance the startup when it is at its earliest stages, together with their families and friends, with the aim of developing the initial idea.

2.4.1.2. Crowdfunding

Crowdfunding is a collective way of raising money to finance projects and businesses which consists of gathering relatively small amounts of money from many different sources. In exchange, investors receive an ownership stake in the firm. In the case of donation-based crowdfunding, investors receive products or rewards in exchange for their capital investment. There are also other types of crowdfunding, such as peer to peer lending-based crowdfunding, which consists of repaying the money borrowed with interest, similar to a bank loan.

2.4.1.3. Venture Capital

The third and most important source of equity funding in terms of volume is venture capital. In fact, venture capital is a form of private equity, with the main difference that the last normally prefer to invest in more stable and mature companies, while venture capital funds generally invest in high potential growth companies that are in its early stages of development.

The participation of venture capitalists in the ownership of the startups is temporary and not always involves a monetary investment, but also providing finance, technical and talent advice. Venture capitalists provide financing expecting a positive return through an eventual exit event, which can be an IPO or selling the owned stake to another firm. This from of funding is divided into different rounds, which go according to the maturity stage of the company:

- **Seed Round:** Can be considered the first round within venture capital, although it can also involve other investors such as business angels, accelerators, or incubators. The usual money raised or ticket ranges between $250k and $3m in exchange for stock ownership or a convertible note. The firms at this stage are normally valued at somewhere between $3m and $6m.
- **Series A:** At this stage, the startup is mainly focusing on making the business model scalable, seeking long term profitability. In addition, they have

established a solid customer base, consistent revenue generation, or significant profits. The company may be assessing the opportunity to expand to other markets. The venture capitalists in this stage, often called “super angels”, normally invest an amount between $2m to $15m.

- **Series B:** When a company reaches a Series B round, it means that it has already developed an important customer base and has showed to investors that the startup is prepared to grow at a much larger scale. Series B funding is often driven by key investor that attracts other investors, which adds a new set of other venture capital firms that focus on Series C or D rounds. The average Series B ticket ranges between $5m to $60m, although it can vary significantly.
- **Series C and more:** Startups at this stage are generating important solid positive cash flows and are expected to keep growing in terms of customers and revenue at a high rate. The company is probably considering strategic acquisitions, partnerships in order to expand its operations, as well as keep growing in terms of geographical expansion. In June 2020, an analysis of 14 Series C deals in the U.S. showed that the average ticket was around $60m, while the pre-money valuations of the underlying firms was around $68m (Fundz.net, 2020). However, the monetary injection invested by venture capitalists at this round can range between $20, to more than $250m.

2.4.2. Debt

The main source of funding of startups is through equity, although in some cases, they can also finance via debt. This is due to the fact that startups have high failure rates, and consequently, no lending institution wants to offer a traditional loan, in particular in their earliest stages. One of the reasons why a startup may consider debt as a source of funding is the fact that it avoids them to give investors an ownership stake on the company, but in return the interest rates are extremely high.

The main source of debt financing startups is venture debt, which refers to loans designed to the demands and risks of venture-backed startups, such as companies that are nor profitable yet or they do not have enough assets to use as collateral.

Another way of debt financing for startup is through convertible debt notes, which allow a startup without a significant valuation to raise capital. This instrument is a loan offered by an investor who expects that, in some years, the debt changes into an ownership stake in the startup.

3. Valuation

3.1. Introduction

This section aims at describing from a theoretical point of view the main valuation techniques, both traditional and alternative methods, with the objective of fully detailing its function and parameters and then apply these concepts to the case study, in section *4. Case study: Zoom.*

Aswath Damodaran describes the value of a firm as *the present value of its expected cash flows, discounted back at a rate that reflects both the riskiness of the projects of the firm and the financing mix used to finance them* (Aswath Damodaran, 2014). The objective of a valuation of a company is to determine the worth of a company at a specific point of time, evaluating all aspects of the business, such as its capital structure, future cash flows and earnings estimation, as well as other financial metrics.

In the case of publicly traded companies, it is easy to obtain their past financial data. Then, with the help of external financial entities that provide financial forecasts, it is possible to forecast the companies' financial metrics. Also, these entities provide information regarding comparable firms in the same business line. However, this does not mean that estimations are easy and straightforward, but on the contrary, it only means that with publicly traded companies, it is easier to obtain past and future information on their financial metrics.

In the case of new companies such as startups, there is normally no financial data available to estimate its cash flows, and discount rates tend to yield unrealistic numbers. Additionally, it is complicated to predict at which point of time a startup will start to generate positive free cash flows. Consequently, alternative valuation methods that rely in more qualitative factors are needed to estimate their value.

3.1.1. Impact of high interest rates on startup valuation

Before starting with the detailed description of each valuation method, it is interesting to develop the impact of higher interest rates on startup valuations. It is widely known that high interest rates lead to lower valuations, but it is worth looking into it closely.

First of all, from a mathematical point of view, this makes total sense. The main way in which publicly traded companies are valued is using the Discounted Cash Flow (DCF) analysis, which will be described on section *3.2.1. Discounted Cash Flow*. At a high level, its valuation equation is the sum of the company's estimated future cash flows discounted by the company's cost of capital. The company's cost of capital is a mix of debt and equity times the cost of debt and cost of equity. Following the mathematical formula, higher interest rates, and consequently, a higher cost of capital, leads to a higher discount rate, and thus, to lower valuation of the firm.

Interest Rates and Risk Premium from an Investor's perspective:

The US Treasury note rate is the return guaranteed by the US government, so a rational investor would never make an investment whose return is lower than the US Treasury note rate. In other words, investors will only invest in an asset whose return is high enough to compensate for the lost opportunity of earning this guaranteed return and for taking the additional risk. The following figure shows the negative correlation between the US 10-Years Yield compared to the S&P 500 Index:

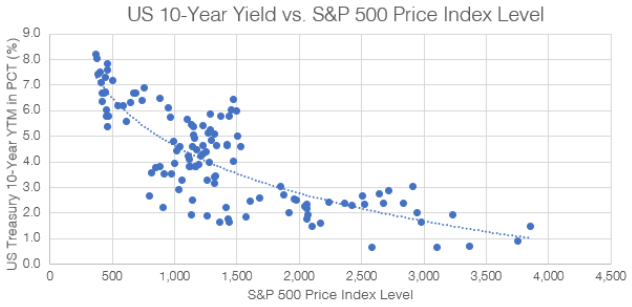

Figure 9: Correlation between US 10-Year Treasury and S&P 500 Index

Source: Bloomberg.com

From a company's perspective, a higher interest rates raises the company's cost of capital. Therefore, if a company keeps performing at the same level, it will generate lower return, and consequently, the higher interest expense will reduce its profits. In addition, very high interest rate can cause problems to a company when paying off its debt. All of this translates into higher risk for the investor, who will seek higher risk premium. Finally, high interest rates are normally associated to a stagnant economy and inflation, so investors would prefer not to invest in the underlying risky company, and as a result, share price drops together with sales and profits. In summary, it is the vicious circle.

Interest Rates and Risk Premium from a company's perspective:

In the same line as stated in the last section, the interest rate influences the cost of capital. In fact, the cost of equity for a company is usually calculated using the Capital Asset Pricing Model (CAPM), which is used to determine expected returns on equity investments:

$$E(r_i) = r_f + \beta_i * Risk\ Premium = r_f + \beta_i * \left[E(r_m) - r_f\right]$$

One of the main components of the CAPM is the risk-free rate, which is normally based on the Treasury note rate of a country (e.g., USA). So, if the risk-free rate (r_f) rises driven by an increase in the US Treasury note rate and everything else remain constant (i.e., Risk Premium), the share fair value will fall. That is why investors usually encourage the US Federal Reserve to cut the rates.

Taking a high-level look at the S&P 500 valuation from a different perspective, its valuation is composed by three components: (i) the current value of its assets, (ii) the net present value of expected future earnings, and a residual component named (iii) "Hopes and dreams".

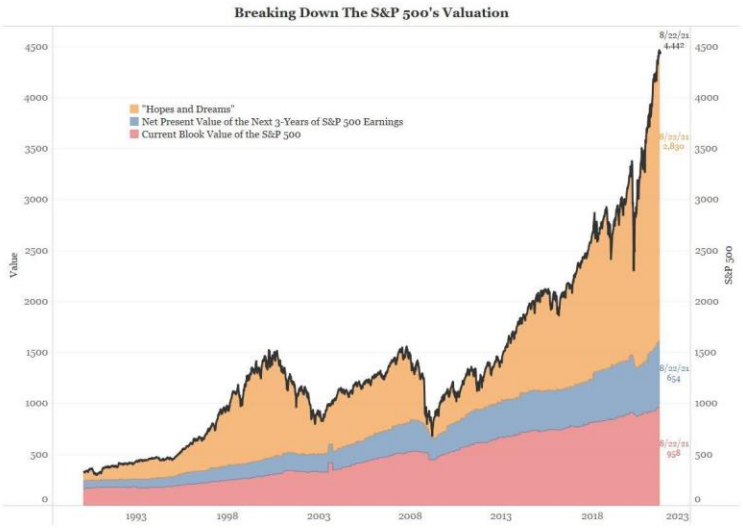

Figure 10: Break down of the S&P 500 Valuation

Source: Bloomberg.com

As seen in the figure above, the “hopes and dreams” portion of recent S&P 500 valuation is very high on a historical basis, way higher since the tech bubble peak in 2000. Finally, it is generally known that high interest rates lead to lower valuations, so in order to maintain them at the same level, massive earnings growth expectations are needed. However, these expectations are currently not very optimistic.

3.2. Traditional Valuation Methods

3.2.1. Discounted Cash Flows

The Discounted Cash Flow (DCF) analysis is one of the most common ways to value a company, in particular, mature and publicly traded companies whose financials are accessible, stable and predictable. In case of early-stage startups, the DCF method is not very popular as it is difficult to predict their future cash flow prosects.

The DCF method returns the enterprise value of a company by calculating the present value of the future free cash flows that the company will generate in the future, discounted by a discount rate that takes into account the risks and financing costs, reflecting all the business's creditors. The following formula depicts the present value of a company at time zero.

$$Enterprise\ Value: EV_o = \frac{FCF_1}{(1+r_d)^1} + \frac{FCF_2}{(1+r_d)^2} + \cdots + \frac{FCF_t}{(1+r_d)^t} = \sum_{t=1}^{\infty} \frac{FCF_t}{(1+r_d)^t}$$

Where:

EV_o *:* Enterprise Value at time period *t = 0*

FCF_t: Cash Flows to the firm in period *t*

r_d: discount rate

t: Time period from one to infinity, in years

Before stepping into detaining the computation of each of the elements that are present in the DCF formula, let's further develop it. The FCF are normally calculated for a finite number of periods (e.g., six years), as it becomes difficult to estimate their growth for very distant time periods. Therefore, defining a new variable called n*,* which accounts for the number of periods for which we will calculate the FCF, the formula results as follows, where the TV_N refers to the terminal value of the firm:

$$EV_o = \sum_{t=1}^{\infty} \frac{FCF_t}{(1+r_d)^t} = \sum_{n=1}^{N} \frac{FCF_n + TV_N}{(1+r_d)^n} = \sum_{n=1}^{N} \frac{FCF_n}{(1+r_d)^n} + \frac{TV_N}{(1+r_d)^N}$$

Where:

TV_N *:* Terminal Value of the firm at time period *n = N*

n: Number of periods, from *n = 1* to *n = N*

Now that the full formula of how the enterprise value is calculated using the DCF method, let's detail how to calculate all its components.

Free Cash Flows (*FCF*)

As stated before, *FCF* are only calculated for a finite period of times, which is defined as *N* time periods. The remaining time periods, i.e., from *n = N* to *n = ∞*, are grouped into the *Terminal Value* component.

FCF are the cash flows available of the company, i.e., "free" to pay its debt and equity holders, in other words, to repay creditors or pay dividends and interest to investors. The FCF formula is as follows:

$$FCF = EBIT * (1 - T_c) + D\&A - CAPEX - \Delta \text{WC}$$

Where:

$EBIT$ *:* Earnings before interest and taxes

T_c: Tax rate

$D\&A$ *:* Depreciation and Amortization

$CAPEX$: Capital expenditure

ΔWC: Number of periods, from *n = 1* to *n = N*

EBIT is calculated by subtracting the firm's cost of goods sold (COGS) and its operating expenses from its revenue. Some examples of operating expenses could be salaries, research and development or administrative expenses. Once the EBIT is obtained, it is multiplied by (1-T_c) to reflect the effect of taxes. Then, it is needed to add back depreciation and amortization, as well as subtracting capital expenditures and the change in working capital requirements.

Discount rate (r_d)

The discount rate, a part form reflecting the time value of money, must take into account the risks and financing costs, reflecting all the business's creditors and expressing the riskiness of the future cash flows. Hence, it is defined the Weighted Average Cost of Capital (WACC):

$$r_{WACC} = \frac{E}{E+D+P} * k_E + \frac{D}{E+D+P} * k_D * (1 - T_c) + \frac{P}{E+D+P} * k_P$$

Where:

E: Market value of equity shares

D: Market value of net debt

P: Market value of preferred stock

K_E: Cost of equity

k_D: Cost of debt

T_c: Tax rate

K_P: Cost of preferred stock

As seen in the formula, the WACC is a weighted average between the cost of debt (K_D) and cost of equity (K_E). The cost of debt, which is the return that a company provides to its debtholders and creditors, can be estimated in two ways. The first one would be to look at the current yield to maturity of the company's debt, while the second approach would

be to look at the credit rating of the firm provided by a credit rating agency (e.g., S&P, Moody's, Fitch) and then adding this yield spread to the risk-free rate.

In the case of the cost of equity, is usually calculated using the Capital Asset Pricing Model (CAPM), which is used to determine expected returns on equity investments, providing a methodology for quantifying risk and translating them into estimates of expected return on equity:

$$E(r_i) = r_f + \beta_i * Risk\ Premium = r_f + \beta_i * \left[E(r_m) - r_f\right]$$

Where:

$E(r_i)$: Expected return on the capital asset for *i*

r_f: Risk-free rate

β_i: Beta coefficient

$E(r_m)$: Expected return of the market

Risk Premium = $[E(r_m)-r_f]$: Excess return expected to yield

The β_i measures the volatility of returns relative to the overall market, so it is a parameter that measures the sensitivity to the market risk. For instance, if $\beta_i=1$, the expected return is equal to the average market return, but if for instance the beta coefficient of a company is $\beta_i=2$, the security doubles the volatility of the market average. The beta coefficient can also take negative values, meaning that for a $\beta_i=-1$, that can be interpreted as the expected return moves in the opposite direction from the market. In summary, for every one unit increase in the β_i, the return $E(r_i)$ will increase by the beta coefficient value, and in the opposite way for negative values of β_i. The coefficient is defined as follows:

$$\beta_i = \frac{Cov(r_i, r_m)}{\sigma^2(r_m)}$$

Where:

Cov(r_i,r_m): Covariance between the asset *i* return and the market return

$\sigma^2(r_m)$: Variance of the market's return

β_i is generally calculated based on similar companies to the one we are trying to value. However, the Beta for a company called "z" (β_z) will reflect z's capital structure. In order to obtain the β_z independent from z's capital structure, or in order words, to obtain the *Unlevered* β_z, it is needed to un-lever β_z and all other betas belonging to the set of comparable companies used to calculate the beta of the company we want to value:

$$Unlevered\ \beta\ (Asset\ Beta) = \frac{Levered\ \beta}{1 + (1 + T_c) * \left(\frac{D}{E}\right)}$$

$$Levered\ \beta\ (Eequiy\ Beta) = Unlevered\ Beta * \left[1 + (T_c) * \left(\frac{D}{E}\right)\right]$$

Having these two equations in mind, which at the and derive from the same formula, the summarized procedure used to calculate the desired unlevered beta (β_i) is to gather a set of comparable companies, take the average and re-lever the beta based on the capital structure (i.e., debt-to-equity ratio) of the company that is being valued.

The unlevered beta can at most the same as the levered beta or lower, meaning in this case that the debt is equal to zero, when the company is completely equity financed. However, in case of negative debt, the unlevered beta can become higher than the levered beta.

On the other hand, startups tend to have few similar public or private peers in the market due to their nature, which makes it very complicated to estimate a reliable beta. Consequently, beta estimation based on the previously detailed CAPM method becomes less popular for startups, specially for the ones that are in early stages of development. In addition, the equity in a young company is often held by its founders or venture capitalists and as a result, these investors are unlikely to accept the fact that the only risk that matters is the risk that cannot be diversified and instead will demand compensation for at least

some of the firm specific risk (Aswath Damodaran, 2009). Instead, they tend to estimate the value of beta based on internal return expectations and perceived risk of the startup and the general market.

