

UNIVERSITY OF ECONOMICS IN BRATISLAVA

FACULTY OF NATIONAL ECONOMY

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**VALUATION OF PUBLICLY TRADED COMPANY USING
DIFFERENT VALUATION METHODS**

Diploma Thesis

2019

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Announcement

I confirm, that all literature sources which I used in writing of this thesis are listed in the part “Bibliography” at the end of this document.

ABSTRACT

KOPAŇA Dávid: *Valuation of publicly traded company using different valuation methods.* – University of Economics in Bratislava, The Faculty of National Economy, Department of Finance – Consultant: prof. Ing. Božena Chovancová, PhD. – Bratislava: NHF EU, 2019, 66p.

Have you ever wondered based on what investors make their decision when buying a particular company? The main goal of this diploma thesis is to provide detailed walkthrough the different valuation techniques and their applicability. Therefore, to use different valuation techniques and demonstrate the benefits or disadvantages of these methods. Later in the second part of this diploma thesis, selected valuations techniques are used and applied on the particular publicly traded company to determine whether the stock is under or overvalued. Throughout the valuation process, important concepts and principles are explained in order to gain better understanding how these determinants affect the valuation process.

As a part of the valuation process, detailed financial statements analysis as well as common size analysis was conducted to evaluate the company's efficiency, leverage and profitability.

The selected publicly was chosen based on the experienced and knowledge of the CPaaS (Communication as a platform) industry. Twilio is considered to be a leader of CPaaS industry in United states with an intention to penetrate deeply into international markets.

Key words: intrinsic value, valuation, DCF, investor, company, enterprise

ABSTRAKT

KOPAÑA Dávid: *Valuation of publicly traded company using different valuation methods.* – Ekonomická Univerzita v Bratislave, Národohospodárska fakulta, Katedra financií – Vedúci záverečnej práce: prof. Ing. Božena Chovancová, PhD. – Bratislava: NHF EU, 2019, 66p

Pýtali ste sa niekedy sami seba, na základe čoho robia investori svoje rozhodnutia, keď uvažujú o kúpe spoločnosti? Hlavným cieľom tejto diplomovej práce je priblížiť a vysvetliť jednotlivé procesy ohodnocovania spoločnosti a následne aplikovať tieto techniky na vybranú akciovú spoločnosť. Teda, pomocou využitia vybraných techník ohodnocovania spoločnosti, hlavnou úlohou je určiť hodnotu vybranej akciovej spoločnosti a následne determinovať či je spoločnosť podhodnotená, alebo nadhodnotená. Počas procesu ohodnocovania, sú vysvetlené dôležité koncepty a determinanty, ich vplyv na hodnotu spoločnosti a taktiež aj ich úlohu v jednotlivých modeloch.

Neodmysliteľná časť ohodnocovacieho procesu spoločnosti, je analýza finančných výročných správ spoločnosti, ktorá je taktiež súčasťou praktickej časti. Na základe tejto analýzy spoločnosti, má investor oveľa lepší prehľad o ziskovosti, efektivite a zadlženosti danej spoločnosti, teda lepšie informácie a stave v akom sa spoločnosť nachádza

Vybraná akciová spoločnosť bola zvolená na základe pracovných skúsenosti v danom CPaaS (Communication Platform as a Service) odbore. Twilio, je považovaný za lídra v tejto oblasti na Americkom trhu, so zámerom rozšíriť svoje pôsobenie medzinárodne a tak zvýšiť svoj celkový podiel na trhu.

Kľúčové slová: firma, akciová spoločnosť, diskontovaný cash flow, diskontná sadzba

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List of Abbreviations:

R_d - Cost of debt

R_e - Cost of equity

R_f - Return on risk-free asset

R_m - Return on Market

W.A.C.C. - Weighted average cost of capital

C.A.P.M. - Capital Asset Pricing Model

APV - Adjusted Present Value

PV - Present Value

TV - Terminal Value

FCF - Future cash flow

EBIT - Earnings Before Interest Taxes

NOPLAT - Net Operating profit/loss after taxes

ROIC - Return on Invested Capital

D - Debt

E - Equity

COGS - Cost of Goods Sold

SG&A - Selling, General and Administrative

CPaaS - Communication Platform as a Service

API - Application Programming Interface

TWLO - Twilio

Introduction

Valuation is the analytical process of determining the current worth of asset or a company. It is a complex process that requires one to input large numbers of assumptions in order to get to the bottom line, which is the intrinsic value of company. There are countless techniques how to assess true value of any asset. Even though, there has been great number of books published on the subject of valuation, many analysts still can't agree on certain things. There is an old saying "Valuation is more of an Art than a Science", and it is often one of the favorite phrases among famous investors during the tough times. Most concepts of valuation perceive the value of security mostly based on the estimate of the future earning power of the company. Not only for that, but for many other reasons the importance of corporate valuation is immense and is present in our every day's life. Some of these concepts helps to answer questions like "How much is this company really worth?" or "What is the fair value of this asset?". Therefore, the curiosity, the presence of the topic in finance and the interest in the subject of valuation, were one of the main motives that drove our decision-making process to choose this topic. The subject of valuation is company called Twilio. It is a leader in CPaaS (Communication Platform as a Service) industry in United States and it is publicly traded company listed on the New York Stock Exchange. The selection of company was based on the personal experience working in the industry during the summer internship in FP&A (financial planning and analysis) field for its main competitor called Nexmo.

This diploma thesis consists of 4 chapters and each of these chapters have its own subchapters. The first part of the thesis is dedicated to the literature that was used as well as the overview of the literature home and abroad, and authors who published books on the subject of valuation. Later on, the distinction between value and price is explained as well as the efficient market hypothesis and its different levels. Following subchapters were dedicated to the main drivers behind the value creation as well as the introduction of the financial statements for value investing. Last subchapter provides detailed explanation and role of the cost of capital and different techniques how to come up with the most precise estimate of either cost of debt or cost of equity.

In the second part of the thesis we discuss methodological aspects of the present research and provide detailed explanation of selected valuation techniques. Each of the techniques have different use cases. Goals and methodology that was used in order to obtain

different results and measurements is discussed at the beginning of the chapter. Later on, forecasting as an inevitable part of valuation is presented thoroughly, step by step.

The third and fourth part of the thesis is devoted to results and discussion, respectively. Using selected methods, different findings were compared against each other and comprehensively explained in case there was significantly big difference between estimates. We discuss the difference between findings and conclude by providing detailed explanation that have caused this deviation between these estimates.

1. Literature Overview

A corporate valuation is very complex process that requires one to input large numbers of assumptions in order to get to the bottom line. Every day, there are countless deals being made, where good valuation is crucial for both target and acquirer. Not only for this reason, but for many others, valuation is a widely discussed topic home as well as abroad among academics, analysts, investors and other entities. First publication about value investing goes decades and decades back. Many value investors even today consider *James Graham* and *David Dodd* as a godfathers of value investing. Their first edition of book called "Security Analysis"¹ was written in 1934 and among many investors it is still considered to be a bible of value investing. Continuously in print through five editions for more than 60 years is indisputably the most influential book on investing ever written. Graham and Dodd were Wall Street's first bargain shoppers. In this book they explain their methods for locating stocks and bonds "which were selling well below the levels apparently justified by a careful analysis of the relevant facts." In this book, authors tells precisely how to find these undervalued securities and analyze those "relevant facts".

Aswath Damodaran is another important figure and probably most famous and best known in nowadays for his publications on equity valuations, as well on corporate finance and investments. He is a professor of Finance at the Stern School of Business at the New York University and his articles were often published in the Journal of Finance, The Journal of Financial Economics and other prestigious economic journals. "Damodaran on Valuation"² is definitively one of the most influential and famous publication that was written by Aswath Damodaran. Another important publication was "Investment Valuation"³ and "The Dark Side of Valuation". The last publication "The Dark Side of Valuation"⁴ is about the potential thread and negative consequences that can happen if there is tremendous mis valuation of the market. This was exactly the case in 2000 where so-called Dot-com bubble popped. Many young

¹ GRAHAM, B. – DODD, D. 2008. Security Analysis. 6th edition, New York : The McGraw Hill Companies, Inc. 765 p. ISBN 978-0-07-160312-6.

² DAMODARAN, A. 2006. Damodaran on Valuation: Security Analysis for Investment and Corporate Finance 2nd edition, New York : John Wiley & Sons, 2009, 696 s. ISBN 978-0471751212.

³ DAMODARAN, A. 2012, Investment Valuation: Tools and Techniques for Determining The Value of Any Asset, 3rd edition, New York: John Wiley & Sons 2012, 992 s. ISBN 978-1118011522.

⁴ DAMODARAN A- 2009. Dark side of Valuation: Valuing Young distressed, and Complex Business. 2nd edition. New York: John Wiley & Sons 2009 , 600 s. ISBN 978-1118011522.

companies with no history especially in technological industry were valued at millions of dollars even though the reality was completely different.

Another important publication for valuation that was written by three authors: *Tim Koller, Marc Goedhart, David Wessels* is called "Valuation: Measuring and Managing the Value of Companies"⁵. In this book authors express the importance of growth and return on invested capital and their impact on the value creation and shareholders value. The sixth edition was published in 2015 and first two authors are employees of the well-known consulting company called McKinsey & Company. McKinsey & Company has been around for more than 90 years and belongs among the most prestigious companies when it comes to valuation. Third author, David Wessels is the former employee, however now he is a principal at the company providing educational programs in field of corporate valuation.

Another great publication that describes investing principles of Charlie Munger and mainly Warren Buffet is called "Warren Buffet Accounting Book"⁶ written by *Stig Brodersen* and *Preston Pysh*. *Brealey, Myers and Allen* also dedicated sufficient portion of their book called "Principles of Corporate Finance"⁷ to the subject of valuation. A great contribution to the topic of valuation was made by *James R. Hitchner* with his book "Financial Valuation: Applications and Models"⁸. Hitchner has more than 30 years of experience in the field of valuation and worked in many executive positions in the private sector as well as for the government. Not only authors, but also companies and association contribute to topic and conduct their research in order to come up with the most accurate estimate as possible. For instance, National Association of Certified Valuation Analysts published extensive article called "Business Valuations: Fundamentals Techniques and Theory"⁹. Many authors worked and contributed to this article but probably most famous profound are *Mel Abraham* and *Stephen A. Degnan*.

⁵ KOLLER, T. - GOEDHART, M. - WESSELS, D. 2015. Valuation: Measuring and Managing the Value of Companies. 6th edition. New York: McKinsey & Company Inc., 2015. 848 p. ISBN: 978-1118873700

⁶ BRODERSEN, S. - PYSH, P. 2014. Warren Buffet Accounting. 1st edition, New York: Pylon Publishing 2014. 251p. ISBN 978-1-939370-15-0

⁷ BREALEY, R. - MYERS, S. - ALLEN, F. 2017. Principles of Corporate Finance, 12th edition. New York: McGraw-Hill Education, 2017. 890p. ISBN – 978-1-259-25333-1.

⁸ HITCHNER, J. R. 2011. Financial Valuation: Applications and Models. 3rd edition. New York: Wiley Finance.,2011 1320p. ISBN 978-0-470-50687-5.

⁹ National Association of Certified Valuation Analysts. 2008. Business Valuations Fundamentals, Techniques and Theory, 1st edition. NACVA, 2008. 772 p. ISBN: 801-486-0600.

From our region, *Miloš Mařík* published "Určování hodnoty firem¹⁰" and "Oceňování podniku¹¹" which is considered to be his most influential publications. He worked with many individuals and published numerous articles on the subject of valuation. He also worked with his wife *Pavla Maříková* and published together "Moderní metody hodnocení výkonnosti a oceňování podniku¹²", "Diskontní míra v oceňování¹³" as well as "Diskontní míra pro výnosové oceňování podniku¹⁴". Another important figure who contributed to the topic of valuation is Karol Zalai with his book called "Finančno-ekonomická analýza podniku¹⁵".

¹⁰ MAŘÍK, M. 1998. Určování hodnoty firem. 1st edition. Praha: Ekopress, 1998. 206 p. ISBN 80-86119-09-2.

¹¹ MAŘÍK, M. 1996. Oceňování podniku. 1st edition, Praha: Ekopress, 1996. 111 p. ISBN 80-901991-1-9.

¹² MAŘÍK, M - MAŘIKOVÁ, P. 2005. Moderní metody hodnocení výkonnosti a oceňování podniku. Praha: Ekopress, 2005. 164 p. ISBN 8086119610.

¹³ MAŘÍK, M. MAŘIKOVÁ, P. 2001 Diskontní míra v oceňování. 1st edition, Praha: VŠE, 2001. 101 p. ISBN 80-245-0228-3.

¹⁴ MAŘÍK, M. MAŘIKOVÁ, P. 2007. Diskontní míra pro výnosové oceňování podniku. 1st edition, Praha: Nakladatelství Oeconomica, 2007. 242 p. ISBN 978-80-245-1242-6.

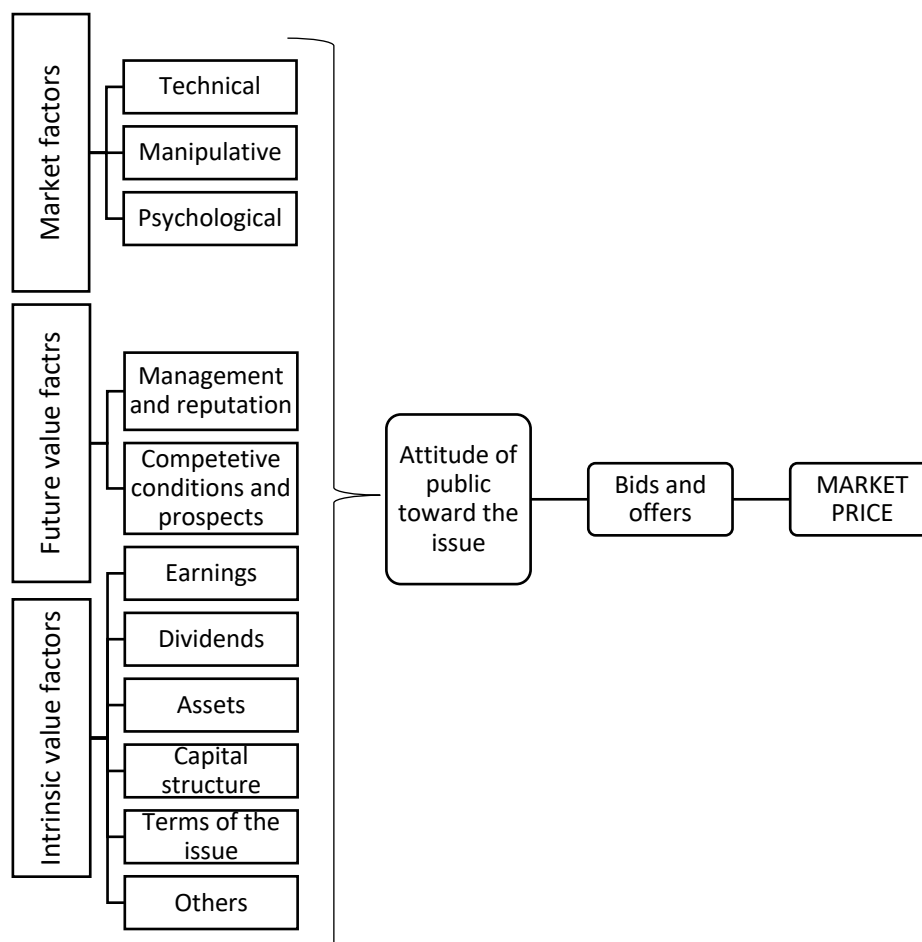
¹⁵ ZALAI, K. 2008. Finančno-ekonomická analýza podniku. 6th edition. Bratislava: Sprint, 2008. 385p. ISBN 8089085996

1. 1. Fundamental Principles of Value creation

1. 1. 1. Price vs. Value

The distinction between price of a company and their intrinsic value are very often two distinct features. One of the most famous investors Warren Buffet once said: "Price is what you pay, value is what you get". The most important difference between price and value is the fact that price is arbitrary, and value is fundamental. It is important to understand that the stock's intrinsic value is not necessarily directly tied to its current market price. Intrinsic value is an estimate of the actual true value of a company. Market value is the current value of a company reflected by the company's stock price. Therefore, market value may be significantly higher or lower than the intrinsic value. It is easier to understand the relationship between market price and its intrinsic value from the following graph.

Graph 1 – The relationship between market price and its intrinsic value



Source: Excel and Measuring and Managing value of companies

It is evident from the chart that the influence of what we call analytical factors over the market price is both partial and indirect. Partial because it frequently competes with purely

speculative factors which influence the price in the opposite direction. Indirect because it acts through the intermediary of people's sentiments and decisions. In other words, the market is not weighing machine, on which the value of each issue is recorded by an exact and impersonal mechanism, in accordance with its specific qualities. It is more like a voting machine, whereon countless individuals register choices which are product of partly reason and partly emotion¹⁶.

Economists define three levels of market efficiency, which are distinguished by the degree of information reflected in security prices. In the first level, prices reflect the information contained in the record of past prices. This is called weak market efficiency. If markets are efficient in the weak sense, then it is impossible to make consistently superior profits by studying past returns. The second level of efficiency requires that prices reflect not just past prices but all other publicly available information, for example, from the Internet or the financial press. This is known as semistrong market efficiency. If markets are semistrong efficient, then prices will adjust immediately to public information such as the announcement of the last quarter's earnings, a new issue of stock, or a proposal to merge two companies. With a strong market efficiency, prices reflect all information that can be acquired by painstaking analysis of the company and the economy. In such a market we would observe lucky and unlucky investors, but we wouldn't find any superior investment managers who can consistently beat the market.

Even though, many value investors do not support the efficient market hypothesis, they trust that market will eventually start to favor those that were, for a time, undervalued. Value investors choose securities that appear to be mispriced based on their fundamental analysis of a company. Value investing is an investment tactic where stocks are selected which appear to trade for less than intrinsic, or book values. A postulate of value investing is that an investor does not pay more for an asset than it is worth. This statement may seem logical and obvious, but it is forgotten and rediscovered at some time in every generation and in every market. There are those who are disingenuous enough to argue that the value is in the eyes of the beholder, and that any price can be justified if there are other investors willing to pay that price. This is absurd to the certain extent. Perceptions may be all that matter when the asset is painting or sculpture, but value investors do not buy and should not buy most assets for aesthetic or emotional reasons. They buy financial assets for the cash flows they expect to receive in the

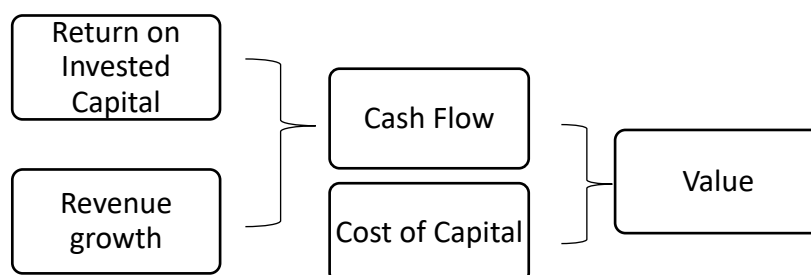
¹⁶ GRAHAM, B. – DODD, D. 2008. Security Analysis. 6th edition, New York : The McGraw Hill Companies, Inc. 71 p. ISBN 978-0-07-160312-6

future. This statement implies that the price we pay for any asset should reflect the cashflows it is expected to generate in future. Investors who use this strategy thinks that market overreacts to good and bad news, resulting in stock price movements which do not correspond to a company's long-term fundamentals as a result of people irrational and unpredictable behaviour.