Along the lines of the limitations previously mentioned when attempting to obtain the beta for a young company, another methodology used to estimate its value is by adjusting the CAPM model in order to reflect the intrinsic characteristics of a startup, such as its stage of development, level of technological adoption, level of risk, capital and organizational structure, or the sector within they operate, among others. In this regard, Gunter W. Festel, Martin Würmseher and Giacomo Cattaneo published a paper in 2013 statin the different adjustments in from of a framework that can be applied while estimating the beta of a startup (Festel et al., 2013):

Category	Subcategory	Adjustment of the beta coefficient					Result
		+1	+0,5	0	-0.5	-1	
Technology	Maturity of technology	Technology still in initial experimental phase	**Technology successful on a laboratory scale**	Technology successful in pilot plant	Technology successful in demo plant	Technology successful in technical application	0.5
	Advantages compared to competitive technologies	No advantages identified	Advantages not clearly identifiable	Costs or quality advantages identifiable	**Costs and quality advantages identifiable**	Significant costs and quality advantages identifiable	-0.5
	Reputation of scientist	**No reputation**	Poor reputation	Moderate reputation	Good reputation	Very good reputation	1.0
	Patent protection	No patent application	**First patent application filed**	Basic patent close to being granted	Basic patent granted	Extensive portfolio of granted patents	0.5
Products	Product benefits	Product benefits not identifiable	**Product benefits not clearly identifiable**	Product benefits clearly identifiable	Product benefits confirmed by first clients	Product benefits confirmed by numerous clients	0.5
	Unique selling proposition	Unique selling proposition not identifiable	**Unique selling proposition not clearly identifiable**	Unique selling proposition clearly identifiable	Unique selling proposition confirmed by first clients	Unique selling proposition confirmed by numerous clients	0.5
	Scalability	Very low scalability	**Low scalability**	Moderate scalability	High scalability	Very high scalability	0.5
	Competition	Currently strong competition	**Potentially strong competition**	Moderate competition	Low competition	Long-term low competition	0.5
Implementation	Business plan	**Business plan unjustifiable**	Business plan with open questions	Business plan plausible	Business plan occasionally proven	Business plan frequently proven	1.0
	Technical development plan	Technical development plan unjustifiable	**Technical development plan difficult to justify**	Technical development plan justifiable	Technical development plan likely to be feasible	Technical development plan very likely to be feasible	0.5
	Marketing plan	Marketing plan unjustifiable	Marketing plan difficult to justify	**Marketing plan justifiable**	Marketing plan likely to be feasible	Marketing plan very likely to be feasible	0.0
	Business development plan	Business development plan unjustifiable	Business development plan difficult to justify	**Business development plan justifiable**	Business development plan likely to be feasible	Business development plan very likely to be feasible	0.0
Organisation	Competences of the management team	Management team with major flaws	**Management team with some flaws**	Management team is complete	Management team is complete and competent	Management team is complete and very competent	0.5
	Headquarters location	Headquarters location problematic	Headquarters location can be improved	Headquarters location is fine	**Headquarters location has advantages**	Headquarters location has many advantages	-0.5
	Competences of advisory board	Very low level of competences of advisory board/ consultants	Low level of competences of advisory board/ consultants	**Moderate level of competences of advisory board/ consultants**	High level of competences of advisory board/ consultants	Very high level of competences of advisory board/ consultants	0.0
	Process efficiency	Process inefficient	Process not very efficient	**Process efficient**	Process very efficient	Process exceptionally efficient	0.0
Finances	Sales plan	Sales plan unjustifiable	**Sales plan difficult to justify**	Sales plan justifiable	Sales plan conservative	Sales plan very conservative	0.5
	Costs plan	**Costs plan unjustifiable**	Costs plan difficult to justify	Costs plan justifiable	Costs plan conservative	Costs plan very conservative	1.0
	Profitability	Fundamentally low profitability	Risk of low profitability	**Average profitability**	Currently high profitability	Fundamentally high profitability	0.0
	Liquidity plan	**Financial resources for next year are not secured**	Financial resources for next year are secured	Financial resources for next 2 years are secured	Financial resources for next 3 years are secured	Financial resources for next 4 years are secured	1.0
							7.5

Figure 11: Assessment scheme to adjust the basic beta coefficient

Source: (Festel et al., 2013)

Terminal Value (*TV*)

Finally, the last component of the enterprise value is the terminal value (TV). It accounts for a large proportion of the company's enterprise value as it comprises the free cash flows for the company for the timer periods greater than N. There are two main procedures to estimate the company's TV.

The first one is by using the Gordon Growth method (GGM), which is a particular case of the Dividend Discount Model for when a constant growth is assumed. The method also presumes that a company exists forever and that the company's free cash flows grow constantly in the future. Although this constant growth assumption, it is important to state that at the same time the discount rate is higher than the FCF's growth rate. Having said that, the TV_N using Gordon's Growth method is defined as follows:

$$TV_N^{GGM} = FCF_N * \frac{1+g}{r_d - g}$$

Where:

FCF_N: Free cash flows of the firm on the last forecasted year *n = N*

g: growth rate (similar to the country's *GDP* growth or inflation)

The second way to estimate the TV_N is the Multiples method, which is as simple as applying an exit multiple to the company's last year's forecasted EBITDA, EBIT or free cash flow. However, the multiple is hard to estimate that many years in advance.

$$TV_N^{Multiples} = \frac{EV_{peers}}{Multiple_{peer,at\ n=0}}$$

Where:

*EV_{peers}: A*verage Enterprise Value of the company's peers

$Multiple_{peer,at\ n=0}$: EBITDA, EBIT or free cash flow at *t = 0*

3.2.2. Relative valuation methods

3.2.2.1. Comparables

The first relative valuation method is Comparable companies, which consists basically of valuing the concerned firm by comparing it with companies with similar characteristics. Although it's a methodology used mainly to value mature companies since financial data from the set of comparable companies selected is needed, it can be also used for early stage and mature startups.

The methodology to follow in order to value a company based on the Comparables method consists of (1) finding the right comparable set of companies, (2) gather their financial data, (3) defining which financial parameters and multiples are going to be compared, and finally calculate the comparable ratios.

(1) Find the right comparable set of companies

This first step is the most subjective and complicated, as it is based on the arbitrary selection of the person performing the analysis. However, there are some guidelines that should be followed once selecting the peers. The set of companies selected should have similar characteristics to the one that is being valued in terms of:

i. Industry: Same industry or sub sector of operation.
ii. Geography: Where the company is based and where it operates.
iii. Financials and others: Size in terms of revenue, assets and employees, as well as similar growth rate and profitability.

As mentioned, finding reliable data is a key part of this step. Several tools such as S&P CapitalIQ or Bloomberg can be used in order to help finding the right peers. These databases provide a list of similar companies operating in the same industry, county and with similar financial performance.

(2) Gather financial data

Once again, databases like CapitalIQ or Bloomberg con provide all financial data needed. It is also possible to manually gather financial information by searching in the company's annual and quarterly reports. However, although it is easy to find data for publicly traded companies, it can be hard to find data for companies in early stages of development. In this case, other tools like CrunchBase can be used to find startups that recently received funding that have similar characteristics to the startup being valued.

The information needed varies depending on the industry or maturity stage of the company. For example, in the case of mature or publicly traded companies, metrics like EBITDA, EBIT and EPS will be more useful. However, for early-stage companies metrics like gross profit or revenue will be probably more insightful.

(3) Define and calculate the comparable multiples and ratios

One the financial data needed is gathered, a comps table is usually created, which states all the financial parameters for all peers. Then, using the comps table built, the ratios can be calculated. Normally, the ratios used are EV/Revenue, EV/Gross Profit, EV/EBITDA or P/E. Finally, a summary table is created with the average outcome of each of the ratios selected.

3.2.2.2. Precedent Transactions

The second most common relative valuation method is Precedent Transactions. It consists of valuing a company by comparing it on the price paid on recent acquisitions of comparable companies. In the case of startups, this methodology requires public data from comparable transactions that can be difficult to find. However, several databases such as Merger Market can be used to find the data needed.

The methodology to follow in order to value a company based on precedent transactions method is composed by the following steps.

(1) Find and filter relevant precedent transactions

While finding precedent transactions, it is important that the selected comparable companies follow the criteria explained in section *3.2.2.1. Comparables*. In addition, it is important to add the time dimension since the transactions must have happened in recent years. Again, tools like CapitalIQ or Bloomberg can be very helpful.

(2) Determine a range of valuation multiples

From the list of selected transactions, it is necessary to eliminate outliers and then calculate the average of the selected multiples, in the case of precedent transactions analysis tends to be EV/EBITDA and EV/Revenue.

(3) Apply the defined multiples to the company being valuated

Once the range has been defined, it is time to determine a range of acceptable values for each of the selected multiples. Finally, it is important to state that the enterprise value obtained through this valuation method will be probably higher than the values obtained through other methods, mainly because precedent transactions method considers the premium paid to acquire the concerned company.

3.2.3. Real Options

Before describing Real Options from a valuation point of view, it is worth to define those options can be classified into two categories: financial and real, based on whether the underlying asset is a financial asset, such as stocks or bonds, or a real asset, such as real estate, projects, and intellectual property (Prasad Kodukula, 2006).

Some traditional valuation methods do not consider the nature of a startup and its potential highly promising future. For example, DCF analysis is based on a set of assumptions related to the project payoff, which is an uncertain and probabilistic parameter. In addition, DCF does only account for the downside part of the risk but not for its potential reward, and also does not consider managerial flexibility. In other words, from

a DCF point of view, an investor will just invest in a project of the net present value of the project is positive. On the contrary, Real Options analysis attempts complement some traditional valuation methods by addressing the limitations and filling the gaps of these methods.

Practical Example: Real Options Analysis vs. Discounted Cash Flow Method

"Traditional approaches assume a static decision-making ability, while real options assume a dynamic series of future decisions where management has the flexibility to adapt given changes in the business environment" (Johnatan Mun, 2002).

Following the structure of example stated by Johnatan Mun in the book "*Real Options Analysis. Tools and Techniques for Valuing Strategic Investments and Decisions"* let's assume a startup owns a patent on a technology with a 10-year life. The present value of the total research and development costs is $250 million, while present value of the projected sum of all future net cash flows is only $200 million. Following the logic explained in *3.2.1. DCF*:

$$V_o = \frac{CF_1}{(1+r_d)^1} + \frac{CF_2}{(1+r_d)^2} + \cdots + \frac{CF_t}{(1+r_d)^t} = \sum_{t=1}^{10} \frac{CF_t}{(1+r_d)^t} = \$200\ millon$$

$$C_o = \$250\ millon$$

$$NPV = V_o - C_o = \ \$200 - \$250 = -\$50\ millon$$

Where:

V_o: Present Value of the sum project's cash flows

C_o: Present value of research and development costs

NPV: Net Present Value of the Project

This quick DCF analysis leads us to a negative NPV, which indicates that the project should be abandoned. If Real Options analysis is applied in this project, the result will be

completely different, as there is a probability that the patent will become more valuable in the future or that future projects can benefit from the technology developed. Most research and development projects fail to meet expectations and generally produce lower incremental revenues than expected. Hence, form a traditional DCF analysis point of view, research and development of new initiatives, such as the case of startups, are usually unattractive and provide little to no incentives (Johnatan Mun, 2002). If we value the patent itself using Real Options analysis and following the methodology learned in class, by assuming discount rate of *r = 6%* and an arbitrary volatility of the present value of cash flows of *σ = 30%*:

$$P = S * e^{\delta*\tau} * \varphi(d_1) - E * e^{-r*\tau}\varphi(d_2) = 200 * \varphi(d_1) - 250 * e^{-0.06*10}\varphi(d_2) = \$13.76\text{ m}$$

$$being\ d_1 = \frac{ln\left(\frac{S * e^{\delta*\tau}}{E}\right) + \left(r + \frac{\sigma^2}{2}\right) * \tau}{\sigma\sqrt{\tau}}\ and\ d_2 = d_1 - \ \sigma\sqrt{\tau}$$

Where:

P: Value of the Patent

S: Present value of the future cash flows

E: Cost of development of the project

τ = life of the patent

$\varphi(d_i)$: Normal distribution outcome for d_i

After computing the calculations, the value of the patent following the ROA method is *P = $13.76 million,* which makes it more attractive as it is considering uncertainty, which is a key concept while launching and valuing a startup due to its nature. Overmore, this method assumes that business decisions can be modified at any point of the development of the project, creating new scenarios and impacting their outcome at any point of time. The approach followed will be described in the following section.

3.2.3.1. Binomial Model

The Binomial Model follows the structure of a decision tree, assuming that in each iteration there only two possible outcomes: upward move or downward move. This method incorporates the effects of management decisions on uncertain situations, providing a plan which depicts possible outcomes with their payoffs, and probability of those decisions. The project NPV is obtained is simply the product of its probability of occurrence and its outcome.

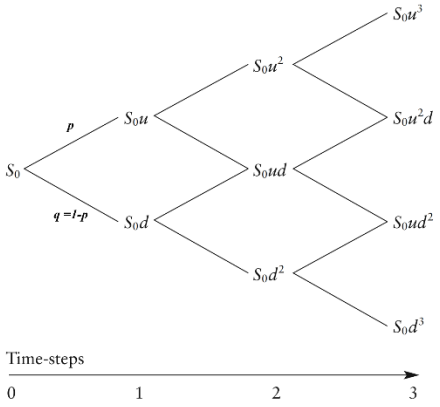

Figure 12: Three-time steps Decision Tree

Source: Project Valuation Using Real Options, (Prasad Kodukula, 2006)

As seen in the previous figure, the outcome at each stage can either increase or decrease. For example, in the case of *Time = 1,* the outcome can be either $S_o u$ (upwards state) or $S_o d$ (downward state), depending on the set probabilities *p* (upward probability) and *q* (downward probability). *S* can represent various financial instruments, such as stocks, bonds or call options.

$$For\ t = 1: \begin{cases} S_1^U = S_0 * u \\ S_2^D = S_0 * d \end{cases}$$

$$where \begin{cases} u = e^{\tau * \sqrt{\tau/n}} \\ d = \dfrac{1}{u} \end{cases} \quad and \begin{cases} p = \dfrac{1 + r - d}{u - d} \\ q = 1 - p = \dfrac{u - 1 - r}{u - d} \end{cases}$$

Where:

S_i^X : Current Stock value at time $t = i$ and state X

r: Risk-free rate

τ: Time in between valuation date and expiration date, in years

n: Number of periods, in years

Now that all parameters of the formula are defined, we can define the value of *S* at $t = 0$ as a weighted average between the probabilities *p* and *q*:

$$S_0 = \frac{1}{1+r}[p * S_0 * u + (1-p) * S_0 * d] = \frac{1}{1+r}[p * S_1^U + (1-p) * S_1^D]$$

From the previous equation, it is possible to extrapolate the formula for any number of periods *n* in order to obtain the value of S_0.

Finally, it is interesting to state the relationship between a call option and an uncertain project such as a startup or a patent. A call option is an option to purchase a stock at a predefined price. It is a bet that the stock price will increase, and the option holder will make a profit as the stock price exceeds the strike price. Real options theory assumes that management acts in the best interests of the company or startup. Following the example of the patent in section *3.2.3 Real Options,* a patent can be seen as a bet performed by the investor that the market will somehow come to the invention, similar to a call option, because it allows its holder to choose between exclusively commercializing the patented invention sometime during the patent term or foregoing commercialization altogether (Christopher A. Cotropia, 2009).

To calculate the Call option value, it is only necessary to apply the call option value formula:

$$C_1^U = max\{u * S_0 - K, 0\}$$

$$C_1^D = max\{d * S_0 - K, 0\}$$

Where:

C_i^X : Call option value at time *t = 1* and state *X*

K: Call option strike price

3.2.3.2. Black-Scholes Model

This Black-Scholes Model is a complex mathematical method used to calculate the call or put option value. It was developed in in 1973 by Fischer Black and Myron Scholes, fowling the preceding study by Robert Merton and Paul Samuelson. The model derives from solving a partial differential equation with specified boundary conditions that describe the change in option value with respect to measurable changes of certain variables in the market.

The model is build based on several strict assumptions (Johnatan Mun, 2002):

- The stocks underlying the call options provide no dividends
- No transaction costs involved with the sale or purchase of the stock or call
- The risk-free interest rate is known and is constant during the life of the option
- The call or put option can be exercised only on its expiration date (European version)
- A lognormal distribution of the underlying asset value
- The increase in the underlying asset value is continuous as dictated by its volatility and does not account for any drastic ups and downs.
- Efficient markets situation

Taking these assumptions into account, the option value is given by the following equation, known as the Black-Scholes equation:

$$Call\ Option\ Value: C = S * \varphi(d_1) - E * e^{-r*\tau}\varphi(d_2)$$

$$Put\ Option\ Value: P = E * e^{-r*\tau}\varphi(-d_2) - s * \varphi(-d_1)$$

$$being\ d_1 = \frac{ln\left(\frac{S * e^{\delta * \tau}}{E}\right) + \left(r + \frac{\sigma^2}{2}\right) * \tau}{\sigma\sqrt{\tau}}\ and\ d_2 = d_1 - \ \sigma\sqrt{\tau}$$

Where:

S: Present value of the future cash flows

E: Cost of development of the project

r: Risk-free rate

τ: life of the patent

$\varphi(d_i)$: Normal distribution outcome for d_i

σ: Volatility of the present value of cash flows

It is worth to mention that the volatility is the most difficult variable to estimate for real options scenarios, as it represents the uncertainty associated with the cash flows that comprise the underlying asset value. Normally, the relationship between a call and a put option is described through the call-put parity equation:

$$P = \ C - S + E * e^{-r*\tau}$$

As stated in the beginning, the Black-Scholes model and the DCF analysis are two valuation methodologies that complement each other. In fact, for the Black-Scholes method, the value of *S* (i.e., the present value of the expected free cash flows) is calculated using DCF analysis.

Although the Black-Scholes method or one of its variants are widely used to calculate the fair price value for a call or a put option and also in real options, it presents some limitations. The main one is that it assumes that there are no dividends paid and that the risk-free rate and volatility are constant during the lifetime of the project, which is normally not true.

3.2.4. Book Value Method

The Book Value Method consists of calculating the value of a company through its accounting books, by basically getting the total assets of the company and subtracting the total liabilities:

$$Book\ Value\ of\ a\ Company = Total\ Assets - Total\ Liabilities$$

It is a method used to double check other valuation methodologies. However, it can be used as a primary valuation technique for companies with expensive assets and low profits. For example, let's imagine a firm with $1,000 of profits for a giver year and a book value of $1 million. The selling price of this firm would be linked to its book value rather than its profitability (Bob Adams, 2020).

Book valuation is subject to adjustments, such as depreciation. It is mainly focused on tangible aspects of the firm, which makes it a poor valuation technique for startups or companies that are focused on intangible assets (e.g., new business model, research and development, intellectual property, etc.).

3.2.5. Liquidation Value

Following the same line as in the Book Value Method, this technique assumes that the assets of the company are sold in order to repay the company's liabilities. In other words, Liquidation Value is the net value of a company's physical assets if the assets were sold, and the company goes out of business. Again, this methodology does not consider intangible aspects such as intellectual property or brand recognition.

$$Liquidation\ Value\ of\ a\ Company = Tagngible\ Assets - Liabilities$$

This method normally leads to lower value of the firm compared to others, and it is commonly used in bankruptcy scenarios, where some of the assets are forced to be sold below its book value, due to the rush to repay debtholders.

3.3. Alternative Valuation Methods

3.3.1. Venture Capital

This method was developed in 1987 by William A. Sahlman and Daniel R. Scherlis in Harvard Business School, and it is detailed in the published case study (*Method for Valuing High-Risk, Long-Term Investments: The "Venture Capital Method,"* 1987). As its name describes, it focuses on valuing high-risk, long-term investments such as those confronting venture capitalists by forecasting a future value and discounting that terminal value by applying a high discount rate. In summary, the Venture Capital Method is a simple net present value that takes the perspective of the investor (i.e., venture capitalist) instead of the company.

Before detailing the methodology, it is important to define to key concepts: Pre and Post Money valuation. The pre-money valuation refers to how much a company's equity is worth before an investment round of financing is performed. Once the financing round is finalized, the resulting value of the company's equity rises by the amount of funding raised, which is equal to the post-money valuation, leading to the following equation:

$$Post = Pre + Investment$$

Where:

Post: Post-Money Value of the company's equity

Pre: Pre-Money Value of the company's equity

Investment: Funding invested in the company in the last financing round

The first step is to estimate a terminal value of the startup at the time of exit, since normally this method is used for early-stage startups which have not generated revenue yet. This estimation can be done by using multiples.

One the terminal value has been estimated, it has to be discounted using a proper discount rate. This point is crucial, and as stated at the beginning of the section, this

method values the company form the investor's perspective instead of the company. Therefore, the WACC is not an adequate discount, and instead, the Return on Investment (ROI) the investor is willing to achieve is much more useful:

$$Post = \frac{Terminal\ Value}{ROI}$$

Again, this method does not consider the concept of uncertainty, which is key in a startup environment. Moreover, it does not take into account possible payments made to the investor within the investment period, and considers a constant discount rate. However, the most relevant drawback of the Venture Capital Method is that it assumes no equity issuances in the future, making the ownership of the investor to be the same at any point of the investment period, which is far from reality in the world of startups.

3.3.2. First Chicago

Developed in 1970 by the venture capital arm of the First Chicago Bank in the 1970 and discussed in an academical paper in 1978 (*Method for Valuing High-Risk, Long-Term Investments: The "Venture Capital Method,"* 1987). It is based on building three development scenarios with its associated success probabilities: an upside case (best-case scenario), a base case and a downside case (worst-case scenario). Each scenario is independent from the others, having each own financial projections in terms of revenues, cash flows, costs etc. At the end, it can be described as a combination of elements from both multiples' valuation and DCF valuation approach.

Before starting with detailing the valuation approach, it is worth to mention that the Venture Capital Method described in section *3.3.1 The Venture Capital Method* and the First Chicago Method share many common characteristics. The main differences are that in the latter, independent probabilities and financial projections are added for each of the tree scenarios, and also the inclusion of the financial flows generated until company's selling period. In comparison with the DCF approach, the terminal value is replaced by the expected divestment price in accordance with the venture capital investor's intentions

(Andrzej Babiarz, 2016). The valuation of each of the tree valuation scenarios can be computed as follows, similar to the DCF methodology:

$$PV_i = \sum_{t=1}^{h} \frac{CF_t^i}{(1+r_d)^t} + \frac{TV_i}{(1+r_d)^h}$$

Where:

PV_i: Present Value for scenario *i*

h: Time to exit, in years

CF_i^t: Cash flow at period *t* and scenario *i*

TV_i: Terminal Value for scenario *i*

Once the present value for each scenario is computed, it is needed to define the three probabilities corresponding to each valuation scenario. For example, following the case study developed by James P. Catty (*The Fisrt Chcago Method*, 2008).

	Fair Value	*Probabilities*	*Contribution to EV*
Best-case scenario (i=1)	*$PV_{i=1}$*	*$p_{i=1}$=70%*	$EV_{i=1} = PV_{i=1} * p_{i=1}$
Base-case scenario (i=2)	*$PV_{i=2}$*	*$p_{i=2}$=20%*	$EV_{i=2} = PV_{i=2} * p_{i=2}$
Worst-Case Scenario (i=3)	*$PV_{i=3}$*	*$p_{i=3}$=10%*	$EV_{i=3} = PV_{i=3} * p_{i=3}$

Table 1: First Chicago Method Example Probabilities

Source: (The Fisrt Chcago Method, 2008)

From the table it is easy to see that the general formula for *N* number of scenarios is:

$$Enterprise\ Value = \sum_{i=1}^{N} p_i * PV_i$$

The First Chicago methods allows to consider as many valuation scenarios as desired. However, the greater number of scenarios *N* the higher the complexity of the overall valuation. The discount rate r_d tends to be lower than in the Venture Capital method since risks of the different scenarios are already considered when assigning the probabilities. The main advantages of this method that it can incorporate potential payments from the company to the investor within its holding period and a well assessment of the risks taken, which are reflected by the probabilities p_i and the discount rate r_d.

3.3.3. Berkus

Berkus valuation method, developed by the American business angel and investor Davide W. Berkus in the 90s decade. It was designed as a tool to value early-stage startups without having to rely in financial forecasts. Therefore, the method does not rely on financial metrics but on qualitative factors driven by the startup's operations and risks. Based on five operational crucial factors identified by Berkus, indicating a value ranging from zero to $500,000 for each factor, leading to a maximum of $2.5m valuation. However, Berkus states that this method can only be used for startups which are expected to reach $20m in revenues in the next five years.

Crucial factor	*Value added to the company*
Sound Idea (Production Risk, Basic Value)	*From $0 to $500,000*
Prototype (Reducing Technology Risk)	*From $0 to $500,000*
Quality Management Team (Reducing Execution Risk)	*From $0 to $500,000*
Strategic Relationship (Reducing Market Risk)	*From $0 to $500,000*
Product Rollout or Initial Sales (Reducing Production Risk)	*From $0 to $500,000*

Table 2: Crucial Factors of the Berkus Model

Source: Own elaboration and Berkonomics

Starting from the first crucial factor, *Sound Idea* refers to the potential of the business idea planning to be developed by the company. Also, the potential of the idea to solve a problem or improve an existing business model. Some of the sub factors that can be assessed in order to estimate the value of the *Sound Idea* are the proprietary nature of the idea (idea potentially secured by patents), the future plan and direction of the startup, the scalability of the idea, and the socio-political relevance. The second success factor, *Prototyping,* is a replica of the concept planning to be deployed in the market, with the aim gathering feedback from customers and identifying the problems and defects of the product before investing and launching the final concept. *Prototyping* can be seen as a technological risk management tool for start-ups. The third success factor refers to *Quality Management Team* in terms of experience of the founders in the field, which provides a sense of security to the investors. The fourth factor is *Strategic Relationship,* which is basically the collaboration between parties in order to achieve a goal. In the startup environment, normally it is necessary to partner with large and well-established entities in order to, for example, enlarge the customer base or reach new markets. Finally, the fifth and last factor is *Product Rollout* or *Initial Sales*. It is the last and the most crucial stage of the product development process, and it includes a product plan that describe the marketing strategy, target audience, resources used and a diligent timeline.

Finally, the Berkus method is widely used for valuing tech startups. One of the main drawbacks is its oversimplified framework and the subjectivity of the method. However, considering that this method is used to value pre revenue startups in early stages of maturity, it can be significantly useful if the chosen values used for each success factor are properly assigned.

3.3.4. Scorecard

The Scorecard valuation approach also tackles the challenging task of valuing pre revenue startups. It is also known as Bill Payne valuation method, in honor to its author. More than a valuation method, it is considered a tool to help angel investors find an

average valuation for startups that can potentially generate and grow in terms of revenue in the future.

Similar to the procedure described in *3.2.2. Relative valuation methods*, the Scorecard approach is based on the comparison of the target company with other similar companies in the industry in terms of the stage of development, sector, and geographic location. Then, once an average valuation has been found, it needs to be adjusted.

The first step of this method is to compute a median pre-money valuation, by comparing the target startup with similar startups in the market. This is basically done by taking a set of several relevant startups with available and recent data regarding its valuation and compute the average. Then, the second step consists of using the scorecard defined by Bill Payne, based on several comparison factors and weights:

Comparison Factor	***Weight*** (From 0% to 30%)	***Target Company*** (From 0% onwards)	***Factor***
Strength of Entrepreneur and Team	$w_{i=1}$	$p_{i=1}$	$F_{i=1} = w_{i=1} * p_{i=1}$
Size of the Opportunity	$w_{i=2}$	$p_{i=2}$	$F_{i=2} = w_{i=2} * p_{i=2}$
Product/Technology	$w_{i=3}$	$p_{i=3}$	$F_{i=3} = w_{i=3} * p_{i=3}$
Competitive Environment	$w_{i=4}$	$p_{i=4}$	$F_{i=4} = w_{i=4} * p_{i=4}$
Marketing/Sales/Partnerships	$w_{i=5}$	$p_{i=5}$	$F_{i=5} = w_{i=5} * p_{i=5}$
Need for Additional Investment	$w_{i=6}$	$p_{i=6}$	$F_{i=6} = w_{i=6} * p_{i=6}$
Other factors	$w_{i=7}$	$p_{i=7}$	$F_{i=7} = w_{i=7} * p_{i=7}$
Total			$\sum_{i=1}^{7} w_i * p_i$

Table 3: Scorecard Valuation Method Worksheet

Source: Bill Payne, own elaboration

To fully understand what the target company weight means, let's imagine a target company that has developed a product using a patented technology that makes it a much better and attractive product than the ones from the set of comparable startups. In this case, the weight $p_{i=3}$ should be higher than 100%, which would refer to the average of the set of companies chosen. On the contrary, if there is one aspect in which the target company performs at a lower level than the comparable companies, the corresponding weight p_i should be lower than 100%.

Finally, taking the average pre-money valuation, the critical factors and its weights, the following formula can be easily inferred:

$$Target\ Compoany\ Pre\ money\ Valuation = Average\ Peer\ Valuation * \sum_{i=1}^{7} w_i * p_i$$

To summarize, the Scorecard Method is aimed at pre revenue startups in the valuation range of $1m and $2.5m. Again, the main limitation of the Scorecard Method is its high level of subjectivity, which allows the investor a high level of personalization, and the fact of having to obtain data about pre-money valuations, which can be very challenging as it does not tend to be public.

3.3.5. Risk Factor Summation

The Risk Factor Summation is also another valuation approach aimed at early-stage startups. The method uses a base-value of a comparable companies to value the startup and then adjusted this base-value for 12 standard risk factors. It is structured in a very similar way to the Scorecard Method.

First of all, finding comparable startups that share similar characteristics (i.e., industry, stage, location) and the compute the median pre-money valuation of the set of companies chosen. The average pre money peer valuation is known as base-value. Secondly, asses the 12 risk factors, which are related to political and market, management quality or level of technology development as well as legal framework or bran reputation, among others:

Comparison Factor	
1. Risk of the Management	7. Risk of the Management
2. Stage of the business	8. Risk of Technology
3. Political risk	9. Risk of Litigation
4. Supply chain or manufacturing risk	10. International risk
5. Sales and marketing risk	11. Risk of Reputation
6. Capital raising risk	12. Exit value risk

Table 4: The 12 Risk Factors for the Risk Factor Summation Method

Source: Own elaboration and Ohio TechAngels

Now that the twelve risk factors are defined, it is time to assign a score to each of them, ranging from -2 to +2, which adds or deducts depending on the positive and negative risks, following the framework of the table below:

Rating	Risk Rationale	Adjustment to Pre-Money Valuation
+2	Extremely Positive	Add $500,000
+1	Positive	Add $250,000
0	Neutral	Add/Minus 0
-1	Negative	Minus $250,000
-2	Extremely Negative	Minus $500,000

Table 5: Score weights for the Risk Factor Summation Method

Source: Own elaboration and Ohio TechAngels

Following the logic of the two previous tables, the average pre-money valuation of the comparable startups is positively adjusted for risks with positive scores (increasing the valuation by $250k for every +1), and it is negatively adjusted for risks with negative grades following the same logic. The main advantage of Risk Factor Summation is that this method forces investors to consider important external factors of risks that would have not been considered otherwise. The downside is that this also implies an increase in the subjectivity and the complexity of the method.

The Risk Factor Summation approach lead also to a high level of subjectivity, but at the same times it ensures that the investor assess both external and internal risks of the startup. In addition, this method also faces the problem of gathering financial information (i.e., base-value for peers) that can be hard to obtain due to its privacy.

3.3.6. Cost-to-duplicate

The Cost-to-Duplicate valuation approach consists of calculating how much it would cost to build another company exactly like the target one from scratch, so the investors would never pay more than what it would cost to duplicate it. It is a very objective method, as it allows investors to look at real expense records of the company.

However, the methodology consists of calculating the fair value of the startup by considering its physical assets. In other words, it does not take into account intangible assets business model, brand recognition or intellectual property. Another drawback is that it does not consider the potential growth of the company, which is a key characteristic of a startup. Consequently, this valuation method usually leads to lower enterprise value compared to other techniques.

4. Case Study: Zoom

4.1. Objectives

The first three sections of this paper are aimed at giving an overview of the startup word, trends, maturity stages and how a company is funded. In addition, section *3. Valuation* provides a detailed description of the most common traditional and alternative valuation methodologies in order to estimate their value.

The main goal of this section *4. Case Study: Zoom* is to put in practice what has been described and studied in the previous sections and to put oneself in the investor's shoes by valuing the company (i.e., Zoom Video Communications) using the different techniques previously detailed. Moreover, once the advantages and drawbacks of each method have been assessed from an investment point of view with the aim of justifying the variances between each of the valuation methods, a final range of valuation will be proposed.

On the other side, the case study will also provide a detailed description of the Zoom, its revenue streams, business model as well as external factors such as a detailed analysis of the industry, its trends, and main competitors.

That being said, this paper will work on the real case study of valuing Zoom as of October of 2020, gathering real data from its annual reports, broker reports and other public data sources. The reason why the author chose this date is because is when Zoom was on its peak in terms of share price and market capitalization, due to the growth experimented during the pandemic lockdowns. Consequently, all data provided in this paper will be as of October 2020.

4.2. Company Overview

4.2.1. General Information

Zoom Video Communications, Inc. is a communications technology company based in California that provides videoconferencing, phone, and chat services through a video-first

unified communications platform[2]. It was created in 2011 by the Chinese American engineer and former Cisco executive Eric Yuan, who launched the software in 2013.

On the 17th of April of 2019, Zoom announced the pricing of its initial public offering of 20,869,565 shares of Class A common stock at a price to the public of $36.00 per share. 9,911,434 of the shares were offered by Zoom and 10,958,131 of the shares are being offered by certain selling stockholders. The shares began trading on The Nasdaq Global Select Market under the ticker “ZM” on the 18th of April of 2019.