1. 1. 2. Drivers behind Value creation

Enterprises creat value for their owners by investing cash now to generate more cash in the future. The amount of value they create is the difference between cash inflows and the cost of the investments made, adjusted to reflect the fact that tommorow's cash flows are worth less than today's because of the time value of money and riskiness of future cash flows. As will be later explained, a company's return on invested capital (ROIC) and revenue growth together determines how revenues are converted to cash flows. That means, the amount of value company creates is determined ultimately by its ROIC, revenue growth and the ability the sustain those two over time. Whole relationship can be better explained via following graph:¹⁷

Graph 2 – relationship between revenue growth, return on invested capital and value



Source: Excel and Measuring and Managing value of companies

One would thought that there would be general and common settlement on a notion as fundamental as value, but the reality is quite different. Many top-level executives, even accounting firms and other parties still consider and think of value and of accounting earnings as the same. Even so, there can be some correlation found between these two, earnings do not provide the entire story of value creation. Thus, companies that focus too much on earnings

¹⁷ KOLLER, T. - GOEDHART, M. - WESSELS, D. 2015. Valuation: Measuring and Managing the Value of Companies. 6th edition. New York: McKinsey & Company Inc., 2015. 18-20 p. ISBN: 978-1118873700

and earnings growth usually leads businesses to stray from value-creating path. This phenomenon can be easily explained and demonstrated using the example of these two well known publicly traded companies. One of them is Walgreen CO., that accounted for \$72 billions in sales in 2012, while the other company General Mills, generated sales only of \$18 billions in the same year. During the period from 1985 and 2012, Walgreen's after-tax operating profits grew 13 % per year while General Mills grew only 9 % annually. If we do simple math using this numbers, by the 2012 profits of Walgreen's should have been 25 times larger while profits generated by General Mills would have been only 9 times larger. From this point of perspective, it seems like Walgreens is much better investment opportunity than General Mills. Is it true, though ? Not really, both companies earned for about an average of 10 % return on annual basis for their shareholders. The reason why General Mills was able to earn approximately same average annual return and create same value for its shareholders as Walgreens is its return on invested capital (ROIC). Despite the fact, that Walgreens was the fastest growing company in United States during this time, company was not able to deliver as much return on its invested capital as General Mills. While General Mills earned a 29 % ROIC, Walgreens earned only 16 %. As a result of that, they both earned same annual average return for their shareholders, despite their different growth rate and return on invested capital. Thus, to find out what drives the company's performance, it is necessary to disaggregate cashflow into revenue growth and ROIC. It is very hard and unprecise to determine company's economic performance just based on comparison of its cashflows over the year. Increase in cashflow can come from many sources including: reduction in capital spending, revenue growth, or a reduction in marketing spending. Therefore, it is crucial to find out company's revenue growth and return on invested capital when assessing the performance of the business. These metrics can be easily compared to the standart in the industry, or can be compared against its main competitor. It is important to be aware, that every industry have its specifics, but this will be discussed later.¹⁸

The relationship between ROIC, growth and cashflow can be expressed mathematically as:

¹⁸ KOLLER, T. - GOEDHART, M. - WESSELS, D. 2015. Valuation: Measuring and Managing the Value of Companies. 6th edition. New York: McKinsey & Company Inc., 2015. 18-20 p. ISBN: 978-1118873700

$$\text{Growth} = \text{ROIC} \times \text{Investment Rate}$$

where:

$$\text{ROIC} = \frac{\text{NOPLAT}}{\text{Invested Capital}}$$

and:

$$\text{Investment Rate} = \frac{\text{Net investment}}{\text{NOPLAT}}$$

where:

$$\text{Net Investment} = \text{Invested Capital}_{t+1} - \text{Invested Capital}_t$$

Another way to look at this relationship in terms of cash flow:

$$\text{Cash Flow} = \text{Earnings} \times (1 - \text{Investment Rate})$$

where:

$$\text{Investment Rate} = \frac{\text{Growth}}{\text{ROIC}}$$

therefore:

$$\text{Cash Flow} = \text{Earnings} \times 1 - \left(\frac{\text{Growth}}{\text{ROIC}} \right)^{19}$$

1.1.2.1 ROIC

As it was mentioned earlier, return on invested capital also referred as return on capital is a calculation to assess company's efficiency at allocating the capital under its control to profitable investments. It is often based on company's return on existing investments, where book value of capital is assumed to measure the capital invested in these investments. Indirectly, one assume that current accounting return on capital is a good measure of the true returns earned on existing investments and that this return is good proxy for return that will be

¹⁹ PLENBORG, T. 2001. Firm valuation: comparing the residual income and discounted cash flow approaches, Scandinavian Journal of Management, Copenhagen Business School p. 2-16

made on future investments. As it was demonstrated earlier in order for company to create value, its return on invested capital has to be greater than company's cost of capital. The greater the difference between the return on invested capital and the cost of capital, the more value company creates. As long as the cost of capital exceeds company's return on invested capital, then company should reevaluate its operations because it destroys its value over time.²⁰

There are many determinants that affect the company's return on invested capital. One of the most important factors behinds ROIC is the company's competitive advantage. Competitive advantage is a superiority that a firm has over its competitors that creates greater profits. Having a competitive advantage means that company can produce good or a service of equal value at a lower price, therefore more efficiently. Competitive advantage is derived from a combination of price-premium advantages and cost and capital efficiency.

1. 1. 2. 1. 1. Price-premium advantages

To sell a product at higher prices for certain goods a firm must find a way to differentiate its products from its competitors. This can be done in various ways. However, we recognize following source of price premiums, which will be explained one by one: innovative products, quality, brand and customer lock-in.²¹ Innovative product are the products that can not be easily reproduced or secured by patent and these products tend to earn high return on invested capital. Quality of product is another very important aspect of competitive advantage. In general, quality is a pragmatic interpretation as the superiority of something. In business, and in terms of ROIC, quality means factual or noticable difference between one service or a product and another. Some "high-end" companies, in automotive industry industry for instance enjoyed price premiums because consumers perceived that its cars drive and handle better than comparable products at the lower price. The cost of providing the extra quality for company is usually less than the price premium they charge. Another inevitable source of competitive advantage is brand. It is highly correlated with quality and it is identifying symbol that represents company, and enterprises use it to distinguish its products from competitors. And then, last two factors - customer lock-in and rationale price discipline. These two are the function of a product and the level of competitivness. People do not like changes in general

²⁰ Investopedia: Return on invested capital definition. [online]. [cit.2018-12-22]. Available online at: <<https://www.investopedia.com/terms/r/returnoninvestmentcapital.asp>>

²¹ Investopedia: Competitive Advantages definition. [online]. [cit.2018-12-22]. Available online at: <https://www.investopedia.com/terms/c/competitive_advantage.asp>

and usually replacing known product for unknown carries some risk and switching costs associated with it. For instance, if a brand-new machine is bought, it requires some time to be invested in order to become proficient in using it.²²

1. 1. 2. 1. 2 Cost and Capital Efficiency Advantages

Theoretically, cost and capital efficiency are two different competitive advantages. But in practice it is hard to separate them, since they have common drivers. Cost efficiency is the act of saving money by making product cheaper than competition, or performing activity in a better way. While capital efficiency represents "the relationship between how many expenses are incurred by company to how much money is used to manufacture a good or service"²³. However, in practice both cost and capital advantages are driven by following factors: innovative business method, unique resources, economies of scale and whether the product or process is scalable. Therefore, the business method is defined as a series of activities that are undertaken by a company to create a product or deliver a service. It is a combination of its logistics, production, and pattern of interaction with customers.²⁴ Lots of these methods can be easily copied and established, but there are some cases where such a implementation comes hand in hand with a substantial investment. Another great advantage for firm to have is an access to or a disposal of a unique resources that can not be replicated by competition. For instance, gold miners in South Africa earn lower return on invested capital than miners from North America, because the ore is closer to the surface, therefore extracting is easier and it cost less. Another important advantage to have indeed is so-called economies of scale. Economies of scale is defined as a proportionate saving in cost gained by an increased level of production. In other words, the cost per unit of output decreasing with increasing scale. However, this notion is often misunderstood that there are automatic economies that comes with size. In many cases, this occurs only on local and sometimes on national level, not on a global market. Therefore, important factors that determines the success of a business, is its scalability. The concept of scalability is closely related to economies of scale but in general, it is the ability to handle growing amount of work with no or very low additional costs. It describes company's

²² KOLLER, T. - GOEDHART, M. - WESSELS, D. 2015. Valuation: Measuring and Managing the Value of Companies. 6th edition. New York: McKinsey & Company Inc., 2015. 90-113 p. ISBN: 978-1118873700

²³ Business Dictionary: Capital Efficiency definition. [online].[cit.2018-12-25]. Available online at: <<http://www.businessdictionary.com/definition/capital-efficiency.html>>

²⁴ Business Dictionary: Business methods. [online].[cit.2018-12-26]. Available online at: <<https://financial-dictionary.thefreedictionary.com/Business+methods>>

ability to grow without being hampered by its structure or available resources faced with increased production.²⁵

1. 1. 2. 2. GROWTH

Growth is indeed another important factor behind value creation. Every company tries to increase its growth year-over-year in order to increase or at least maintain their share of the market. The popular view is that company must grow to survive and prosper. When top managers plan for growth, they usually start with disaggregating growth into following main components: portfolio momentum, market share performance, mergers and acquisitions. It is important to know what is behind the grow in revenues and disaggregating it to the main components allows to see real reason behind increase in revenues. One of the most important component of revenue growth for all enterprises is portfolio momentum. Portfolio momentum can be explained as the organic growth that is mostly driven by an expansion of the market/company, therefore leads to higher revenues. Another component of revenue growth can be market share performance.²⁶ Market share performance is also organic revenue as portfolio momentum, but unlike portfolio momentum, revenues increases as long as company is able to increase its share in the market they operate in. One of the last components that has been very popular in recent years to maintain growth at the certain level are mergers & acquisitions activities. Such a activities represents the inorganic growth a company achieve when it acquires another company or when it divest its division and receive money for it. It is logical, that managers typically strive for high growth. However, as it was earlier explained, high growth does not necessarily have to create the most value. Every type of growth creates different value. Historically, to create a new markets through new products, convince existing customers to buy more of a product or attract a new customer to the market, created the most²⁷ value. On the other hand, large acquisition and gaining share from rivals through product promotion and pricing did not seems like very good source of value creation.

²⁵ KOLLER, T. - GOEDHART, M. - WESSELS, D. 2015. Valuation: Measuring and Managing the Value of Companies. 6th edition. New York: McKinsey & Company Inc., 2015. 90-113 p. ISBN: 978-1118873700

²⁶ ARMITAGE, S. 2007. Incorporating financing-related determinants of value in the discounted cash flow model, Journal of Economic Surveys, vol.22 p. 5-25

²⁷ KOLLER, T. - GOEDHART, M. - WESSELS, D. 2015. Valuation: Measuring and Managing the Value of Companies. 6th edition. New York: McKinsey & Company Inc., 2015. 115-135 p. ISBN: 978-1118873700

1. 2. Reading Financial Statements for Value Investing

For most people financial reports are as interesting as looking at painty dry. But in reality, it is the language of the business. One can look at financial statements as systematic reports that inform you about the success or the failure of a company. At the end of the day, there is nothing more important to consider when you're looking to invest in a business. Financial statements give investor better idea about how does this company make profit and what are they currently worth. In annual report, investor could see several important statements of varying relevance. However, the three most important reports that every investor look at are called the income statement, the balance sheet and cashflow statement. These are main statements to focus on when one start looking into value investing. These three financial statements will be shortly explained just to have a basic understanding what is the purpose of each statement and what information each of these statements tells us about the company.