Zoom offers local telephone service and domestic calling across 25 countries and toll-free service in 29 countries. However, users can start or join a meeting (i.e., videoconferencing services) from any international location[3]. As of January 31st, 2020, Zoom had 2,532 full-time employees, 1,396 of them based in the United States and 1,136 in Zoom’s international locations. In April of 2020, Zoom reached more than 300 million daily meeting participants (free and paid), which represented an increase of 2,900% compared to the 10 million daily meeting participants Zoom had in December 2019.

4.2.2. Business Model

Zoom business model is widely known to be based on a freemium modality. However, the company offers many solutions to its clients. For example, for its *Zoom Meetings* product, the offer ranges from a basic free plan that can host up to 100 participants for a maximum of 40 minutes meeting duration, to an enterprise plan, which can host up to 500 participants for a price of $199.9 per year per license. All products can be billed monthly or annually.

In October 2020, Zoom offered a variety of six products: *Zoom Meetings, Zoom Phone, Zoom Video Webinars and Zoom Rooms*.

3: Zoom.us, Restricted Countries or Regions: Cuba, Iran, North Korea, Syria, Ukraine (Crimea, Luhansk, Donetsk regions)

- *Zoom Meetings:* It enables hosts to schedule and start meetings, allowing participants to join these meetings using voice, video, and screensharing functionality. Every meeting must have a minimum of one host. Additional services include team chat, records and transcripts of the meeting, build-in collaboration tools that make the session interactive (e.g., interactive screen sharing) and streamlined calendaring. *Zoom Meetings* is targeted at small, medium, and big companies, as well as educational and government institutions. In addition, this service also offers a plan for developers called *The Zoom Developer Platform* that enables developers, platform integrators, service providers, and customers to easily build integrations that use Zoom's video-based communications solutions.
- *Zoom Phone:* It is a cloud-based phone service, launched in 2019, that use voice over internet protocol (VoIP) to provide voice services. One of its features is *Bring Your Own Carrier* (BYOC), which allows customers to use the telecommunications provider of their choice, as well as access to a range of Zoom call management features and functions (e.g., SMS capabilities in some regions).
- *Zoom Video Webinars:* It is cloud-based software that allows users to host virtual events, including a variety of registration and built-in ticketing options, and the use of *Zoom Meetings* for the event. *Zoom Events* is an all-in-one platform with the power to create virtual experiences and event hubs for the attendants. For example, virtual representations of a venue (e.g., company's offices or product demonstrations). In addition, it allows offers customizable registration, built-in ticketing options, and event registration tracking (e.g., number of attendants, ticket sales, revenue). *Zoom Events* provides analytical tools to help the host understand how the event is performing.
- *Zoom Rooms:* Zoom Rooms is a software-based conference room system that provides a collaboration experience between participants, such as wireless multi-sharing, interactive whiteboard, and intuitive room. It allows to bring video

collaboration into any space (e.g., in the office, classroom, at home) and enable participants to interact in real time.

As an example, Zoom's main product is *Zoom Meetings* and it is offered in four different plans, which differ in terms of price and features provided:

	Basic	***Pro***	***Business***	***Enterprise***
Price	Free	€149.90/year/license	€199.90/year/license	€199.90/year/license
Participant Capacity	100	100	300	500 (+1000 *Enterprise*+)
License count	1	1 to 9	10 to 99	+100
Billing cycle and terms	Free, supported by adds	Monthly or annual	Monthly or annual	Annual agreements only
Other basic services[4]	Yes, with limitations	Yes	Yes	Yes
Meeting duration	40 minutes	24 hours	24 hours	24 hours
Recording	Locally stored	Locally stored and 1Gb could	Locally stored and 1Gb could	Locally stored and unlimited
Telephone dial-in	No	Toll-based	Toll-based	Toll-based
Live streaming	No	Yes	Yes	Yes

Table 6: Zoom Meetings Plans overview

Source: Own elaboration and (zoom.us, n.d.)

4: Screen sharing, Breakout rooms, Virtual background, Personal Meeting ID, Private & Group chat, Host controls, Co-Annotation, Remote keyboard & mouse, TLS encryption, Waiting room, Pin multiple people, Filters, among others

In the same manner, apart from *Zoom Meetings,* the company also different plans for its other five products previously mentioned, following a similar structure based on an increasing relationship in terms of prices and services offered.

4.2.3. Facts and Figures

This section aims to describe the main financial (e.g., Revenue, Free Cash Flow, Net Income) and business figures (e.g., Number of Customers) of Zoom In order to show the fast growth experimented by the company since its IPO in April 2019. It is important to mention that all the data used in this section comes from Zoom's Annual Reports, Broker, Research and Analyst Reports as of October 2020.

Number of customers

Zoom defines a customer *as a separate and distinct buying entity, which can be a single paid host or an organization of any size (including a distinct unit of an organization) that has multiple paid hosts*. In order to better distinguish between business customers from its total customer base, Zoom reports its customers in terms of *Customers with more than 10 employees* and *Customers Contributing More Than $100,000 of Trailing 12 Months Revenue.*

Customers with more than 10 employees:

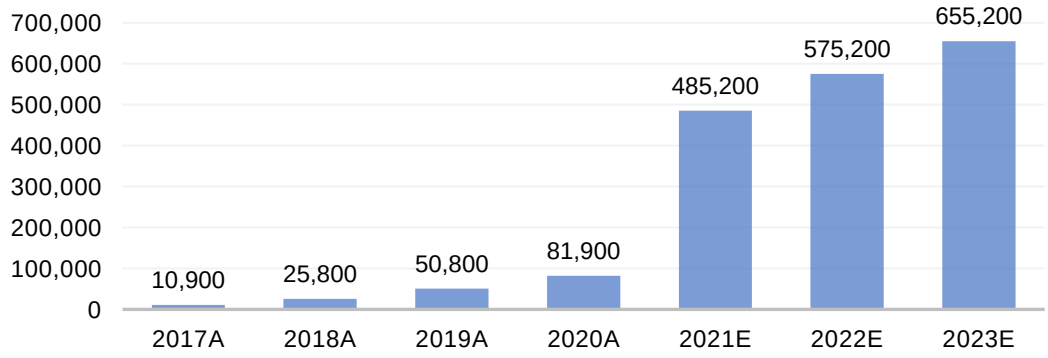

Figure 13: Number of Customers with more than 10 employees

Source: Zoom Annual Reports and JP Morgan Analyst Report

Zoom has customers of all sizes, from individuals to global Fortune 50 organizations operating in industries such as education, entertainment and media, infrastructure, finance, government, healthcare, manufacturing, non-profit organizations, or tech companies. The reason why Zoom reports its customer in this way is based on the impact of each set of customers to its revenue. For example, as of January 31st of 2020, no individual customer represented more than 5% Zoom's total revenue in the fiscal year.

Customers Contributing More Than $100,000 of Trailing 12 Months Revenue:

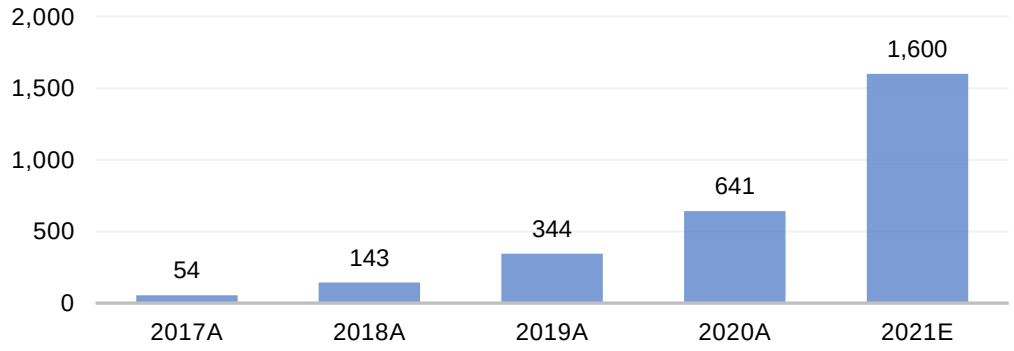

Figure 14: Customers Contributing More Than $100,000 TTM Revenue

Source: Zoom Annual Reports

The metric represented in *Figure 12* is an insightful measure to show the target customer of the company. Zoom generates a large share of their total revenue from *Enterprise* customers, as it will be seen in *Figure 16.*

***Revenue*:**

Before starting, it is important to note that all the data provided is at the end of the fiscal year, so for example, the $0.62 bn revenue of *2020A* refers to the revenue at 31st of January 2020 (i.e., end of fiscal year). According to financial forecasts from *Morgan Stanley,* the revenue will go up to $3.44 bn in *2023E*, growing a 15.4% from the previous year. Note that, as mentioned before, Zoom experimented an extraordinary growth thanks to the lockdowns imposed during the pandemic, which forced people and companies to

change to a working from home model. In particular, Zoom's revenue went from $0.62 bn in *2020A* to $2.38 bn in *2021E*, representing a growth of 282.7%.

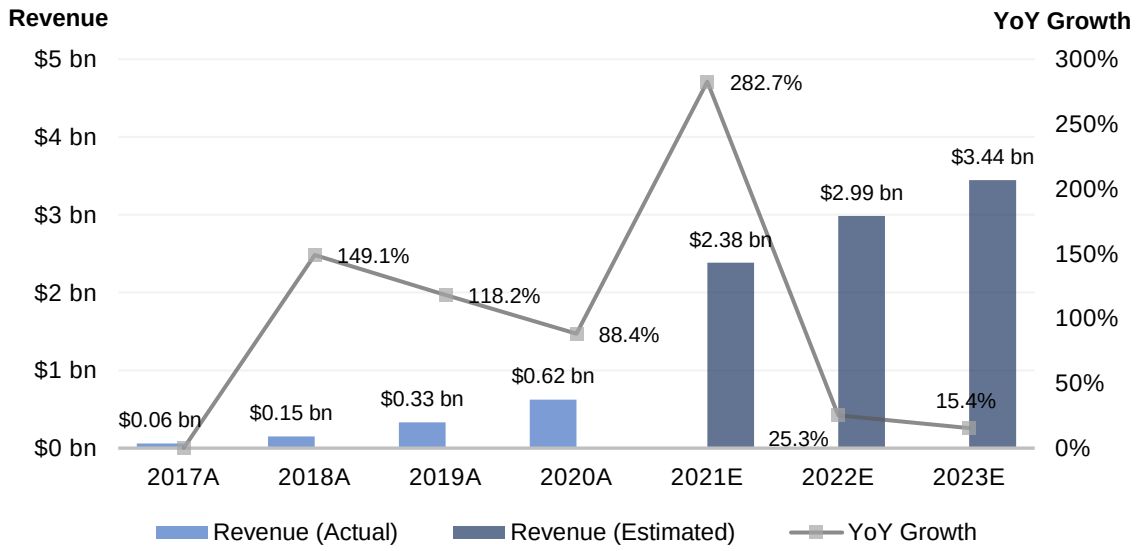

Figure 15: Zoom Revenue at the end of the fiscal year

Source: Company Annual Reports. Estimations from Morgan Stanley Analyst Report

In is also interesting to see the split of revenue between the two different types of customers that Zoom reports. On average, between a 30% and 20% of the revenue historically comes from customers who have less than 10 employees. However, these types of customers represent a larger part of the customer base.

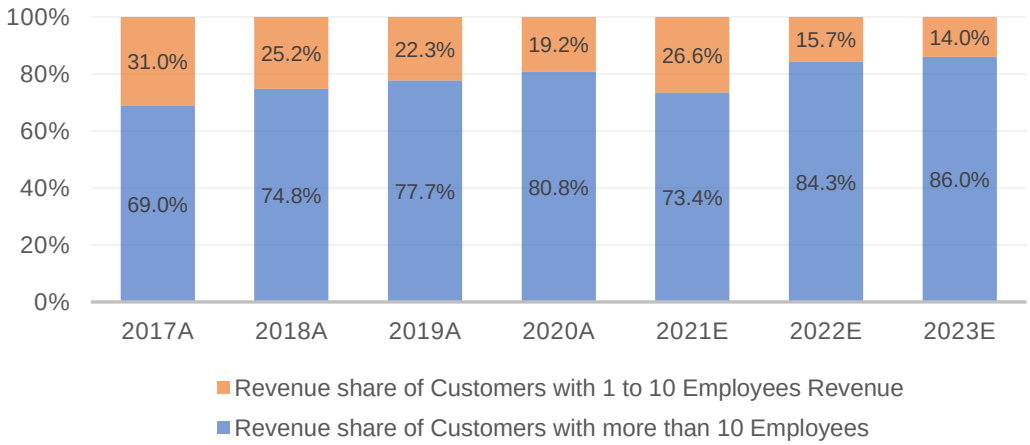

Figure 16: Revenue split by type of customer

Source: Morgan Stanley Analyst Report and Zoom Annual Reports

Cost of Goods Sold and Operating Expenses:

Cost of Goods Sold (COGS) refers to costs related to hosting Zoom's video-first communications platform and providing general operating support services to customers (e.g., data centers, third-party cloud hosting, integrated third-party PSTN services, etc.).

Operating Expenses are divided into three main components: Sales and Marketing (S&M), Research and Development (R&D) and General and Administrative (G&A). In the case of S&M, they are expenses related to personnel of the sales team, or advertising and promotional events. For R&D, they are personnel-related expenses associated with the research and development organization, depreciation of equipment used in research and development, and allocated overhead. Finally, in the case of G&A, they are costs related to personnel associated with finance, legal, and human resources teams.

Figure 17: Cost Structure of Zoom

Source: Morgan Stanley Analyst Report and Zoom Annual Reports

What is most surprising about *Figure 17* is the increase in terms of absolute and relative values of COGS from 2020A to 2021E. This is mainly because of the expanison of Zoom's data center capacity and third party cloud-hosting, driven by the increase of usage of streaming services due to the pandemic. However, COGS is expected to decrease as a percentage of revenue over time as Zoom scales its data centers to accommodate usage from its increased customer base.

EBIT and Gross Margin:

In terms of EBIT Margin or operating margin, Zoom is expected to reach a 31.2% in 2021E, and then move down to stabilize at around 20% in 2023E onwards. The reason why the operating margin increased from 14.2% in 2020A to a 31.3% in 2021E is because of the much lower expense in terms of S&M. This can be seen in *Figure 17*, where it can be inferred that S&A expenses went from 47% to 23% (% Revenue), which results in the higher operating margin.

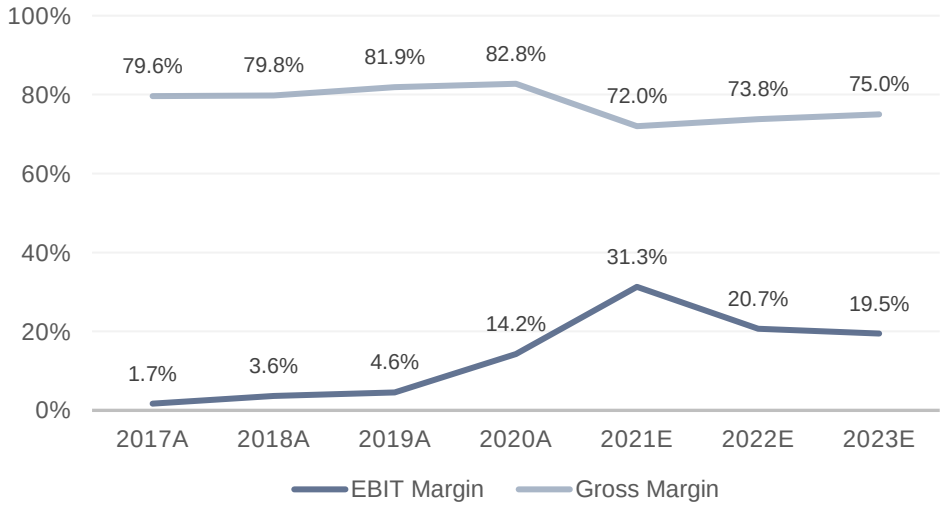

Figure 18: EBIT Margin and Gross Margin

Source: Morgan Stanley Analyst Report and Zoom Annual Reports

Capital raised during finding rounds:

Zoom was officially created in 2011, although the startup obtained its first funding round (Pre Seed) in February 2010, raising $500,000. One year later, and just after the company was officially founded, they raised $3m in a Seed Round. After that, the company went through Series A, B, C, D Rounds, raising $6 mm, $6 mm, $3 mm, and $100 mm respectively from several investors, such as Qualcomm Venture or Sequoia Capital.

Date	*Round Type*	*Share Value ($mm)*	*Pre-Money Valuation ($ mm)*	*Post-Money Valuation ($ mm)*	*Investor level % ownership*
Dec-31-2019	Growth	-	-	-	-
Oct-11-2018	Growth	-	-	-	-
Dec-01-2016	Series D	666.21	550.97	666.21	17.30
Dec-23-2014	Series C	127.69	97.69	127.69	23.49
Aug-20-2013	Series B	28.13	21.63	28.13	23.11
Jan-28-2013	Series A	12.91	2.84	12.91	77.96

Table 7: Zoom Seed and Growth Funding Rounds

Source: Crunchbase and Capital IQ

4.2.4. Shareholder structure

Zoom did its IPO in April 2019, with a valuation of $9.2 bn and a share price of $36. After that, the ownership of the company has spited into various types of public and private investors.

The following figure shows a summary of the shareholder structure of Zoom at 30th of September 2020, when the company had a market capitalization of $133.71 bn and a share price of $470.11. It is important to mention that Eric Yuan, Zoom's founder and CEO, was the top holder in terms of outstanding shares with 15.2% of the shares, with a market cap of $20.37 bn. After him, Emergence Equity Management and The Vanguard Group are the second and third top holders, with 4.2% and 3.8% of the shares respectively.

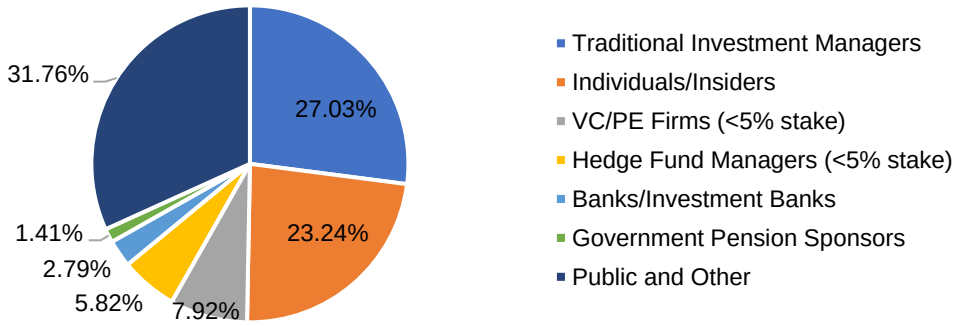

Figure 19: Zoom Shareholder Structure Summary in September 2020

Source: S&P Capital IQ

4.2.5. Company Risks

In terms of internal and external risks of the company, both from a financial and business point of view, the author has identified 10 potential risks related to Zoom's business model, market, competition, and valuation that are and will affect the company in the near future:

1. Vulnerability and security issues: The "zoombombing", which occurs when uninvited individuals disrupt a teleconferencing session, was a privacy risk during 2020. Although the company took measures to avoid it, there is a potential risk that this practice becomes popular among unwanted users. The risks of an incident are likely to increase as Zoom grows in terms of scalability and functionality of its platform, processing, storing, and transmitting large amounts of customer data.
2. Privacy issues: Zoom's iOS app was accused of sending user data to Facebook and Google, which ultimately resulted in a class action lawsuit. In addition, Zoom lied to its customers about offering end-to-end encryption. Finally, Zoom agreed to pay $85 million to settle claims.
3. Outages: Zoom serves its customers from 13 co-located data centers around the world, establishing private links between data centers to optimize performance. Outages in data centers could impact performance and affect the reputation of the company. In addition, Zoom does not control the operation of

the co-located data center facilities, which makes them vulnerable. For example, the company suffered from an outage in January 2019 that lasted for less than two hours.

4. "Back to Normal" Scenario: The virus expanded Zoom's sales growth and share price (up ~510%). The problem is that limited visibility into post virus scenario raises doubts about the extent to which online meetings will replace in person environment (e.g., business meetings, teacher conferences, doctor visits etc.)
5. Service diversification: Zoom may need to capture share in other markets such as phone or non-video in order to ensure the profitability of its business. The company needs to reverse the impact of its slowing videoconferencing business by expanding into other segments.
6. Interoperability with external platforms. The experience of Zoom's users depends upon the interoperability of its platform across third-party applications that Zoom does not control. If Zoom is unable to maintain and expand its relationships with third parties to integrate its platform with their solutions, the company may experience a decrease in number of companies.
7. Competition: Zoom faces fierce competition from Cisco WebEx, Microsoft Skype, Microsoft Meeting or Google Meet, which are part of larger corporations, and consequently better capitalized and hedged. In addition, Amazon and Facebook have also made investments in video communication tools.
8. High Valuation and financials fluctuation: Valuation reflects very high investor expectations for growth and profitability, which forces Zoom to meet expectations to avoid a decline in stock price. Its key metrics (i.e., revenue, gross margin, cash flow, deferred revenue) have fluctuated in the past and may vary significantly in the future as a result of a variety of factors, many of which are outside of Zoom's control.
9. Performance of the top management team: Recently joined senior management of Zoom have limited operating history. Three of its high-level management team members joined relatively recently. Kelly Steckelberg joined Zoom as CFO in November 2017, Harry Moseley as CIO in March 2018, and Aparna Bawa as

General Counsel in September 2018. Because of these changes, the team may not be able to effectively execute Zoom's business objectives.

10. Geopolitics and Macrotrends: The US-China trade war poses some risk as most engineers are based in China and the company may have to increase R&D spending to hire locally. In addition, Zoom also operates R&D centers in China which might lead to greater scrutiny regarding data security features and adversely affect a research center's operations.

4.2.6. Key Performance Metrics

Zoom, as any other subscription-based business model, uses several metrics such as DAU (Daily Active Users) or MAU (Monthly Active Users) to evaluate its performance. This section shows some of these metrics from December of 2019 to October 2020.

Monthly Active Users (MAU):

MAU refers to the unique number of active users that have used to platform in a specific month. According to data from Apptopia and JP Morgan analyst reports, Zoom's MAU's reached its maximum on September 13th of 2020 (212.6 million). On October 9th, it went down to 196 million users (8% decline). MAU is expected to stabilize or even increase in the future, according to JP Morgan analysts.

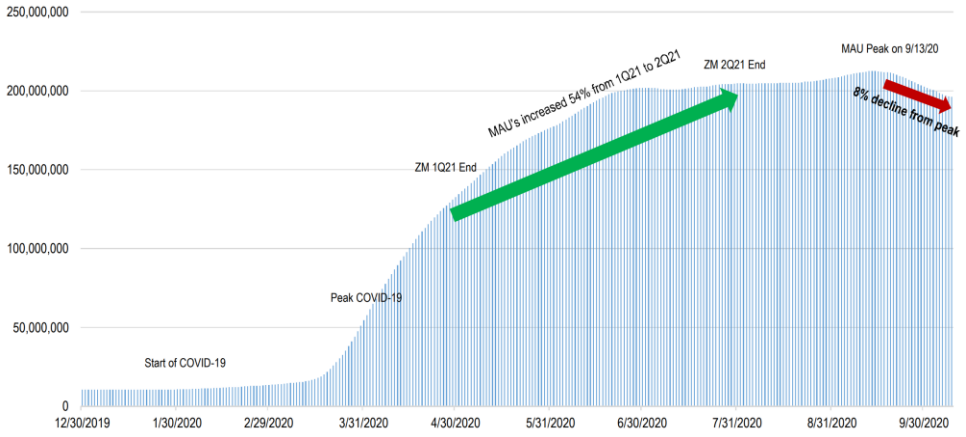

Figure 20: Zoom Monthly Active Users

Source: JP Morgan Research report

It is interesting to break down MAU by country. *Figure 21* below shows that in most countries MAU seem to be declining from the peak in September 2020. The United States together with India represent almost 40% of Zoom's monthly active users, where the declines compared to the peak have been 4% and 10% respectively.

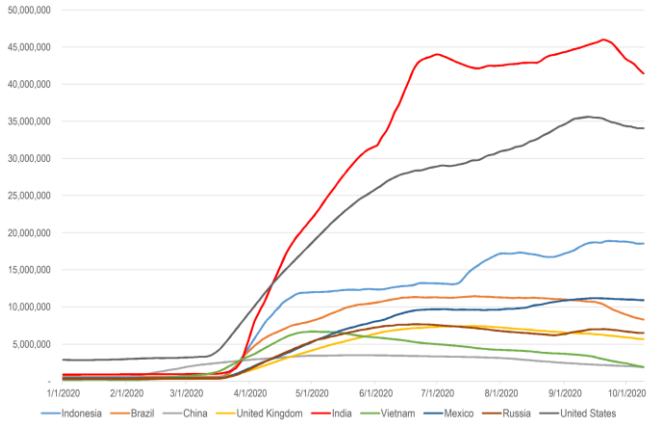

Figure 21: Monthly Active Users Breakdown by Country

Source: JP Morgan Research report

Daily Active Users (DAU) and Stock Price:

This metric differs from the count of "daily meeting participants". The last can be counted multiple times, while DAS only counts users once per day. It is often used by companies to measure service usage among its customers. In addition, *Figure 22* also plots the evolution of the stock price of Zoom, which follows a similar growth trend but with a few months of delay.

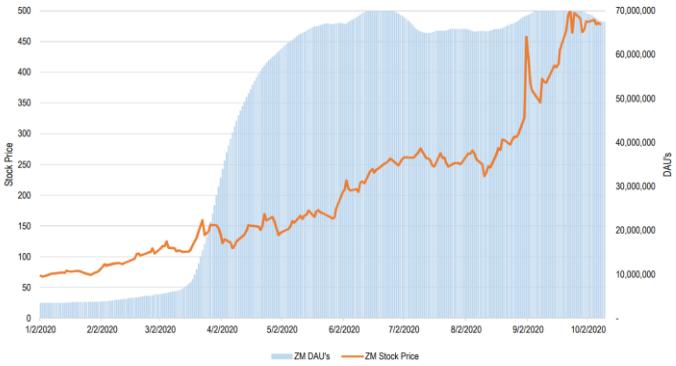

Figure 22: Zoom Daily Active Users

Source: JP Morgan Research report

Finally, it is interesting to compute the ratio MAU vs DAU, also known as *User Stickness*, in order to obtain an overview of how often your users engage with Zoom. This metric is widely used by startups and venture capital firms to measure how active monthly users are on a daily basis. In other words, to measure the customer engagement or the number of days in each month that users used the platform. As an example, the DAU/MAU Ratio at October 2020 was around 30% on average.

Daily Downloads:

In terms of total daily downloads, Zoom continues at more than 1 million downloads per day since its popularization due to the pandemic lockdowns, reaching the peak in end of March 2020. Moreover, the average daily downloads YTD is 1.7 million, which indicated that they expected to be stable around 1.4 million. The decline experimented from the peak is due to the emergence new downloads from other competitors and will be assessed in the next sections of this paper.

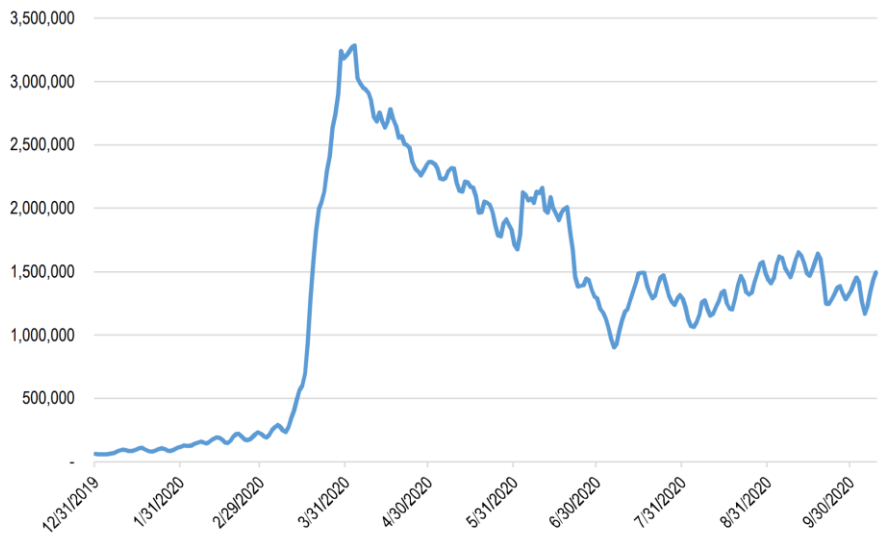

Figure 23: Zoom Number of Daily Downloads

Source: JP Morgan Research Report

4.2.7. Industry Overview

Zoom belongs to Video Conferencing Industry, which had a market size of $6 bn in 2019. Video conferencing is an online technology that enables users in distinct locations to hold face-to-face live audio and video call meetings at a little or no cost for the end user, and it is used nowadays by any company in the world, regardless its sector, maturity, or size. It is expected to grow to grow at 24% CAGR from 2020 to 2030, reaching a value of $16 bn. This impressive growth trend is explained by the fact that switching to cloud-based video conferencing is easy and involves minimal investments of time and money.

Figure 24 shows that the sub sector, represented by the *S&P 500 Application Software Sub Industry Index,* performed relatively better than the whole industry itself, represented as the *S&P 500 Information Technology Index* (GICS Sector). Overmore, comparing the sub industry with the *S&P 500*, it also performed much better in relative terms.

This performance reflects is driven by the rise of cloud offerings and related opportunities in acquisition activity. As a summary, companies in the Application Software industry that have made significant progress on cloud transitions, see reflected improving pricing and gross margins. However, as application software companies hire and invest related to demand, it is seen a negative impact on operating margins.

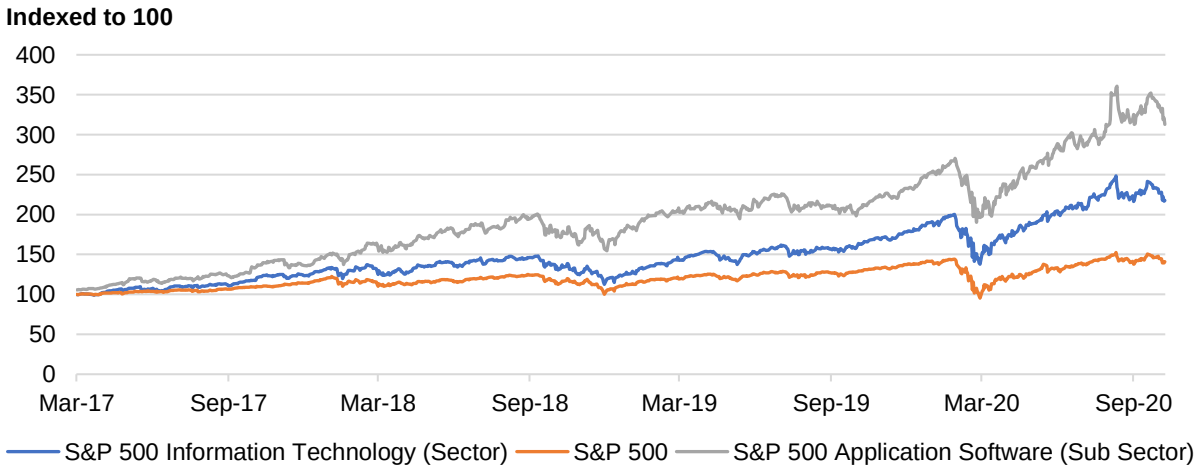

Figure 24: Industry and Sub Sector Performance (Indexed to 100)

Source: JP Morgan Research Report

Industry Trends

Video conferencing platforms experienced a boom in terms of number of users thanks to the lockdowns imposed during the pandemic, which forced people to work from home or attend online classes. It allowed professionals and students to meet with their clients or professors, enabled to conduct some legal proceedings and court cases in an online environment and even allowed medical professionals to move to a telehealth model.

1. Cloud-based videoconferencing

Cloud-based videoconferencing solutions are gaining popularity among small and medium size companies due to cost efficiency, since it avoids companies from having to invest in conventional workplace setups and reduce money spend on business travel. This solution provides all the benefits from videoconferencing without having to invest in hardware and network deployment. The cloud also enables team members to participate in a call, join a group chat, send shared documents with their own devices, and log into a video conference without location barriers.

2. Web communication via browser-based access

Browser-based video conferencing applications are gaining popularity since they eliminate the need for downloading any additional software or plug-ins, enabling the user to attend the call just using a browser from his phone of computer. Some of the services are based on WebRTC technology, which is a free and open-source project providing browsers and mobile applications with real-time communication via application programming interfaces, enabling users to join and share a video conference right away.

3. Unified Communications integration

Unified communications (UC) refer to a concept used in business and marketing environments that describes the integration of enterprise communication services such as instant messaging, voice, mobility features and video conferencing. The main idea behind UC in videoconferencing is to allow users to initiate video calls instantly and enabling chat,

video, audio, and other features (e.g., document sharing, live interaction etc.) in a single application.

4. Company-wide conferencing

Companies are deploying video and audio-conferencing services for their entire workforce for both internal and external communications. A few years back, companies mostly used video conferencing as a communication internal. Nowadays, the numerous solutions that the market offers adapt to meet new customer demands, from small to large corporations. External communication allows companies to conduct interviews, collaborating with remote experts and calling a client or sharing documents to third parties.

5. Mobile friendly platforms

One of the main trends in the video conferencing platforms is “mobile friendliness”, in particular for voce meetings. Companies in the sector are moving to a mobile environment and increasing the number of functionalities that users can execute from their smartphones, allowing them to join a call or share a document at any time regardless of their location.

6. Content Management

Most companies, when they integrate a videoconferencing software to their system, they also look for the capability of the platform to manage audio and video recordings, file sharing, and collaborative workspace. This trend goes in parallel with cloud-based platforms. One of their main features is video content management, which allows companies to have a centralized location for meeting recordings, with improved search capabilities and analytical tools to provide insights on who's watching videos or for how long to understand employee and customer engagement.