1. 2. 1. The income statement

How much profit does a company make in one year ? That is really question that is being asked in the income statements. In general, the income statement is determining how much profit the company has made in one year. That is why is income statement also referred as the profit and loss statement. It summarizes how much money the company has made during the year and how much it spent. The difference is the profit or the loss, which you can find at the very bottom of the statement. Profit, earnings - more commonly know as net income or earning before interest and taxes, are all terms for same thing. It is important to know that income statements of two different companies might not look identical. All income statements are build in the same manner, and it is only the names of the different lines and the presentation of the numbers that are different. However, the intention is always to show how much net income the company has made at the bottom line.

1 . 2. 2. The Balance Sheet

A balance sheet is indeed another important financial statement that is sectionalized into three major categories: the assets, the equity and the liability. It provides a basis for computing rates of return and evaluating its capital structure. It is a financial statement that provides a snapshot of what company owns and owes, as well as amount invested by shareholders. The easiest way to explain the relationship is looking at what company owns. If we look at the random company, it would probably own variety of assets such as: buildings,

machines etc. However, every asset needs to be somehow financed. Simply said, company need to find money from somewhere to finance its assets. Therefore, assets can be financed in two ways: with the company's money - this is called equity, or with someone else's money - this is called liabilities. The most important thing to understand when first thinking about balance sheet. Because assets are either financed by equity or liabilities, the two sides will always be equal. They will balance.²⁸

1. 2. 3. The cash flow statement

When investor think about financial statements, they usually think of that income statement and the balance sheet. Amateur investors often overlook the cashflow statement even though it is a source of very valuable information. It connect the income statement with the balance sheet thereby giving the investor a synergized vantage point of the company's financial situation. Looking at a corporate cash flow statement would be similiar to beeing able to look at an individual's checking account each month. There is a great example to explain the importance and the role of cash flow. If you are looking at company's balance sheet and discover that the cash balance is increasing. Is it a good news ? It depends, the increase in cash may arise because company is making more money. If this is the case, then increase in cash is good news. But on the other hand, the cash balance might have increased because company has taken out a loan or issued more shares. This is where cashflow statement helps clarify the picture. It is sectionalized into three major groups. ²⁹

²⁸ Investopedia: Beta estimate [online].[cit.2018-12-27]. Available online at: <<https://www.investopedia.com/terms/b/balancesheet.asp>>

²⁹ BRODERSEN, S. - PYSH, P. 2014. Warren Buffet Accounting. 1st edition, New York: Pylon Publishing 2014. 204 - 206 p. ISBN 978-1-939370-15-0

2. Goals and Methodology

The main purpose of this thesis was to describe different valuation methods and then use selected valuation methods to estimate the intrinsic value of Twilio. In part three, essential valuations methods are thoroughly explained with an intention to explain the logic and the use case of the particular approach. In part four, discounted cash flow method and exit multiple was used to determine the intrinsic value of the company. However, in order to determine the intrinsic value of the company using selected valuations methods, it was inevitable to set following sub goals:

- Explain the importance of valuation in corporate finance
- Provide details about the company and the industry
- Conduct a common-size analysis
- Assess Beta
- Calculate Cost of debt and Cost of Equity
- Estimate WACC
- Estimate the intrinsic value of company
- Forecast Financial Statements
- Compare different results and techniques applied

In order to come up with the estimation of the intrinsic value of company, it requires one to gather large number of data as well as information about the company. Inputs for the theoretical part were mainly gathered from the literature as well as academic papers and sources that were obtained online. Great source of information that we used was from 10-K annual report which provided not only numbers for our research we later used, but also valuable information about the company, the industry, the risk it faces and its vision for future. Financial statements were downloaded and then MS Excel was used to insert and organize all the data in appropriate manner. YAHOO finance and Bloomberg served as a great tools to obtain some fundamentals as well as the historical prices of the company and the S&P500 in order to get Beta estimate. A common-sized analysis was conducted with the intention to see the trends and their development over the time. The data were collected from the 10-K annual report.

3. Results

3. 1. Cost of capital

Today most companies start with the company cost of capital as a benchmark risk-adjusted discount rate for a new investment. Another way to explain cost of capital is the opportunity cost in making an investment in a business. The company cost of capital is usually estimated as a weighted-average cost of capital, that is, as the average rate of return to investors in the firm's common stock. The company cost of capital is defined as the expected return on a portfolio of all company's outstanding equity and debt securities. In discounted cash flow valuations, the discount rates used should reflect the riskiness of the cash flows. In particular, the cost of debt has to incorporate a default premium or spread for the default risk in the debt, and cost of equity has to include a risk premium for equity risk.³⁰

3. 1. 1. Cost of debt

The cost of debt measures current cost to the firm of borrowing funds or finance its assets. In general terms, it should be a function of the default risk that lenders perceive in the firm. As the perceived default risk increases, lenders will charge higher default spreads to lend to the firm. Therefore, default risk measures a firm-specific risk on promised returns. In fact, the default risk of a firm is a function of two variables. The first is the firm's capacity to generate cashflows from its operations and the extent of its financial obligations. The second is the volatility in these cashflows. The more stability there is in cashflows, the lower is the default risk in the firm. Firms that operate in predictable and stable business will have lower default risk than will otherwise similar firms that operate in cyclical or volatile business.

The most common method to measure firm's default risk is its bond rating, which is generally assigned by independent agencies best known as Standard & Poor's and Moody's. Thousands of companies are rated by these two agencies, whose view carry significant weight with financial markets. The process of rating a bond usually starts when the issuing company requests a rating from a bond rating agency. The rating agency then collects information from both publicly available sources, such as financial statements and the company itself and makes a decision on rating. The ratings assigned by the agencies are letter ratings. A rating of AAA

³⁰ BREALEY, R. - MYERS, S. - ALLEN, F. 2017. Principles of Corporate Finance, 12th edition. New York: McGraw-Hill Education, 2017. 220 – 225p. ISBN – 978-1-259-25333-1.

from Standard & Poor's and Aaa from Moody's represents the highest rating granted to firms that are viewed as having the lowest default risk.³¹

“Also, the market price of the bond, in conjunction with its coupon and maturity, can serve to compute a yield that we can use as the cost of debt. This approach works for liquid and frequently traded bonds. Although, many firms have bonds outstanding that do not trade on regular basis. Since these firms are usually rated, we can estimate their cost of debt by using their ratings and associated default spreads to come up with the cost of debt. But still, there many firms out there that are not covered and rated by these rating agencies and still borrow money. For enterprises by looking at the most recent borrowing made by a firm, we can get a sense of the default spreads being charged the firm and use these spreads to come up with a cost of debt. Another alternative is to assign a rating to a firm based on its financial ratios. This is called synthetic rating. Using the following formula, we can obtain Interest coverage ratio and based on the table XY, we can assign rating and typical default spread”.³²

$$\text{Interest coverage ratio} = \frac{\text{Operating income} + \text{Lease expense}}{\text{Interest expense} + \text{Lease expense}}$$

Table 1 - Interest coverage Ratios and Ratings

Interest Coverage Ratio	Rating	Typical Default Spread
> 12.50	AAA	0.35%
9.50 - 12.50	AA	0.50%
7.50 - 9.50	A+	0.70%
6.00 - 7.50	A	0.85%
4.50 - 6.00	A-	1.00%
4.00 - 4.50	BBB	1.50%
3.50 - 4.00	BB+	2.00%
3.00 - 3.50	BB	2.50%
2.50 - 3.00	B+	3.25%
2.00 - 2.50	B	4.00%
1.50 - 2.00	B-	6.00%
1.25 - 1.50	CCC	8.00%
0.80 - 1.25	CC	10.00%
0.50 - 0.80	C	12.00%
< 0.50	D	20.00%

Source: Excel and Bondsonline.com

³¹ DAMODARAN, A. 2006. Damodaran on Valuation: Security Analysis for Investment and Corporate Finance 2nd edition, New York : John Wiley & Sons, 2009, 60-70 p. ISBN 978-0471751212.

³² DAMODARAN, A. 2006. Damodaran on Valuation: Security Analysis for Investment and Corporate Finance 2nd edition, New York : John Wiley & Sons, 2009, 65 p. ISBN 978-0471751212.

3. 1. 2. Cost of equity

The cost of equity as well as cost of debt are key components of every discounted cash flow valuation. It is difficult to estimate the cost of equity because it is an implicit cost and can vary widely across different investors in the same company. Unlike the interest rate on debt, the cost is an implicit cost and cannot be directly observed. The cost of equity is simply what investors in the equity in a business expect to make on their investment. Investors who buy assets expect to earn return over the time horizon that they hold assets. Their actual returns over this holding period may be very different from expected returns that gives rise to risk. Different investors may very well see different degrees of risk in the same investment and demand different rates on return, given their risk aversion.

There are 3 different ways in which we can estimate the cost of equity for a business. In the first, we derive models that measure risk in an investment and convert the risk measure into an expected return, which in turn becomes the cost of equity for that investment. The second approach looks at differences in actual returns across stocks over long time periods and identifies the characteristics of companies that best explain the differences in returns. Then this relationship is used to forecast expected equity returns for individual companies. Last approach uses observed market prices on risky assets to back out the rate of return that investors are willing to accept on these investments.³³ While most conventional risk and returns models in finance agree on the first steps on the risk analysis (i.e., that risk comes from distributional of actual returns around the expected returns and that risk should be measured from perspective of a marginal investor who is well diversified) they part ways when it comes to measuring non-diversifiable or market risk.

The most famous model that is still used in finance for measuring market risk in finance is the Capital Asset Pricing Model (CAPM). The Capital Asset Pricing model is widely used in the finance by various professionals such as investment bankers, accountants or financial analysts. Also, it is integral part of the weighted average cost of capital as it calculates the cost of equity³⁴. The Capital Asset Pricing Model describes the relationship between systematic risk and expected return for assets, particularly stocks. The CAPM says that³⁵

³³ DAMODARAN, A. 2006. Damodaran on Valuation: Security Analysis for Investment and Corporate Finance 2nd edition, New York : John Wiley & Sons, 2009, p. 29 . ISBN 978-0471751212.

³⁴ MAŘÍK, M. 1998. Určování hodnoty firm. 1st edition. Praha: Ekopress, 1998. 206 p. ISBN 80-86119-09-2.

³⁵ Principles of Corporate Finance 12th edition - Brealey,Myers,Allen - 225p.

$$\text{Expected stock return} = r_f + \beta(r_m - r_f)$$

r_f - Risk-free rate

β - Beta of the investment

r_m - Expected return on market

Risk-free rate is the theoretical rate of return of an investment with zero risk. The risk-free rate represents the interest of an investment investor would expect from an absolutely risk-free investment over a specified period of time. In practice, however, the risk free-rate does not exist because every investment carries some amount of risk. However, for many investors a 10-year government bond yield is usually considered to be risk-free rate. Also 3-month U.S. Treasury Bill is often used as the risk-free rate for the U.S. based investors. It is usually based on the length of the investment as well as the geolocation of the investment. Many investors argue that U.S. Treasury bonds carries no risk, because government can always print some more money to fulfill its obligations towards the creditors.³⁶

Another very important aspect of the Capital Asset Pricing Model is Beta. Basic definition of Beta is that it measures the stock risks in relation to the overall market. It is a measure of the volatility, or systematic risk of a security in comparison with the entire market or benchmark. It reflects the tendency of the security's returns to respond to swings in the market.³⁷ The most conventional approach for estimating betas was to use regression model. For firms that have been publicly traded for sufficient amount of time, it is relatively easy to calculate returns that an investor would have made on its equity in weekly or monthly intervals over that period. These returns can then be related to returns on proxy for the market portfolio to get beta in the Capital Asset Pricing Model. The standard procedure for estimating CAPM beta is to regress stock returns against market returns:

$$R_j = a + b * R_m$$

where:

³⁶Investopedia: Risk free rate definition [online].[cit.2019-01-01]. Available online at: <<https://www.investopedia.com/terms/r/risk-free-rate.asp>>

³⁷Investopedia: Beta estimate [online].[cit.2019-01-02]. Available online at: <<https://www.investopedia.com/terms/b/beta.asp>>

R_j - Stock returns

a - Intercept from the regression

b - Slope of the regression = Covariance ($R_j, R_m / \sigma_m^2$)

The slope of the regression corresponds to the beta of the stock and measures the riskiness of the stock. This slope, like any statistical estimate comes with standard error, which reveals just how noisy the estimate is, and can be used to arrive at the confidence intervals for "true" beta value. Therefore, it can be also written as:

$$\text{Beta of an asset } i = \frac{\text{Covariance of asset } i \text{ with market portfolio}}{\text{Variance of the market portfolio}} = \frac{\text{Cov}_{im}}{\sigma_m^2}$$

Since the covariance of the market portfolio with itself is its variance, the beta of the market portfolio, and by extension the average asset in it, is 1. As a result of that, assets that are riskier than average will have betas that are greater than 1 and assets that are safer than average will have betas less than 1. The riskless asset would have a beta of 0. The classic example of a company that would have beta less than 1 is utility company. On the other hand, beta greater than 1 is very common for the companies that operate in the tech industry. In general, the more stable and predictable cashflows make enterprises safer in the eye of the investor, resulting to lower beta. The beta for a firm may be estimated from regression but in reality, it is determined by fundamental decisions that the firm has made decision on what business to be in, how much operating leverage to use in the business, and the degree to which the firm uses financial leverage. The beta of the firms is determined by these three variables. Thus, another approach to come up with beta estimate will be based on these fundamentals and can be expressed as:³⁸

$$\beta_L = \beta_u * [1 + (1 - t) * D/E]$$

³⁸ DAMODARAN, A. 2006. Damodaran on Valuation: Security Analysis for Investment and Corporate Finance 2nd edition, New York : John Wiley & Sons, 2009, 62 - 83 p. ISBN 978-0471751212.

where:

β_L - Levered beta for equity in the firm

β_u - Unlevered beta of the firm (Beta of the firm with no debt)

t - Marginal tax rate for the firm

D/E - Debt-to-equity ratio (in market Value terms)

The main component that drives this formula is leverage measured by debt-to-equity (D/E) ratio. By looking at the formula, it is clear that there is direct relationship between debt-to-equity ratio and levered beta equity. As leverage increases, investors bear increasing amount of risk in the firm and that leads to higher Beta. Unlevered Beta compares the risk of unlevered company to the risk of the market. Unlevering a beta removes financial effects of leverage and allows to see the real performance of a company that is not impacted by its debt. The unlevered beta of a firm is determined by the types of businesses in which its operates and its operating leverage. The unlevered beta is often called asset beta, since its value is determined by the assets owned by the firm, Thus the equity beta of a company is determined by both the riskiness of the business it operates in and the amount of the financial leverage risk it has taken on. Since financial leverage multiplies the underlying business risk, it stands t reason that firms that have high business risk should be reluctant to take on financial leverage. It also implies for the firms which operates in stable business should be much more willing to take on financial leverage.

A third approach is to estimate the market risk parameters from accounting earnings rather than from traded prices. Thus, changes in earnings at a division or a firm on a quarterly or annual basis can be regressed against a market beta to use in the Capital Asset Pricing Model. While the approach has some intuitive appeal, it suffers from some potential's pitfalls. Since accounting earnings are measured only once per quarter, very few observations wouldn't bring very good estimate of firm's risk using regression analysis.³⁹

³⁹ DAMODARAN, A. 2006. Damodaran on Valuation: Security Analysis for Investment and Corporate Finance 2nd edition, New York : John Wiley & Sons, 2009, 65 - 85 p. ISBN 978-0471751212.

3. 2. Valuation Techniques

When it comes to professional business valuation there are three main approaches. Cost approach, market approach known as well as relative value approach, and then discounted cash flow or also known as intrinsic value approach. There are two different methods within a cost approach. One of them looks at the cost of the business and the other looks at the replacement of the business. This approach can be useful because it is sort of opportunity cost in some sense. For instance, if I was looking at the company to acquire, I could just pay for the business that is already operated or simply build it by myself. Another main approach is the market approach or relative value approach. With this approach, we look at what are the other companies worth, or other assets worth and use them as proxy for what are we trying to value. First method is to look at the comparable companies that are publicly traded. They are relatively easy to find, and they share and have to disclose lot of information about the company including financial statements. Second method is to use precedent transactions of past mergers and acquisitions how much an acquiring company paid for business. Finally, we have discounted cash flow approach also called intrinsic value approach. We don't look at what other companies are worth or cost approach how much already have been invested but instead we forecast the future performance of the business which is later discounted by appropriate discount rate to the present value.

3. 2. 1. Discounting free cash flow at the weighted average cost of capital

To determine the present value of operations, discount each year's forecast of free cash flow for time and risk. When discounting any set of cash flows, make sure to define the cash flows and discount factor consistently. In an enterprise valuation, free cash flows are available to all investors. Consequently, the discount factor for free cash flow must represent the risk faced by all investors. The weighted average cost of capital (WACC) blends the rates of return required by debt holders (R_d) and equity holders (R_e). For a company financed solely with debt and equity, the WACC is defined as follows.

$$WACC = \frac{D}{D+E} R_d(1-T_m) + \frac{E}{D+E} R_e$$

where debt (D) and equity (E) are measured using market values. It is important to notice how the cost of debt has been reduced by the marginal tax rate (T_m). The reason for doing this is that the tax shield attributable to interest has been excluded from free cash flow. DCF values tax shield by reducing the weighted average cost of capital. However, even weighted average cost of capital have some drawbacks. If free cash flow is discounted with the constant weighted average cost of capital, we are implicitly assuming the company keeps its capital structure at the target ratio of debt to equity.

3. 2. 2. Discounted Cash Flow Valuation

In discounted cash flow valuation, we begin with the premise that the value of an asset is the present value of the expected cash flows on the asset. The enterprise DCF model discounts free cash flow, meaning the cash flow available to all investors - equity holders, debt holders and any other nonequity investors at the weighted average cost of capital, meaning the blended cost of capital for all investor capital. To value an asset, we have to forecast the expected cash flows over its life. This can become a problem when valuing a publicly traded company, which at least in theory can have a perpetual life. In discounted cash flow models, we usually resolve this problem by estimating cash flow for a period which is usually specified to be an extraordinary growth period, and a terminal value at the end of the period. The most consistent way of estimating terminal value in a discounted cash flow model is to assume that cash flow will grow at a stable growth rate that can be sustained forever after the terminal year. In general terms the value of an enterprise, that can sustain extraordinary growth for n years can be written as:⁴⁰

$$\text{Value of operating assets of the firm} = \sum_{t=1}^{t=n} \frac{\text{FCFF}_t}{(1+\text{WACC})^t} + \frac{\text{TV}_n}{(1+\text{WACC})^n}$$

where:

$$\text{Terminal value (TV)} = \frac{[\text{FCFF}_t / (\text{WACC} - g_n)]}{(1+\text{WACC})^t}$$

⁴⁰ DAMODARAN, A. 2006. Damodaran on Valuation: Security Analysis for Investment and Corporate Finance 2nd edition, New York : John Wiley & Sons, 2009, 116 p. ISBN 978-0471751212.

FCFF = EBIT(1 - Tax Rate) - (Capital expenditures - Depreciation) - Change in noncash working capital⁴¹

However, as it was stated earlier, value creation is a function of return of its invested capital and its growth. Therefore, the key value driver formula is superior to alternative methodologies because it is based on cash flow and links cash flow directly to growth and ROIC. The key value driver formula is expressed as follows:

$$\text{Terminal Value}_t = \frac{\text{NOPLAT}_{t+1} \left(1 - \frac{g}{\text{ROIC}}\right)}{\text{WACC} - g}$$

The formula requires a forecast of a net operating profit less adjusted taxes (NOPLAT) in the year following the end of the explicit forecast period, the long-run forecast for return on invested capital, the weighted average cost of capital (WACC), and long-run growth (g) in NOPLAT. You can use enterprise DCF model to value individual projects, business units and even the entire company with a consistent methodology. Valuing a company's equity using enterprises DCF is a four-part process.