4.2.8. Competitive Landscape

Zoom faces strong competition from (i) desktop and web-based meeting providers such as Cisco WebEx, Google Meet or Microsoft Teams, (ii) bundle productivity solutions providers that offer limited video functionalities such as Google Chat, and (iii) one-off solutions providers like GoToMeeting or LogMeIn.

Main Competitors

- Cisco WebEx Meetings

Webex by Cisco is an American company founded in 1995 as WebEx and then taken over by Cisco in 2007 that develops and sells videoconferencing solutions, Unified Communications services, and contact center as a service application. They offer a similar product mix to Zoom, targeting mainly US-based companies and in the computer software industry. WebEx had a DAU's market share of 5.0% in October 2020, being the fifth player in the industry.

- Microsoft Teams

Microsoft Teams is a business communication platform developed by Microsoft, initially released on 2017 and part of the firm's Microsoft 365 suite of products. Teams will eventually replace other Microsoft messaging platforms, including Skype and Microsoft Classroom. Thanks to its smooth integration with other Microsoft's applications, it is the third player of the videoconferencing market in terms of MAU and DAU market share, with a 13.8% and 12.9% respectively.

- Microsoft Skype

Skype was created in 2003 and acquired by Microsoft eight years later, who used it to replace Windows Live Messenger. In July 2019, Microsoft announced that the end-of-life for Skype for Business would be July 31st, 2021. It is best known for its VoIP calls, although it also offers videoconferencing services. The main difference with Zoom is that Skype is

much simpler and with less features, since it just offers voice and video services, with a limited number of extra features.

- Google Meet

Formerly known as Google Hangouts Meet, is a video communication service offered by Google. It was released in the iOS App Store in 2017 as the mobile friendly version of Google Hangouts. A few months later, Google released a web version for computer and version for Android devices. It is part of the premium Google's workspace, formerly known as G Suite.

Google Chat

Previously called Google Hangouts Chat and created in 2017, it is a paid chat service provided withing Google G Suite. Although it was initially launched for business users, it went also available for general customers with a Gmail account. This app includes direct messaging, threaded team channels and allows users to create tasks and share files in addition to chatting.

- Slack

Slack was first developed in 2013 as an internal tool for the company, it was launched to the general public in in 2013. In June 2019, the company went public through an IPO and two years later Salesforce announced the acquisition of Slack. Its main capability was the introduction of threaded channels, which allowed users to split individual and group conversations by topic. Apart from chat and file sharing, Slack also offers video conferencing services.

- GoToMeeting

GoToMeeting is a web-hosted service created and marketed by LogMeIn It is an American provider of software as a service and cloud-based tools for team collaboration, founded in 2003 in Budapest. In 2017, LogMeIn completed a merger with GetGo. It offers

a similar set of products as Zoom, but it is widely known for its top-notch security and privacy. Their target market is professional, business, and enterprises, and they do not offer a freemium version.

Market Share

In terms of market share, and in particular MAU and DAU share, Zoom is the clear market dominant, with a DAU's market share of 48%, and a MAU's market share of 44% at 9th of October 2020. Looking closely at the DAU's market share, Zoom is expected to be stable around a 48% of the market share in the coming months, which implies that the company will continue to dominate the video conferencing market. The second main player is Google Meet (25.1%), followed by Microsoft Teams (12.8%), Skype (6.6%) and Cisco WebEx (5.0%). In terms of MAU's market share, it follows a very similar trend.

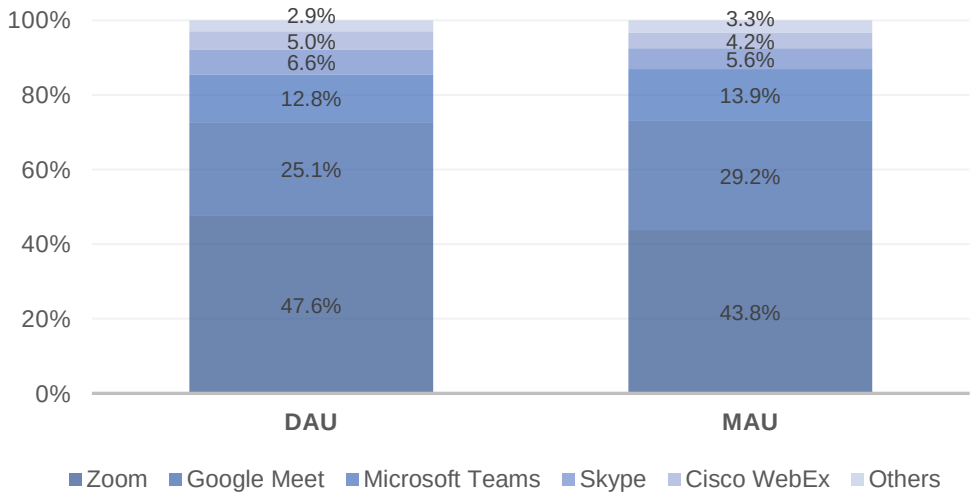

Figure 25: DAU and MAU Videoconferencing Market Share in October 2020

Source: JP Morgan Analyst Reports

Zoom's primary incumbent competitors, including Cisco Systems, Microsoft, and Google are better capitalized, since they are part of a larger corporation that operates in many other industries a part form videoconferencing. Zoom's main focus segments are Cloud-based solutions, Unified Communications and Collaborative Applications, which represent a represent a small and noncore segment for incumbent players. Hence, Zoom

is by far the main player in these niches. However, the big incumbent ones decide to focus on these niches, it could put strong pressure on Zoom's penetration. On the other side, smaller players like LogMeIn solutions, also competes in the same space as Zoom, but with a much lower market share.

One of the threads that Zoom should consider, is the low switching costs in the industry. This used to be an advantage in the past, which allowed Zoom to rapidly gain market share and even substitute incumbent players before and during a pandemic. However, the low switching costs can also affect Zoom negatively as competitors improve their product and service offer. Zoom has a strong competitive lead at the moment and the new announced features and updates will probably strengthening its leadership, always keeping in mind potential price competitive alternatives.

4.3. Company Valuation

The objective of this section is to put in practice the valuation methods described in section *3. Valuation.* More specifically, the valuation of Zoom in this case study will be performed as of October 2020, when the company was at its peak in terms of share price, being $568.34 the all-time high Zoom stock closing price on October 19th, 2020.

The financial data and forecasts used to perform the valuation come from various analyst and broker reports developed by several investment banks (e.g., Morgan Stanley, JP Morgan, and Credit Suisse), as well as other investment research companies. In terms of the main financial scenario used, although the forecast from Morgan Stanley can be considered pessimistic while compared with other broker reports, they are the most accurate, realistic and in line with what the future results published showed. The financial statements and its forecasts used in the case study can be found in the appendix of the thesis.

4.3.1. Discounted Cash Flow Analysis

The Discounted Cash Flows Analysis is the main methodology in which stable and mature companies are valued. In the case of Zoom, as this case study considers its valuation as of October 2020, Zoom can be perfectly considered a mature company.

One of the main parameters of a DCF is the time horizon or number of years used in the forecast period. The problem of using a short time horizon (e.g., three or four years) is that it is only optimal for mature companies that have reached a steady state. In the case of Zoom, the company is in an extremely fast-growing state, so in order to capture its full growth potential, a 12-years DCF is used in this case study.

Income Statement:

Zoom's financial forecast show that the company generated positive free cash flows and solid revenues in the last years and that it is expected to grow at 77% CAGR from 2020A to 2023E in terms of revenue due to the pandemic. *Table 8* shows the Income Statement and its forecasts used in the model.

mm$	*2019A*	*2020A*	*2021E*	*2022E*	*2023E*	*2024E*	*2025E*	*2026E*	*2027E*	*2028E*	*2029E*	*2030E*	*2031E*	*2032E*
Income Statement - Morgan Stanley														
Revenue	330.5	622.7	2,383.0	2,986.2	3,444.7	4,823.0	6,510.0	8,789.0	11,865.0	16,018.0	20,823.0	24,155.0	27,537.0	30,841.0
%Growth		*88.4%*	*282.7%*	*25.3%*	*15.4%*	*40.0%*	*35.0%*	*35.0%*	*35.0%*	*35.0%*	*30.0%*	*16.0%*	*14.0%*	*12.0%*
COGS	59.9	107.4	667.0	783.3	861.2									
Gross Margin	**270.6**	**515.3**	**1,716.0**	**2,202.9**	**2,583.5**									
Opex	255.5	426.6	971.0	1,584.9	1,911.8									
EBIT	15.1	88.7	745.0	618.0	671.7	965.0	1,302.0	1,846.0	2,492.0	3,684.0	5,206.0	6,522.0	7,986.0	9,561.0
D&A	6.8	16.4	36.4	100.3	163.2	266.0	432.0	703.0	1,145.0	1,862.0	2,142.0	2,356.0	2,592.0	2,851.0
Other Amortization	23.1	37.1	71.9	95.2	131.1	177.0	238.9	322.6	435.4	587.9	793.6	1,071.4	1,446.3	1,952.6
EBITDA	**45.0**	**142.2**	**853.3**	**813.5**	**966.0**	**1,408.0**	**1,972.9**	**2,871.6**	**4,072.4**	**6,133.9**	**8,141.6**	**9,949.4**	**12,024.3**	**14,364.6**
Net Interest	2.2	13.6	12.3	11.8	19.9									
EBT	**40.4**	**139.4**	**829.2**	**725.0**	**822.7**									
Net Interest	0.8	1.1	14.7	31.5	172.9									
Net Income	**39.6**	**138.3**	**814.5**	**693.5**	**649.8**									
EPS (in $)	0.06	0.35	2.9	2.89	2.97									
NSHO (in Millions)	*254*	*297.2*	*297.2*	*297.2*	*297.2*									

Table 8: Zoom Income Statement Forecasts

Source: Company Annual Reports and JP Morgan Analyst Reports

Free Cash Flows:

In terms of Free Cash Flow, an average scenario has been computed in order to better represent both optimistic and pessimistic forecasts. On the one hand, the *Optimistic Scenario*, is provided by *JP Morgan Analyst Reports*, while the *Pessimistic Scenario* is provided by *Morgan Stanley Analyst Reports*. The following table shows a summary both scenarios used to develop the model in terms of Free Cash Flow.

Base Case - Morgan Stanley														
EBIT	**15**	**89**	**745**	**618**	**672**	**965**	**1,302**	**1,846**	**2,492**	**3,684**	**5,206**	**6,522**	**7,986**	**9,561**
Effective Tax Rate (%)	*25.0%*	*25.0%*	*25.0%*	*25.0%*	*25.0%*	*25.0%*	*25.0%*	*25.0%*	*25.0%*	*25.0%*	*25.0%*	*25.0%*	*25.0%*	*25.0%*
NOPAT	**11**	**67**	**559**	**464**	**504**	**724**	**977**	**1,385**	**1,869**	**2,763**	**3,905**	**4,892**	**5,990**	**7,171**
D&A	7	16	36	100	163	266	432	703	1,145	1,862	2,142	2,356	2,592	2,851
CAPEX	31	38	136	257	297	341	357	413	454	500	550	605	665	732
Change in WC	27	41	328	10	113	69	68	68	-31	-42	-48	-33	-34	-33
FCF	**15**	**86**	**787**	**316**	**483**	**718**	**1,120**	**1,743**	**2,529**	**4,083**	**5,449**	**6,610**	**7,883**	**9,257**
Bull Case - JP Morgan														
Revenue	**331**	**623**	**2,577**	**3,527**	**4,393**									
FCF	**21**	**114**	**1,174**	**1,221**	**1,622**	**2,141**	**2,784**	**3,563**	**4,490**	**5,667**	**6,792**	**8,219**	**9,862**	**11,736**

Table 9: Zoom Free Cash Flows Scenario Calculation

Source: Company Annual Reports, Morgan Stanley, and JP Morgan Analyst Reports

Discount Rate:

The discount rate applied to the Free Cash Flows is the Weighted Average Cost of Capital, which has been calculate considering a 100% equity, meaning that the Cost of Equity is equal to the WACC*:*

WACC Calculation	
Risk-free Rate of Return	0.8%
Equity Risk Premium	6.50%
Company Beta	1.12
Cost of Equity	8.1%
Weighted Average Cost of Capital	**8.1%**
Pre-tax Cost of Debt	2%
Tax Rate	25%
After-tax Cost of Debt	1.5%

Table 10: Zoom WACC Calculation

Source: Own elaboration and Morgan Stanley Analyst Reports

The Risk-free Rate of Return is equal to the *10-Year Treasury Yield,* which was at its lowest point during mid 2020 due to pandemic impact. The equity risk premium and the company beta are provided by *Morgan Stanley Analyst Reports.*

Terminal Value:

The Terminal Value captures the value beyond the twelve-year projection period. Using the Gordon Growth Model, as of October 2020 the terminal value has been calculated as follows:

WAAC	
Discount rate	8.1%
Perpetuity growth	3.0%
Free Cash Flow at 2032	10,496
Terminal Value as of 2032	**187,686**

Table 11: Zoom Terminal Value Calculation

Source: Own elaboration and Morgan Stanley Analyst Reports

The perpetuity growth of 3% used is in line with *Morgan Stanley Analyst Reports*. The discount rate is the same as the WACC and has been detailed above.

DCF Analysis:

Now that the financial projections, discount rate and terminal value have been detailed, the calculation of the DCF analysis is as follows:

Average Scenario - DCF Analysis														
Bull and Base Weights: 50%														
FCF	**18**	**100**	**981**	**769**	**1,053**	**1,430**	**1,952**	**2,653**	**3,509**	**4,875**	**6,120**	**7,414**	**8,872**	**10,496**
Terminal Value														**187,686**
Discount period			1	2	3	4	5	6	7	8	9	10	11	12
Discount rate			8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%
Discount factor			0.93	0.86	0.79	0.73	0.68	0.63	0.58	0.54	0.50	0.46	0.43	0.39
PV of FCF + TV			**907**	**658**	**834**	**1,048**	**1,323**	**1,664**	**2,037**	**2,618**	**3,041**	**3,409**	**3,774**	**78,005**

Table 12: Zoom DCF Analysis

Source: Own elaboration and Morgan Stanley Analyst Reports

Once the present value of the free cash flows and the terminal value have been calculated, the enterprise value of Zoom can be obtained by just adding them up:

Implied Valuation	
PV of Cash Flows (in mm$)	99,319
Enterprise Value (in mm$)	**99,319**
Net Debt (in mm$)	-754
Equity Value (in mm$)	**100,073**
Shares Outstanding (in Millions)	*297.20*
Share Price (in$)	**336.72**

Table 13: DCF Analysis - Valuation Outcome

Source: Own elaboration and Morgan Stanley Analyst Reports

The enterprise value obtained by the DCF Analysis computed is $101,330mm. However, as some of the assumptions used in the analysis were taken from *Morgan Stanley Analyst Reports* and they slightly vary from other broker reports, the following sensitivity table helps to capture these variations in terms of growth rate for the terminal value and WACC.

Sensitivity of EV: WACC vs Perpetuity Growth							
	WACC						
Perpetuity Growth		*6.5%*	*7.0%*	*7.5%*	*8.0%*	*8.5%*	*9.0%*
	2.0%	127,367	111,540	98,700	88,096	79,208	71,665
	2.5%	140,229	121,313	106,296	94,111	84,046	75,607
	3.0%	156,766	133,529	115,581	101,330	89,763	80,206
	3.5%	178,815	149,235	127,186	110,152	96,624	85,641
	4.0%	209,684	170,177	142,107	121,180	105,009	92,164
	4.5%	255,987	199,496	162,003	135,359	115,491	100,135
	5.0%	333,159	243,474	189,856	154,264	128,967	110,100

Table 14: DCF Sensitivity Analysis fro Enterprise Value

Source: Own elaboration and Morgan Stanley Analyst Reports

4.3.2. Comparables

The Comparables analysis is a relative method used to value a company using similar peers in terms of in size, industry, and financial metrics. In the case of Zoom, there are not many public companies that can be compared to Zoom. This is mainly because all Zoom direct competitors (e.g., Skype, Microsoft Meetings, Google Meet etc.) are part of a larger corporations. That being said, the Comparables or “comps” analysis has been structured into three main blocks of comparable companies:

1. ***Sub-Industry Peers in the Cloud Software Application***. This group includes a group of companies in the mentioned sub-industry, such as Atlassian Corporation, Datadog or Cloudflare.
2. ***Fast-growing SaaS Peers***. Includes companies in the SaaS sector that are experiencing and expecting to keep growing at a very fast peace. Some examples are Coupa, Slack or Everbridge.
3. ***Large Cap Internet Peers***. The companies in this group do not operate within the same sub-industry as Zoom, but they can be used as a good reference. Some examples are Amazon, Alphabet or Twitter. However, this group is expected to give lower multiples values.