1. Value the company's operations by discounting free cash flow at the weighted average cost of capital.
2. Identify and value nonoperating assets, such as excess of cash and marketable securities, nonconsolidated subsidiaries, and the other assets not included in free cash flow. Summing the value of operations and nonoperating assets gives gross enterprise value.
3. Identify a value all debt and other nonequity claims against the enterprise value. Debt and other nonequity claims include fixed-rate and floating-rate debt, debt equivalents such as unfunded pension liabilities and restructuring provisions, employee options, preferred stock and few others.

⁴¹ MAŘÍK, M. 1996. Oceňování podniku. 1st edition, Praha: Ekopress, 1996. 111 p. ISBN 80-901991-1-9.

4. Subtract the value of debt and other nonequity claims from enterprise value to determine the value of common equity. To estimate value per share, divide equity value by the number of current shares outstanding.⁴²

3. 2. 2. 1 Identifying and Valuing Nonoperating assets

Many companies own assets that have value but whose cash flows are not part of the operations of the business and are not included in accounting revenue or operating profit. As a result, the cash generated by these assets is not part of free cash flow and must be valued separately. For example, consider equity investment, known outside of United States as nonconsolidated subsidiaries. When a company owns a small minority stake in another company, it will not record the company's revenue or costs as a part of its own. Instead, the company will record only its proportions of the other company's net income as a separate line item. Including net income from nonconsolidated subsidiaries as part of the parent's operating profit will distort margins, since only the subsidiaries' profit is recognized and not the corresponding revenue. Consequently, nonconsolidated subsidiaries are best analyzed and valued separately. Other nonoperating assets include excess cash, tradable securities, and customer-financing business units.

3. 2. 2. 2. Identifying and Valuing Debt and Other Nonequity Claims

„To convert enterprise value into equity value, subtract debt and other nonequity claims such as unfunded retirement liabilities, capitalized operating leases, and outstanding employee options. Common equity is a residual claimant, receiving cash flow only after the company has fulfilled its other contractual claims. Careful analysis of all potential claims against cash flows is therefore critical. However, the list of nonequity claims may be comprehensive and impractical, here are some most common:

- Debt: If available, use the market value of all outstanding debt, including fixed and floating-rate debt. If that information is not available, the book value of debt is a reasonable proxy, unless the probability of default is high, or interest rates have changed dramatically since the debt was originally issued.

⁴² KOLLER, T. - GOEDHART, M. - WESSELS, D. 2015. Valuation: Measuring and Managing the Value of Companies. 6th edition. New York: McKinsey & Company Inc., 2015. 241 - 265 p. ISBN: 978-1118873700

- Operating leases: Under certain conditions, companies can avoid capitalizing leases as debt on their balance sheets, although required payments must be disclosed in the footnotes.
- Unfunded retirement liabilities: Companies with defined-benefit pension plans and promised retiree medical benefits may have unfunded obligations that should be treated like debt
- Preferred stock: Although the name denotes equity, preferred stock more closely resembles unsecured debt.
- Employee options: Many companies offer their employees compensation in the form of options. Since options give the employee the right to buy company stock at a discounted price, they can have great value and must also be factored into equity value.
- Noncontrolling interest: When a company controls a subsidiary but does not own 100 percent, the investment must be consolidated on the parent company's balance sheet. The funding other investors provide is recognized on the parent company's balance sheet as noncontrolling interest. When valuing noncontrolling interest, it is important to realize that the minority interest holder does not have a claim on the company's assets, but rather a claim on the subsidiary's assets".⁴³

3. 2. 3. *Dividend discount model*

The oldest discounted cash flow models in practice are dividend discount models. While many analysts have turned away from dividend discount models on the premise that they yield estimates of value that are far too conservative, several of the fundamental principles that come through with dividend discount models apply when we look at other discounted cash flow models. However, when investors buy stock in publicly traded company, they generally expect to get two types of cash flows: dividends during the holding period and an expected price at the end of the holding period. Since this expected price is itself determined by future dividends, the value of a stock can be written as the present value of dividends in perpetuity. Since projections of dollar dividends cannot be made through infinity, several modifications of the dividend discount model have been developed based on different assumptions about future growth. It is important to introduce the simplest model designed to value stock in stable-growth

⁴³ KOLLER, T. - GOEDHART, M. - WESSELS, D. 2015. Valuation: Measuring and Managing the Value of Companies. 6th edition. New York: McKinsey & Company Inc., 2015. 149p. ISBN: 978-1118873700

firm that pays out what it can afford to in dividends and then look at how model can be adapted to value companies in high growth that may be paying little or no dividends. The most simple and powerful approach to value equity is called "The Gordon Growth Model". This model can be expressed algebraically as:⁴⁴

$$\text{Value of stock} = \frac{\text{DPS}_1}{r_e - g}$$

where:

DPS₁ - Expected dividends next year

r_e - Required rate of return for equity investors

g - Growth rate in dividends forever

Even though, it was among first models to use valuing company, it has some drawback. Its use is limited to firms that are growing at a stable rate. Also, since the growth rate in the firm's dividends is expected to last forever, the firm's other operating measures (revenues, earnings) can also be expected to grow at the same rate. To see the reasoning, consider the consequences in the long term of a firm whose earnings grow 3 percent a year forever, while its dividends grow at 4 percent. Over time, the dividends will exceed its earnings. However, if a firm's earnings grow at faster rate than dividends in the long run, the payout ratio, in the long run, will converge toward zero, which is not also a steady rate. Another issue relates to the question about what growth rate is reasonable as a stable growth rate. It is a rule of thumb for every investment banker that this growth rate has to be less than or equal to the growth rate of the economy in which firm operates. This, however does not imply that analyst will agree about what this rate should be even if they agree that a firm is a stable growth firm for these following reasons:⁴⁵

- “Given the uncertainty associated with estimates of expected inflation and real growth in the economy, there can be differences in the benchmark growth rate used by different

⁴⁴ FOERSTER, S.R. – SAPP, S.G. 2005. Dividends and Stocks Valuation: Study of the Nineteenth to the Twenty-first Century, Working Paper, University of Western Ontario p. 24-37

⁴⁵ RONALD, E. – SHRIEVES, M. – WACHOWICZ, M. 2001. Free Cash Flow (FCF), ECONOMIC VALUE ADDED (EVA), AND NET PRESENT VALUE (NPV): A RECONCILIATION OF VARIATIONS OF DISCOUNTED CASH-FLOW (DCF) VALUATION, The Engineering Economist: A journal Devoted to the Problems of Capital Investment p. 33-52

analyst. For instance, analysts with higher expectations of inflation in the long term may project a nominal growth rate in the economy that is higher

- The growth rate of stable-growth company cannot be greater than that of the economy, but it can be less. Firms can become smaller over time relative to the economy. Thus, even though, the cap on the growth rate may be the nominal growth rate of the economy, analysts may use growth rate much lower than this value for individual company.
- There is another instance in which an analyst may stray from a strict limit imposed on the stable growth rate. If a firm is likely to maintain a few years of above-stable growth rates, an approximate value for the firm can be obtained by adding a premium to the stable growth rate to reflect the above-average growth in the initial years. Even in this case, the flexibility that the analyst has is limited. The sensitivity of the model to growth implies that the stable growth rate cannot be more than 0.25 percent to 0.5 percent above the growth rate in using two-stage or three stage model, which will be explained later to capture "supernormal" or "above-average" growth and restricting the Gordon growth model to when the firm becomes truly stable.

The most general and practical model among all dividend discount model is so-called "Three-Stage Dividend Discount Model". It is the most general model because it does not impose any restriction on the payout ratio and assumes an initial period of stable high growth, a second period of declining growth and third period of a stable low growth, that lasts forever. Then the value of a stock is the present value of expected dividends during the high-growth and the transitional periods and of the terminal price at the start of the final stable-growth phase. It can be mathematically written as:⁴⁶

$$P_0 = \sum_{t=1}^{t=n1} \frac{EPS_0 \times (1 + g_a)^t \times \Pi_a}{(1 + k_{e,hg})^t} + \sum_{t=n1+1}^{t=n2} \frac{DPS_t}{(1 + k_{e,tr})^t} + \frac{EPS_{n2} \times (1 + g_n) \times \Pi_n}{(k_{e,st} - g_n)(1 + k_e)^{n2}}$$

where:

EPS_t= Earning per share in year t

⁴⁶ DAMODARAN, A. 2006. Damodaran on Valuation: Security Analysis for Investment and Corporate Finance 2nd edition, New York : John Wiley & Sons, 2009, 166 p. ISBN 978-0471751212.

DPS_t =Dividends per share in year t

g_a =Growth rate in high-growth phase (last n1 periods)

g_n =Growth rate in stable phase

Π_a =Payout ratio in high-growth phase

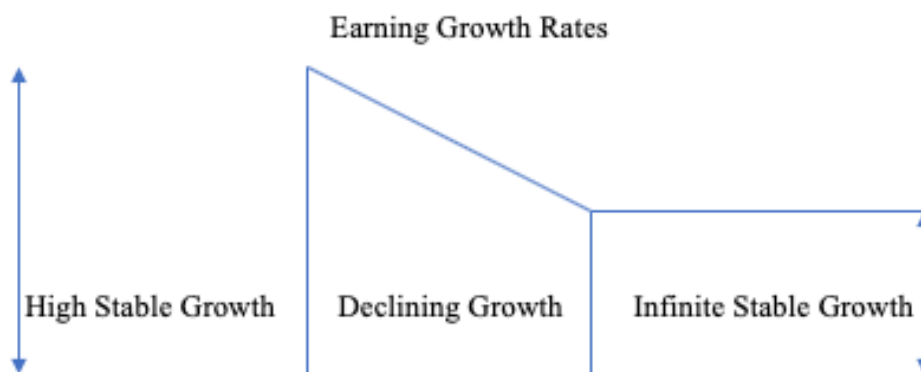
Π_d =Payout ratio in stable-growth phase

k_e = Cost of equity in high-growth (hg), transition (tr) and stable-growth (st)

$$\text{Payout ratio } (\Pi_d) = 1 - \frac{g_n}{ROE_n}$$

This model allows to use different growth rates in order to capture the stage a company is currently going through. Therefore, its flexibility makes it a useful model for any firm, which in addition to changing growth over time is expected to change on other dimensions as well - in particular payout policies and risk. In particular, this model is very useful to value companies that do enjoy a high growth in its initial phase and then experience gradual declining toward a stable rate as firm becomes larger and loses its competitive advantages. It can be better explained via following graph:⁴⁷

Graph 3 – Different stages of company



Source: Excel and Measuring and Managing value of companies

⁴⁷DAMODARAN, A. 2006. Damodaran on Valuation: Security Analysis for Investment and Corporate Finance 2nd edition, New York : John Wiley & Sons, 2009, 116 p. ISBN 978-0471751212.