The reason why the comps analysis has been structured in three blocks is because there are no comparable public companies in the sub-industry that are growing as fast as Zoom, so the idea is to build a model that captures both the optimistic growth of the sub-industry thanks to the pandemic, but also taking into account that the working from home practices will probably be reduced in the future.

1) Sub-Industry Peers in the Cloud Software Application

This first group of comparable companies are the most representative and relevant while obtaining the enterprise value of Zoom. All the seventh companies operate in the same sector as Zoom and experienced a strong growth thanks to the pandemic lockdowns. In that sense, they all show high EV/Revenue multiples, which may translate to that they are overvalued, similar to the situation of Zoom.

Sub-Industry Peers - Could Software Applications	Ticker	Country	Price (in $)	Market Cap	EV	Revenue			EV/Revenue		
Zoom	**ZM**	**US**	**491.54**	**139,800**	**143,800**	**622.7**	**2,383.0**	**2,986.2**	**230.9x**	**60.3x**	**48.2x**
Datadog	DDOG	US	112.2	34,150	36,800	362.9	570.5	769.9	101.4x	64.5x	47.8x
Cloudflare	NET	US	57.01	17,500	18,500	287.3	406.6	534.7	64.4x	45.5x	34.6x
Atlassian Corporation	TEAM	UK	194.27	48,410	46,700	1,415.2	1,762.3	2,103.6	33.0x	26.5x	22.2x
Mongodb	MDB	US	263.3	15,490	18,100	421.9	553.5	696.2	42.9x	32.7x	26.0x
Crowdstrike	CRWD	US	145.96	32,030	33,400	481.3	820.6	1,109.6	69.4x	40.7x	30.1x
Zscaler	ZS	US	151.15	20,090	21,700	359.9	508.2	667.7	60.3x	42.7x	32.5x
Okta	OKTA	US	245.55	31,450	36,400	587.1	803.5	1,037.0	62.0x	45.3x	35.1x
Average									**61.9x**	**42.6x**	**32.6x**
Median									**62.0x**	**42.7x**	**32.5x**

Table 15: Zoom Sub-Industry Peers in The Cloud Software Application

Source: Own elaboration and Credit Suisse Analyst Reports

As the following table shows, enterprise value ranges from $38,607 mm and $105,892 mm. However, the enterprise value obtained in 2020A is not representative since Zoom revenue was still very low

mm$	2020A	2021E	2022E
Enterprise Value from Sub-Industry Peers Average	**EV/Revenue**		
Revenue - Average (in mm$)	623	2,480	3,257
Peer's Average	61.9x	42.6x	32.6x
Implied Zoom EV (in mm$)	**38,554**	**105,537**	**106,215**
Peer's Median	62.0x	42.7x	32.5x
Implied Zoom EV (in mm$)	**38,607**	**105,892**	**105,843**
Net Debt (in mm$)	-754.1	-1528.2	-1884.9
Equity Value (in mm$)	**39,362**	**107,420**	**107,728**
Shares outstanding (in Millions)	*297.2*	*297.2*	*297.2*
Share Value (in $)	**132.44**	**361.44**	**362.48**

Table 16: Comps Analysis 1: Enterprise Value from Sub-Industry Peers

Source: Own elaboration and Credit Suisse Analyst Reports

In terms of share price, and discarding the value for 2020A, it ranges between $361.44 and $362.48.

2) Fast-growing SaaS Peers

The second group of *comps* comprise a group of companies in the SaaS industry that experienced a strong growth derived from the pandemic lockdowns.

Fast Growing SaaS Peers	Ticker	Country	Price (in $)	EV/Revenue		
Bill.com	BILL	US	116.44	55.6x	44.8x	34.2x
Elastic	ESTC	US, NL	120.14	22.9x	18.1x	15.0x
Everbridge	EVBG	NL	129.27	19.0x	15.1x	11.8x
Smartsheet	SMRT	US	55.42	18.3x	14.6x	11.6x
Coupa	COUP	US	306	42.7x	32.8x	25.2x
MonogoDB	MDB	US	269.8	34.5x	27.2x	20.6x
Slack	WORK	US	32.57	21.7x	16.8x	13.1x
ZoomInfo	ZI	US	42.77	39.0x	31.0x	25.0x
Average				**31.7x**	**25.1x**	**19.6x**
Median				**28.7x**	**22.7x**	**17.8x**

Table 17: Zoom Fast-growing SaaS Peers

Source: Own elaboration and Credit Suisse Analyst Reports

In terms of the enterprise value derived from the EV/Revenue multiple from this second group of peers, it ranges between $56,170 mm and 57,969 mm, which is far from the

enterprise value obtained from the first group of peers due to a lower multiple. This is because this set of companies are not as overvalued as the previous group.

mm$	2020A	2021E	2022E
Enterprise Value from Fast Growing Peers Average	**EV/Revenue**		
Revenue - Average (in mm$)	623	2,480	3,257
Peer's Average	31.7x	25.1x	19.6x
Implied Zoom EV (in mm$)	**19,747**	**62,121**	**63,709**
Peer's Median	28.7x	22.7x	17.8x
Implied Zoom EV (in mm$)	**17,871**	**56,170**	**57,969**
Net Debt (in mm$)	-754.1	-1528.2	-1884.9
Equity Value (in mm$)	**18,626**	**57,698**	**59,854**
Shares outstanding (in Millions)	*297.2*	*297.2*	*297.2*
Share Value (in $)	**62.67**	**194.14**	**201.39**

Table 18: Comps Analysis 2: Enterprise Value from Fast-Growing Peers Average

Source: Own elaboration and Morgan Stanley Analyst Reports

3) Large Cap Internet Peers

Finally, the last group used for the comparable analysis, contains some of the main "tech giants". They are all mature companies that, despite they have performed well, their growth is below from what Zoom experienced. Consequently, the average EV/Revenue multiples are much lower (42.6x vs. 9.8x).

Large Cap Internet Comparables	Ticker	Country	Price (IN $)	Market Cap	EV/Revenue		EV/EBITDA		P/E	
Amazon	AMZN	US	3,176	1,619,170	3.8x	3.2x	24.1x	19.6x	79.2x	62.5x
Alphabet	GOOGL	US	1,607	1,122,343	4.6x	3.8x	13.0x	11.1x	28.2x	25.3x
Snapchat	SNAP	US	39.0	58,064.0	16.9x	12.6x	NA	NA	NA	NA
Twitter	TWTR	US	50.3	39,496.0	8.8x	7.1x	26.9x	22.2x	71.4x	56.0x
Pinterest	PINS	US	50.8		14.7x	11.2x	NA	NA	NA	NA
Average					**9.8x**	**7.6x**	**21.3x**	**17.6x**	**59.6x**	**47.9x**
Median					**8.8x**	**7.1x**	**24.1x**	**19.6x**	**71.4x**	**56.0x**

Table 19: Zoom Large Cap Internet Peers

Source: Own elaboration and Morgan Stanley Analyst Reports

In terms of the enterprise value obtained, the average EV/Revenue multiple obtained is even lower than in the previous group of peers. In fact, all the multiples calculate from this group of peers end up providing a very low enterprise value of Zoom. The fact that the multiples from big tech companies are much lower than Zooms can be understood as that Zoom is currently overvalued and that its value will be lower in the future.

mm$	2021E	2022E	2021E	2022E	2021E	2022E
Enterprise Value from Large Cap Internet Comps	**EV/Revenue**		**EV/EBITDA**		**P/E**	
Peer's Average	9.8x	7.6x	21.3x	17.6x	59.6x	47.9x
Implied Zoom EV (in mm$)	**23,258**	**22,635**	**18,204**	**14,345**	**51,368**	**41,170**
Peer's Median	8.8x	7.1x	24.1x	19.6x	71.4x	56.0x
Implied Zoom EV (in mm$)	**20,970**	**21,202**	**20,565**	**15,945**	**61,538**	**48,099**
Net Debt (in mm$)	-1,528	-1,885	-1,528	-1,885	-1,528	-1,885
Equity Value (in mm$)	**22,499**	**23,087**	**22,093**	**17,830**	**61,538**	**48,099**
Shares outstanding (in Millions)	*297.2*	*297.2*	*297.2*	*297.2*	*297.2*	*297.2*
Share Value (in $)	**75.70**	**77.68**	**74.34**	**59.99**	**207.06**	**161.84**

Table 20: Comps Analysis 3: Enterprise Value from Large Cap Internet Peers

Source: Own elaboration and Morgan Stanley Analyst Reports

4.3.3. Real Options

Following the Binomial Model explained in section *3.2.3.1. Binomial Model,* two scenarios are defined: *Up-State* and *Down-State.* The first one is based on the optimistic forecasts from *JP Morgan*, while the second is based on the estimates provided by *Morgan Stanley.*

First of all, the current stock price (So) is needed, so the value of the stock at 15th of September 2020 is the one used:

On the 15th of September 2020	
Equity Value	122,131,368
NSHO	297,200
Share Value	**410.94**

Table 21: Zoom Current Share Price

Source: Company Annual Reports and Own Analysis

Next, in order to calculate the stock price for each of both scenarios, a DCF analysis has been performed in the same way as showed in *4.3.1. Discounted Cash Flow Analysis.* The following table shows the results obtained for both scenarios, providing a minimum and a maximum value for both:

	Down State		Up State	
Future Stock Value	**Max**	**Min**	**Max**	**Min**
Enterprise Value (in mm$)	96,022	84,616	167,525	159,595
Net Debt (in mm$)	-754.1	-754.1	-754.1	-754.1
Equity Value (in mm$)	95,268	83,862	166,771	158,841
Shares outstanding (in Millions)	*297.2*	*297.2*	*297.2*	*297.2*
Share Value (in $)	**320.55**	**282.17**	**561.14**	**534.46**

Table 22: Real Options Share Price for each state

Source: Company Annual Reports and Own Analysis

To calculate the strike price of the stock (*K*), it is assumed that a potential investor would only invest if the return was equal or higher than Zoom's cost of equity (i.e., 8.1%). Consequently, the calculation of the (minimum) strike price is as follows:

Srike Price Calculation	
Share Value	410.94
Investor expected rate of return (Ce)	*8.1%*
Strike Price	**444.23**

Table 23: Zoom Strike Price Calculation

Source: Own Analysis

Finally, following the binomial model, the computation of the enterprise value ranges between $99,288 mm and $138,995 mm, which is detailed in the following table:

Real Options Method	**Min**	**Max**
Risk-free rate of return (Rf)	0.80%	0.80%
Current stock value (So)	410.94	410.94
Stock value at Up-State (Su)	534.46	561.14
Stock value at Down-State (Sd)	282.17	320.55
Strike price (K)	444.23	444.23
Investor expected rate of return (Ce)	*8%*	*8%*
Up-State factor (u)	1.30	1.37
Down-State factor (d)	0.69	0.78
Option value at Up-State (Cu)	90.23	116.91
Option value at Down-State (Cd)	0.00	0.00
Stock portfolio allocation (a)	0.4	0.5
Bond portfolio allocation (b)	189.6	270.5
Share Price - Real Options Valuation (in $)	**336.6**	**470.2**
Shares outstanding (in Millions)	*297.2*	*297.2*
Equity Value (in mm$)	**100,042**	**139,749**
Net Debt (in mm$)	-754	-754
Enterprise Value (in mm$)	**99,288**	**138,995**

Table 24: Real Options Valuation Analysis

Source: Own Analysis and Morgan Stanley Reports

4.3.4. Book Value

The following table depicts the computation of the Book Value of Zoom, which assumes that the enterprise value of Zoom equals the company's assets minus liabilities:

Book Value Method	
Total Assets (in mm$)	1,290
Total Liabilities (in mm$)	456
Book Value (in mm$)	**834**
Net Debt (in mm$)	-754
Equity Value (in mm$)	1,588
Shares outstanding (in Millions)	*297.2*
Share Value (in $)	**5.34**

Table 25: Book Value Valuation Method

Source: Own Elaboration and Company Annual Reports

4.3.5. Venture Capital

For the Venture Capital Method, two scenarios (i.e., optimistic, and pessimistic) have been defined, same as described for other methodologies. First of all, it is needed to calculate the terminal value at the time of exit, taking into account an investment horizon of three years and an expected return of 8.1%, same as it was done for the Real Options.

ROI Calculation	
ROI	**126.3%**
Expected annual rate of return	8.1%
Investment Horizon (years)	3

Table 26: Venture Capital Method ROI Calculation

Source: Own Elaboration and Morgan Stanley Analyst Reports

Then, using the terminal value and the ROIC, the post-money valuation can be computed. Finally, it is needed to subtract the Investment or Money Raised to obtain the pre-money valuation. The following table details the process:

Weighted Average EV	EV/Revenue
Comps multiple	42.7x
Terminal Value (in mm$) (2023)	167,339
Post-Money Valuation (in mm$)	132,471
Expected capital raised	0
Pre-Money Valuation (in mm$)	**132,471**
Net Debt (in mm$) (2020)	-754.1
Equity Value (in mm$)	133,225
Shares outstanding (in Millions)	297.2
Share Value (in $)	**448.3**

Table 27: Venture Capital Valuation Method

Source: Own Elaboration and Morgan Stanley Analyst Reports

4.3.6. First Chicago

The first step to compute a valuation using the First Chicago method is to define the scenarios. In this case, a best-, mid- and worst-case scenario have been defined, each of them linked to a probability and a different business plan. The next step is to compute the Terminal Value in the same way as in the Venture Capital Method. Additionally, for the multiple EV/Revenue, two groups of peers have been added to the model in order to offer a more comprehensive valuation.

	EV/Revenue	
Scenatrio 1: Best-Case (JP Morgan)	Sub-Industry Peers	Fast Growing SaaS Peers
Probability	25%	25%
Revenue (2023)	4,393	4,393
Comps Multiple	32.5x	17.8x
Terminal Value	**142,779**	**78,199**

	EV/Revenue	
Scenatrio 2: Mid-Case (Credir Suisse)	Sub-Industry Peers	Fast Growing SaaS Peers
Probability	25%	25%
Revenue (2023)	3,649	3,649
Comps Multiple	32.5x	17.8x
Terminal Value	**118,595**	**64,954**

	EV/Revenue	
Scenatrio 3: Worst-Case (Morgan Stanley)	Sub-Industry Peers	Fast Growing SaaS Peers
Probability	50%	50%
Revenue (2023)	3,445	3,445
Comps Multiple	32.5x	17.8x
Terminal Value	**111,953**	**61,316**

	EV/Revenue	
Average Scenario	Sub-Industry Peers	Fast Growing SaaS Peers
Terminal Value	**121,320**	**66,446**

Table 28: Frist Chicago Terminal Value Calculation

Source: Own Elaboration and Morgan Stanley Analyst Reports

Once the terminal value has been calculated and assuming an investment horizon of three years and an expected return of 8.1%, the enterprise value can be calculated, which ranges between $83,936 mm and $153,253 mm, depending on the group of peers selected:

	EV/Revenue	
First Chicago - Implied Valuation	**Sub-Industry Peers**	**Fast Growing SaaS Peers**
Annal Return Expected	8%	8%
Investment Horizon	3	3
Enterprise Value (in mm$)	**153,253**	**83,936**
Net Debt (in mm$)	-754	-754
Equity Value (in mm$)	154,007	84,690
Shares outstanding (in Millions)	*297.2*	*297.2*
Share Value (in $)	**518.19**	**284.96**

Table 29: First Chicago Valuation Method

Source: Own Elaboration and Morgan Stanley Analyst Reports

4.3.7. Risk Factor Summation

The last valuation method used is the Risk Factor Summation. First, the risks defined by the method need to be graded in a scale of -2 to +2, as showed in the following table:

Risk Assessment	Grade	Adjustment
Management	1	125,000
Stage of the business	2	250,000
Legislation/Political risk	0	0
Manufacturing risk	0	0
Sales and marketing risk	1	125,000
Funding/capital raising risk	2	250,000
Competition risk	-2	-250,000
Technology risk	-1	-125,000
Litigation risk	0	0
International risk	0	0
Reputation risk	2	250,000
Potential lucrative exit	0	0
Total Adjustment		**625,000**

Table 30: Risks Grading for Risk Factor Summation

Source: Own Elaboration

Then, once the Total Adjustment value is obtained, it needs to be added to the peer's valuation obtained from the multiple EV/Revenue calculated before:

Risk Factor Summation Method	EV/Revenue
Revenue (in mm$)	623
Comps multiple	42.7x
Peers Valuation (in mm$)	26,589
Total Adjustment (in mm$)	0.625
Enterprise Value (in mm$)	26,590
Net Debt (in mm$)	-754.1
Equity Value (in mm$)	27,344
Shares outstanding (in Millions)	297.2
Share Value (in $)	**92.01**

Table 31: Risk Factor Summation Valuation Method

Source: Own Elaboration and Morgan Stanley Analyst Reports

4.3.8. Valuation Methods Comparison: Football Field

Now that the enterprise value and *Share Price* of Zoom has been assessed using several valuation methods, the bast way to compare all of them is to plot them in a Football Field Chart. It is a good way to detect outliers and to properly weight the most relevant valuation methods for a specific company.

Enterprise Value

The following table shows all the valuation methods used to value Zoom in this case study, also providing a minimum and a maximum value, as well as two weighted average valuation scenarios:

Valuation Methods - Enterprise Value (in mm$)	Min	Max	Diff	Weight 1	Weight 2
Discounted Cash Flow Alaysis	101,330	115,581	14,251	25%	25%
Public Comparables	101,754	114,634	12,880	25%	25%
Real Options	99,288	138,995	39,707	25%	25%
Book Value	834	834	0	0%	0%
Venture Capital	116,440	148,502	32,062	15%	25%
First Chicago	83,936	153,253	69,318	10%	0%
Risk Sum Factor	26,590	26,590	0	0%	0%
Valuation 1	**101,452**	**129,903**	**28,451**	**100%**	**100%**
Valuation 2	**104,703**	**129,428**	**24,725**	**100%**	**100%**

Figure 26: Zoom Valuation Overview (Enterprise Value)

Source: Own Elaboration, JP Morgan and Morgan Stanley Analyst Reports

First of all, the Book Value and the Risk Factor Summation methodologies provide an enterprise value far from the other ones. In the case of the Book Value, since it only takes into account the assets minus the liabilities of the company, ignoring the future growth potential of Zoom, it provides a very low enterprise value. Second, the Risk Factor Summation is mainly designed to value startups in a very early stage of development that have received little funding, so this method is not appropriate for this case study. That said, the Football Field Chart looks as follows (in mm$):

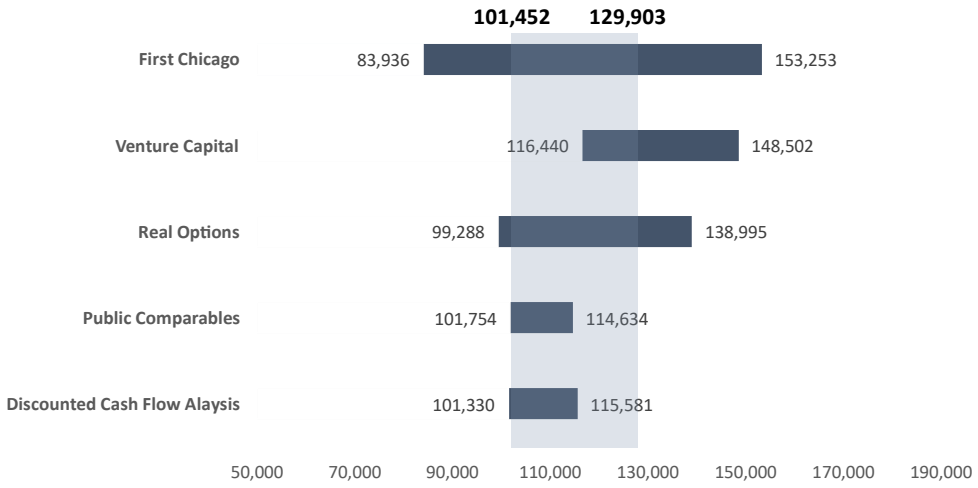

Figure 27: Zoom Football Field Valuation Overview (Enterprise Vale)

Source: Own Elaboration, JP Morgan and Morgan Stanley Analyst Reports

As seen in *Figure 27,* the enterprise value suggested by this case study ranges between $101,425 mm and $129,903 mm. In addition, an accuracy analysis has also been developed in order to assess which of the method presents the most accurate results compared to the final valuation suggested:

Accuracy of the Method - Enterprise Value	Average	Error	Error (%)
Discounted Cash Flow Alaysis	108,455	-7,223	-6.2%
Public Comparables	108,194	-7,484	-6.5%
Real Options	119,141	3,464	3.0%
Venture Capital	132,471	16,793	14.5%
First Chicago	118,594	2,917	2.5%
Valuation 1	**115,678**	**0**	**0.0%**

Figure 28: Zoom Valuation Accuracy Analysis (Enterprise Value)

Source: Own Elaboration, JP Morgan and Morgan Stanley Analyst Reports

Share Value

In term of the share value estimated for Zoom in this case study and following the same procedure as done for the enterprise value, the following figure shows its value obtained in each valuation method:

Valuation Methods - Share Price (in $)	Min	Max	Diff	Weight 1	Weight 2
Discounted Cash Flow Alaysis	343.5	391.4	48.0	25%	25%
Public Comparables	347.5	392.1	44.5	25%	25%
Real Options	336.6	470.2	133.6	25%	25%
Book Value	5.3	5.3	0.0	0%	0%
Venture Capital	394.3	502.2	107.9	15%	25%
First Chicago	285.0	518.2	233.2	10%	0%
Risk Sum Factor	92.0	92.0	0.0	0%	0%
Valuation 1	**344.5**	**440.6**	**96.0**	**100%**	**100%**
Valuation 2	**355.5**	**439.0**	**83.5**	**100%**	**100%**

Figure 29: Zoom Valuation Overview (Share Value)

Source: Own Elaboration, JP Morgan and Morgan Stanley Analyst Reports

Also, discarding the Book Value and the Risk Factor Summation methods for the same reasons states above, the Football Field Chart for the share salue looks as follows:

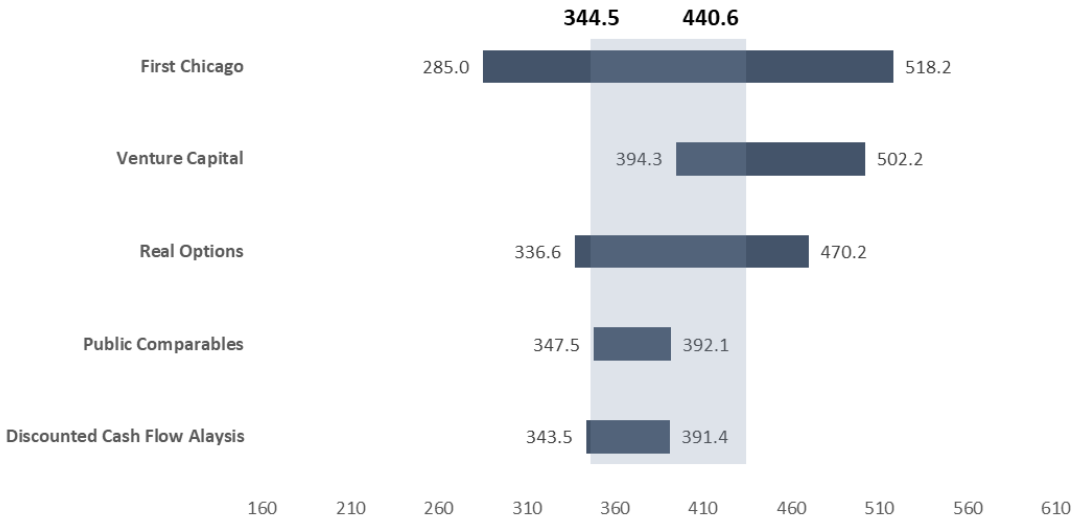

Figure 30: Zoom Football Field Valuation Overview (Share Vale)

Source: Own Elaboration, JP Morgan and Morgan Stanley Analyst Reports

5. Conclusions

The first part of this thesis details the main characteristics of a startup's nature: Limited availability of financial historics, high risk of failure, operation losses and equity financed. Then, the main trends in startup industry operations, showing that tech and finance are the sectors that most attract startup founders, together with the fact that the number of unicorns announced every year grows exponentially, most of them in the U.S. and China. In addition, the maturity stages of a startup are laid down along with the main sources of founding corresponding to each stage.

Among the various traditional valuation methodologies described, the Discounted Cash Flow and the Public Comparables analysis seem to be the most appropriate to value Zoom due to its advanced stage of development, since the valuation in this case study has been carried out in October 2020, at which time Zoom was already publicly traded and fully developed. Regarding the alternative valuation methods, Real Options analysis and the Venture Capital method seem to be the most appropriate and in line with the output of the aforementioned traditional methodologies.

Even though in October 2020 the interest rates were at historically low levels in order to keep borrowing costs low with the intention of boosting the economy and to help governments to rollout large fiscal stimulus packages, this paper tries to explain the current financial context of increasing interest rates, which significantly affects a company by lowering its valuation. The current environment of rising interest rates increases a company's cost of capital, which cause valuations to fall, giving way to a vicious cycle of low earnings, low share price and sluggish economy that feed back into each other.

Previously to the valuation case study, the extensive market and industry analysis proved that Zoom was the market leader in terms number of users in October 2020, way ahead of its main competitors, which have the advantage of being backed by large corporations. In addition, Zoom not also performed better than its direct videoconferencing providers competitors, but also showed higher growth than peers in the SaaS industry.

The last part of this paper aims at valuing Zoom using the valuation techniques described, detailing their output and their advantages and disadvantages. The methodologies that relied on qualitative factors (e.g., Berkus, Risk Factor Summation) are mainly aimed at startups in a very early stage of development, which does not fit the timeframe in which the valuation of Zoom has been carried out in this case study. On the other hand, the traditional valuation methods (i.e., DCF and Comparable analysis) together with the remaining alternative valuation techniques (Real Options, First Chicago, and Venture Capital method) show a more consistent but overvalued valuation of Zoom. In particular, the weighted average enterprise value valuation obtained from the aforementioned methods ranges between $101,452 mm and $129,903 mm as of October 2020, leading a share price of between $344.5 and $440.6.

6. Annex

6.1. Zoom Income Statement – Morgan Stanley

mm$	*2019A*	*2020A*	*2021E*	*2022E*	*2023E*	*2024E*	*2025E*	*2026E*	*2027E*	*2028E*	*2029E*	*2030E*	*2031E*	*2032E*
Income Statement - Morgan Stanley														
Revenue	330.5	622.7	2,383.0	2,986.2	3,444.7	4,823.0	6,510.0	8,789.0	11,865.0	16,018.0	20,823.0	24,155.0	27,537.0	30,841.0
%Growth		*88.4%*	*282.7%*	*25.3%*	*15.4%*	*40.0%*	*35.0%*	*35.0%*	*35.0%*	*35.0%*	*30.0%*	*16.0%*	*14.0%*	*12.0%*
COGS	59.9	107.4	667.0	783.3	861.2									
Gross Margin	**270.6**	**515.3**	**1,716.0**	**2,202.9**	**2,583.5**									
Opex	255.5	426.6	971.0	1,584.9	1,911.8									
EBIT	15.1	88.7	745.0	618.0	671.7	965.0	1,302.0	1,846.0	2,492.0	3,684.0	5,206.0	6,522.0	7,986.0	9,561.0
D&A	6.8	16.4	36.4	100.3	163.2	266.0	432.0	703.0	1,145.0	1,862.0	2,142.0	2,356.0	2,592.0	2,851.0
Other Amortization	23.1	37.1	71.9	95.2	131.1	177.0	238.9	322.6	435.4	587.9	793.6	1,071.4	1,446.3	1,952.6
EBITDA	**45.0**	**142.2**	**853.3**	**813.5**	**966.0**	**1,408.0**	**1,972.9**	**2,871.6**	**4,072.4**	**6,133.9**	**8,141.6**	**9,949.4**	**12,024.3**	**14,364.6**
Net Interest	2.2	13.6	12.3	11.8	19.9									
EBT	**40.4**	**139.4**	**829.2**	**725.0**	**822.7**									
Net Interest	0.8	1.1	14.7	31.5	172.9									
Net Income	**39.6**	**138.3**	**814.5**	**693.5**	**649.8**									
EPS (in $)	0.06	0.35	2.9	2.89	2.97									
NSHO (in Millions)	*254*	*297.2*	*297.2*	*297.2*	*297.2*									

6.2. Zoom Balance Sheet – Morgan Stanley

mm$	*2019A*	*2020A*	*2021E*	*2022E*	*2023E*	*2024E*	*2025E*	*2026E*	*2027E*	*2028E*	*2029E*	*2030E*	*2031E*	*2032E*
Balance Sheet - Morgan Stanley														
Cash and Cash Equivalents	63.1	283.1	936.4	1,465.4	1,919.3									
Marketable Securities	112.3	572.1	733.0	733.0	733.0									
AR	63.6	120.4	625.1	740.1	865.6									
Pre-paid expenses and other current a	10.3	44.9	112.5	125.4	146.6									
Deferred contract acquisition costs	26.5	75.0	155.8	225.2	296.1									
Total Current Assets	**275.8**	**1,095.5**	**2,562.8**	**3,289.1**	**3,960.6**									
PP&E	37.3	57.1	167.1	324.2	457.8									
Deferred contract acquisition costs	39.9	46.2	213.1	308.1	405.0									
Other LT Assets	1.5	90.9	149.0	149.0	149.0									
Total Assets	**354.5**	**1,289.7**	**3,092.0**	**4,070.4**	**4,972.4**									
AP	5.0	1.6	48.7	48.8	56.0									
Accured Expenses	32.3	122.7	421.9	470.2	549.9									
Deferred Revenue	115.2	209.5	843.8	1,003.1	1,246.5									
LT Debt	0.0	0.0	0.0	0.0	0.0									
Total Current Liabilities	**152.5**	**333.8**	**1,314.4**	**1,522.1**	**1,852.4**									
Other Liabilities	24.5	101.1	141.2	313.5	366.6									
Deferred Revenue	10.6	21.0	28.1	28.1	28.1									
LT Debt	15.0	0.0	0.0	0.0	0.0									
Total Liabilities	**202.6**	**455.9**	**1,483.7**	**1,863.7**	**2,247.1**									
Net Debt	**-135.9**	**-754.1**	**-1,528.2**	**-1,884.9**	**-2,285.7**									
Change in Working Capital	27.0	41.0	328.0	10.0	113.0	69.0	68.0	68.0	-31.0	-42.0	-48.0	-33.0	-34.0	-33.0
Convertible preferred stock	162.1	0.0	0.0	0.0	0.0									
CommonStock	0.1	0.3	0.3	0.3	0.3									
Additional paid-in capital	*15.5*	*832.7*	*1041.7*	*1297.7*	*1728.6*									
Accum. other comprehensive loss	-0.5	0.8	2.8	2.8	2.8									
Accumulated deficit	-25.2	0.2	563.5	905.9	993.7									
Total Shareholders' Equity	**152.0**	**834.0**	**1,608.3**	**2,206.7**	**2,725.4**									
Total Liabilities and Shareholders' Ec	**354.6**	**1,289.9**	**3,092.0**	**4,070.4**	**4,972.5**									

6.3. Cash Flow Statement – Morgan Stanley

mm$	*2019A*	*2020A*	*2021E*	*2022E*	*2023E*	*2024E*	*2025E*	*2026E*	*2027E*	*2028E*	*2029E*	*2030E*	*2031E*	*2032E*
Cash Flow Statement - Morgan Stanley														
Cash Flow from Operations Activities														
Net Income (loss)	7.6	25.3	563.3	342.4	87.8									
Depreciation&Amortization	6.8	16.4	36.4	100.3	163.2	266.0	432.0	703.0	1,145.0	1,862.0	2,142.0	2,356.0	2,592.0	2,851.0
Amortization of deferred contract acquisition costs	23.1	37.1	71.9	95.2	131.1									
Stock-based compensation	8.9	73.1	144.8	256.0	430.9									
Provision for accounts receivable allowances	0.0	6.4	15.0	0.0	0.0									
Others	14.8	4.8	58.2	172.3	53.2									
Accounts receivable	-39.1	-64.7	-526.7	-115.0	-125.5									
Prepaid expenses and other assets	-4.7	-24.8	177.0	-12.9	-21.3									
Deferred contract acquisition costs	-59.4	-72.7	-349.7	-259.5	-298.9									
Accounts payable	2.2	-2.0	46.9	0.2	7.2									
Accrued expenses and other liabilities	16.8	46.7	62.5	48.3	79.7									
Deferred revenue	71.5	106.3	648.5	159.2	243.4									
Net cash provided by operating activities	**48.4**	**151.9**	**948.2**	**786.4**	**750.8**									
Cash Flow from Inveting Activities														
Purchases of marketable securities	-78.0	-852.0	-716.5											
Maturities of marketable securities	68.7	343.6	287.3											
Purchases of property and equipment	-30.5	-38.2	-135.7	-257.4	-296.8	-341.0	-357.0	-413.0	-454.0	-500.0	-550.0	-605.0	-665.0	-732.0
Payment received fromloan to related party	0.0	-1.6	-2.8											
Net cash used in investing activates	**-39.7**	**-548.3**	**-567.6**	**-257.4**	**-296.8**									
Cash Flow from Financing Activities														
Proceeds from issuance of conv. Pref. stock	2.5													
Proceeds fromexercise of stock options	15.0	57.7	17.4											
Repurchase of convertible preferred stock														
Principal payments on capital lease obligations														
Proceeds fromissuance of common stock		558.0	255.2											
Net cash provided by financing activities	**17.5**	**615.7**	**272.6**											
Net change in cash	26.3	219.3	653.3	529.0	454.0									
Cash and cash equivalents at beg. of period	36.8	63.8	283.1	936.4	1,465.4									
Cash and cash equivalents at end of period	**63.1**	**283.1**	**936.4**	**1,465.4**	**1,919.3**									

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