The dividend discount model after all only represents the cash flow from the firm that is tangible to investors. As it was mentioned, it has some drawback, but in some ways, it is simpler and more intuitive compared to other models. For instance, the advantage of using dividend discount model is making fewer assumptions to forecast dividends than free cash flow tangible to investors. In general, it establishes a baseline or some kind of floor value for the companies that have cash flow to equity that exceeds dividends. In this case, dividend discount model should yield a conservative estimate, assuming money will be wisely spent by the executive managers and not wasted on the project with a negative net present value.⁴⁸

3. 2. 4. Adjusted Present Value Approach

In the adjusted present value (APV) approach, we start to value firm without debt. As we add debt to the enterprise, we consider, the net effect on value by considering both the benefits and the cost of borrowing. In order to do this, we need to assume that the main benefit of borrowing is a tax benefit and that the most significant cost of borrowing is added risk of bankruptcy. This approach is particularly good when significant change in company's capital structure occurs. When there is a significant change, stable WACC is no longer good measure of firm's cost of capital because, it may over or understate the value of company. For instance, if capital structure of firm was 50 % debt and 50 % equity with an expected return on debt 5 % and expected return on equity 15 %. In this case weighted average cost of capital would be 10 %. However, imagine situation that this company decide to issue new debt. As a result of that, capital structure has changed to 70 % debt and 30 % equity. Since capital structure has changed significantly, it would be inappropriate to use same WACC as before, because it no longer reflects the current company's cost of capital. Taxes in reality play significant role and many companies use debt as a tool to lower their taxes. Since interest is tax deductible, profitable companies can lower their taxes by raising debt. The adjusted present value method explicitly value and measure the cash flow effects of financing separately. In this approach we estimate the value of the firm in three steps. First step is to begin enterprise with no debt. Then we must consider the present value of the interest tax savings generated by borrowing a given amount

⁴⁸ MAŘÍK, M – MAŘÍKOVÁ, P. 2006. Rentabilita investic a pokračující hodnota při oceňování podniku. In Soudní inženýrství. 2006, edition 4, number. 17, p. 189-198

of money. Finally, we must assess the probability that the company will go bankrupt as it takes on additional debt.

The first step in this approach is the estimation of value of the unlevered firm. This can be accomplished as if it had no debt, by discounting the expected free cash flow to the firm at the unlevered cost of equity.

$$\text{Value of unlevered firm} = \frac{FCFF_0(1 + g)}{\rho_u - g}$$

where:

FCFF - the current after-tax operating cash flow to the firm

ρ_u - the unlevered cost of equity

g - is the expected growth rate.

The second step is calculation of the expected tax benefit from a given level of debt. This tax benefit is a function of the tax rate of the firm and is discounted at the cost of debt to reflect the riskiness of this cash flow.

$$\text{Value of tax benefits} = (\text{Cost of debt}) \times (\text{Tax Rate})$$

The third step have some drawbacks. Nor probability of bankruptcy neither bankruptcy cost can be estimated directly. However, there are some ways how to get an approximate value. Bond rating is always a good estimate of default risk of a firm. Therefore, it is important to consider, that if more debt is issued, probability of default increases hand in hand with bankruptcy.⁴⁹

⁴⁹ DAMODARAN, A. 2006. Damodaran on Valuation: Security Analysis for Investment and Corporate Finance 2nd edition, New York : John Wiley & Sons, 2009, 211-220 p. ISBN 978-0471751212.

3. 2. 5. Multiples

When investing in the stock, our interests primarily lie in whether the equity in a company is fairly priced. Hence, it is logical to look at the equity multiples. Even though, discounted cash flow valuation is the most accurate method to use, relative valuation gives you good insight and helps you to summarize your valuation. In the discounted cash flow valuation, the objective is to find the value of an asset, given its risk uncertainties, cash flow and growth. Unlike in the discounted cash flow valuation, the objective in relative valuation is to value assets based on how similar assets are currently priced by the market. Very basic idea behind using multiples is that similar assets should be selling for similar prices. In relative valuation there are three inevitable steps to follow. The first step is finding comparable assets that are priced by the market. The second step is scaling the market prices to a common variable to generate standardized prices that can be compared with each other. The third and last step in the process is adjusting for difference across assets when comparing these standardized values. It is important to step back and when comparing multiples across the sector. It is crucial to know how every company operates and what are their competitive advantages. If a company is trading at the higher multiple what is a standard in this sector, it can be due numerous reasons. For instance, higher-growth companies should be trading at higher multiple than lower-growth companies. It is also logical, that companies that have lower ROIC should be also punished for not managing their businesses as good as others.

3. 2. 5. 1. Price-Earnings Ratio

The price-earnings ratio of the market is the ratio of the market value of equity to the earnings generated for equity investors. Defined in other words, price-to-earnings ratio is the ratio for valuing a company that measures its current share price relative to its per share earnings. It can be mathematically expressed as:

$$P/E = \frac{\text{Market Value of equity}}{\text{Equity Earnings}}$$

It is commonly used by the investors to determine the intrinsic value of company's share in apple-to-apple comparison. To Determine the P/E value, one simply must divide the current stock price by the earnings per share. Price is publicly available information and so is company

earnings per share. It can be either computed using forward P/E or the trailing P/E. The difference between these two measures are that forward P/E uses future earnings guidance. While trailing figures represent twelve months of actual earnings. It is commonly defined with the notation "TTM" which stands for "trailing 12 months". It is logical that investors prefer to look at the P/E ratio that consist of earnings that represents past twelve months, since it is more objective measure of actual performance of a company.⁵⁰

3. 2. 5. 2. Price-to-earning-to-growth Ratio (PEG)

Some analyst and investors use P/E-to-growth (PEG) ratio to get an approximate estimate of the value of a company. Some portfolio managers compare P/E ratios to the expected growth rate to identify over or undervalued companies. PEG ratio san be written as:

$$\text{PEG ratio} = \frac{\text{P/E ratio}}{\text{Expected growth rate}}$$

By looking at the formula, it is clear that PEG ratio is only a modification or an extension of a P/E ratio with the respect to company's growth. This was once upon a time secret formula for one the greatest mutual fund manager in history, Peter Lynch. His interpretation of P/E formula was following: "The P/E ratio of any company that's fairly priced will equal its growth rate. For instance, if P/E of Apple is 15, you would expect the company to be growing at about 15 percent a year. But if P/E ratio is less than the growth rate, you may have found yourself a bargain. Peter Lynch developed the PEG ratio as an attempt to solve a shortcoming of the P/E ratio by factoring in the projected growth rate of future earnings.

In estimating PEG ratio, the analyst estimates of growth in earnings per share over the next five years are used in conjunction with the current P/E. PEG ratios are most widely used to value technology firms. Even though, the concept of the PEG ratio seems to be reasonable it has no mathematical derivation, therefore no meaningful result. The choice of horizon makes

⁵⁰ Investopedia: Price-to-Earnings ratio definition. [online].[cit.2019-02-01]. Available online at: <<https://www.investopedia.com/terms/p/price-earningsratio.asp>>

a big difference and also it is ignoring company's ROIC. As we mentioned earlier ROIC is one of the most influential determinants that has the effect on how well company performs.⁵¹

3. 2. 5. 3. Price-to-Book Ratio

The market value of the equity in a company reflects the market's expectations of the firm's earning power and cash flows. It is a financial valuation metric that is used to evaluate company's current market value relative to its book value. The book value of equity is the difference between the book value of asset and the book value of liabilities. It is simply the amount that would be left if company liquidated all of its assets and repaid all of its liabilities. The price-to-book ratio is assessed by dividing the market value of equity by the current book value of equity. It is typically used by the investors to see the market's perception of a particular stock's value. However, it does not work well for the companies with mostly intangible assets. It can be mathematically expressed as:

$$P/BV = \frac{\text{Market Value of Equity}}{\text{Book Value of Equity}}$$

A low ratio usually below one could indicate that the stock is undervalued. Value greater than one should indicate that stock is overvalued.⁵²

3. 2. 5. 4. EV to EBITA

The most common way to see EV to EBITA multiple is in comparable analysis of the company. To derive an enterprise multiple an analyst first needs to find a company's enterprise value. There is a simple formula to do that. The way to calculate enterprise value is as follows: (market capitalization) + (value of debt) +(minority interest)+(preferred shares)-(cash and cash equivalents). Then the company's value number is divided by earnings before interest and taxes. It can be mathematically written as:

⁵¹ The Balance: Peter Lynch Secret Formula for Valuing a Stock's growth. [online].[cit.2019-03-03]. Available online at: <<https://www.thebalance.com/peter-lynch-s-secret-formula-for-valuing-a-stock-s-growth-3973486>>

⁵² CFI Institute: Market-to-book-ratio definition. [online].[cit.2019-01-09]. Available online at: <https://corporatefinanceinstitute.com/resources/knowledge/valuation/market-to-book-ratio-price-book/>

$$\text{Enterprise Multiple} = \frac{\text{EV}}{\text{EBITDA}}$$

It can be very depending on the industry a company operates in. This multiple is useful for transnational comparison because it ignores the distorting effects of individual countries' taxation policies⁵³. Because it includes assets, debt and equity in its analysis, a company's enterprise multiple provides an accurate depiction of total business performance. It is also easy to calculate with publicly available information. It is widely used and referenced in the financial world. However, it is not a good proxy for cash flow and it does not take into account capital expenditures.⁵⁴

3. 2. 5. 5. EV/Revenues

Enterprise value-to-revenue multiple is another important measure used in investment banking as well as in private equity and it is a measure of the value of the stock that compares company's value to its revenue. This multiple is essentially answering following question "What is company being valued per each dollar of revenues?" In most cases, enterprise value-to-revenues multiples are not particularly useful for explaining enterprise valuation. However, on the other hand, it is very useful especially in industries with unstable or negative profits. For instance, using enterprise value-to-revenue multiple is useful for valuing start-up businesses where profits are usually negative and sustainable margin level can't really be estimated. This multiple can be simply mathematically expressed as:⁵⁵

$$\text{Revenue Multiple} = \frac{\text{Enterprise Value}}{\text{Revenues}}$$

⁵³ INVESTOPEDIA: Enterprise multiple EV-EBITDA Definition. [online].[cit.2019-02-19]. Available online at: <https://www.investopedia.com/terms/e/ev-ebitda.asp>

⁵⁴ CFI Institute: Enterprise value over Earnings before Interest, Taxes, Depreciation & Amortization [online].[cit.2019-01-11]. Available online at:<<https://corporatefinanceinstitute.com/resources/knowledge/valuation/ev-ebitda/>>

⁵⁵ CFI Institute: Enterprise value over Revenue Multiple definition. [online].[cit.2019-01-19]. Available online at: <https://corporatefinanceinstitute.com/resources/knowledge/valuation/ev-to-revenue-multiple/>

Economic interpretation of this formula is logical and straightforward. The lower the ratio is, the "cheaper" and more attractive the enterprise appears to be for investor. In general, it can be understood as a quantifiable metric of how much it cost to purchase company's sales. While it can be very useful metric for high growth companies, or companies with negative EBITDA, it has some drawbacks. It does not take into account the company's cost structure, nor profitability, neither cash flow generation.⁵⁶

3. 3. Forecasting

Forecasting in general is a specified technique that uses historical data to make reasonable estimates that are predictive in determining the direction of the future trends. It is inevitable part of financial planning and analysis of every big corporation. Enterprises uses forecasting to determine its sales, expenses and also, they decide how to allocate their budgets based on these forecasts. For investors, forecasting represents important benchmark. Companies that are publicly traded often provide their own forecast based on the information they have. The forecast that is published by the company is taken very seriously by potential investors and is usually incorporated into their valuations. As it was stated, every publicly traded company have to disclose four-times a year information about the performance of the company for its shareholders. During those meeting, usually CEO with the CFO presents the information about past quarter and outlook for next quarter. These meeting have great effect on company's stock price. The volatility of any stock around the release of 10-Q is significantly higher in comparison with other trading days. For instance, the technology giant Apple just few months ago reported that their revenue expectations will not be met due to the weak demand of its iPhone, especially in China. As a result of this concerning information, the stock on this particular day plunged by 10 %. As it can be seen, the importance of well-build forecast in valuations is magnificent. Forecasts play such a huge role in valuations. Forecast provide numbers for our valuations, so it is important to get this part right. While great knowledge of the company as well as great knowledge of the industry is valuable skillset to have, it is inevitable to follow certain mechanics when building a forecast model. Before we start building a model, it important to step back and determine how many years to forecast as well as how detailed this forecast should be. A rule of thumb is to forecast revenues for ten years and then assume that company will grow no more than the growth rate of the whole economy. Higher

⁵⁶ INVESTOPEDIA: Enterprise-Value-To-Revenue Multiple EV/R definition. [online].[cit.2019-01-23]. Available online at: <<https://www.investopedia.com/terms/e/ev-revenue-multiple.asp>>

growth is unreasonable, because company cannot grow more than the whole economy in perpetuity. It would have become too big relative to the economy. Another approach is to forecast revenues long enough, so it can reach steady phase and grow at constant growth thereafter. For a company that wants to maintain its growth in steady state, constant proportion of its operating profits needs to be reinvested into a business each year as well as constant rate of return on both existing capital and new capital invested needs to be earned. These assumptions are in line with the perpetuity approach of DCF valuation. Usually complex model consists of many numerous phases, but it can be generally break into the following steps.

1. Prepare and analyze historical financials
2. Forecast Revenues
3. Forecast the income statement
4. Forecast the balance sheet
5. Calculate ROIC and FCF

3. 3. 1. Prepare and analyze historical financials

In order to start analyzing the historical financials of the company, we need to input historical data into a spreadsheet program. It can be either done manually, which is much more time consuming, or using one of the tools that were developed for this purpose such as Compustat or Capital IQ. While using of these tools is much faster process, it may aggregate some important items that may lead to poor valuation result, therefore it is a safer to do it manually. When reading annual report of the company and looking at the numbers, most of the valuable information are hidden in the notes. Companies tend to simplify their sheets by consolidating few items into one and these changes are usually explained in the notes. Financial statements are always reported in absolute numerical figures. However, to see the historical trend and have a better understanding of a company an investor should start analyzing a company with common sizing. A common size financial statement displays all items as percentages of a common base figure rather than absolute numerical figure. Not only it allows for easy analysis between companies, it also allows for analysis between time periods for the same company. The logic is that common sized statements are expressed as ratios or percentages of a statement, such as revenue. In other words, it reduces all figures to a comparable figure, such as percentage of sales. This technique commonly includes income statement, cash flow statement and balance sheet. The common figure in the income statement

as well as cash flow statement is total sales revenue. The common figure for the balance sheet is line item total assets.

3. 3. 2. Forecast Revenues

Forecasting revenue is definitively one of the hardest and most important part of the whole valuation process. There are various ways how to come up with a good forecast. Usually analysts gather data from the company, industry and consumers. Typically, both companies and industry trade groups publish data related to the potential size of the market. Every industry has its specifics and revenues may be somehow estimated in different way. For instance, when forecasting the telecommunications industry, we will predict the market size and use the current market share. In the retail industry, revenues are forecasted by using the expansion rate and derive income per square meter. However, speaking generally there are two approaches to come up with the revenue forecast. A top-down approach is the one that looks at the overall market and uses this information to identify your company's share and future prices. A bottom-up approach is more like a detailed budget with spending plans by the department. Probably the best way to forecast revenues is to use a combination of both.

3. 3. 3. Forecast the Income Statement

As it was stated earlier, not all the companies classify their operating results the same way. The process of forecasting the income statement involves either manual data entry from the 10K or press release or using one of the plugins provided by financial providers such as Capital IQ or Cactset. With a revenue forecast in place, forecast individual line items related to the income statement. To forecast a line item, it is a good to follow these 2 steps:

- Identify what relationship drive the line item. This is a crucial part. Even though most of the line items are directly tied to revenues, there may be some cases where it may not be necessarily true. For instance, interest income is usually produced by marketable securities and cash. As a result of this relationship, it would be more accurate to tie interest income to cash and marketable securities instead of revenues.
- Estimate ratios. In order to estimate ratios, we need to look back and start computing historical values for each ratio we aim to use in our model. The best educated guess is to use previous year's values since it is the best indicator of the latest company performance.

3. 3. 4. Forecast the Balance Sheet

Similarly, as when forecasting the income statement, it is critical to identify and determine typical driver for individual line items. To forecast the balance sheet, we need to start with the operating working capital. The items that falls into a category of operating working capital such as: accrued expenses, account receivables, account payables, inventories are estimated as a percentage of revenues. Property, plant and equipment are also consistent with our previous line items and this line items is usually forecasted as the percentage of revenues.

3. 3. 5. Calculate ROIC and FCF

Once we have completed all the necessary steps, we can calculate ROIC and FCF. Our income statement and balance sheet forecast will serve as a source of information and will provide essential values, so we can calculate ROIC and FCF for each forecast year and then finally come up with the intrinsic value of company.⁵⁷

⁵⁷ KOLLER, T. - GOEDHART, M. - WESSELS, D. 2015. Valuation: Measuring and Managing the Value of Companies. 6th edition. New York: McKinsey & Company Inc., 2015. 222 - 245 p. ISBN: 978-1118873700

4. Valuation of Twilio

4. 1. Business Overview

The main goal and purpose of this diploma thesis is to evaluate publicly traded company called “Twilio” using different valuation methods and explain their differences and usage. Software developers are reinventing nearly every aspect of business today. Yet as developers, Twilio repeatedly encountered an area where they could not innovate -communications. Because communication is a fundamental human activity and vital to building great business, Twilio wanted to incorporate communications into software applications, but the barriers to innovation were too high. Twilio was started to solve this problem. Twilio believes the future of communications will be written in software, by developers of the world – their customers by empowering them. Cloud platforms are a new category of a software that enable developers to build and manage applications without the complexity of creating and maintaining the underlying infrastructure. These platforms have risen to enable a fast pace of innovation across a range of categories, such as computing and storage. Twilio is a leader in the Cloud Communications Platform category. They enable developers to build, scale and operate real-time communications within software applications. Their platform consists of three layers: Engagement Cloud, Programmable Communications Cloud and Super Network. The Engagement Cloud software is designed to address specific use cases like account security and contact centers and is a set of Application Programming Interfaces (“APIs”) that handles the higher-level communication logic needed for nearly every type of a customer engagement. These APIs are focused on the business challenges that a developer is looking to address, allowing clients to more quickly and easily build better ways to engage with their customers throughout their journey. Twilio’s Programmable Communications Cloud software is a set of APIs that enables developers to embed voice, messaging and video capabilities into their applications.

In February 2019, Twilio completed acquisition of SendGrid, the leading email API platform, Email is important channel for businessman to communicate with their customers and incorporating SendGrid’s products into Twilio’s platform will allow Twilio to enable business to engage with their customers via email effectively and at scale. In addition, adding this important channel to their platform will allow Twilio to more strategically address their customers’ engagement strategy across voice, messaging, video and now e-mail.

As of December 31, 2018, Twilio had 64, 286 Active Customer Accounts representing organizations big and small, old and young, across nearly every industry, with one big thing in common: they are competing by using the power of software to build differentiation through communications. With Twilio's platform, customers are disrupting existing industries and creating new ones. For instance, software applications use Twilio's platform to notify diner when a table is ready, provide enhanced application security through two-factor authentication, connect potential buyers to real estate agents, and power large omni-channel contact centers. As Twilio's customer succeed, they share their success through usage-based revenue model. Twilio's revenue grow as customer increase their usage of a product, extend their usage of product to new applications or adopt a new product. Twilio believes that the most useful indicator of this increased activity from our existing customer accounts is their Dollar-Based Net Expansion Rate, which compares revenue from cohort of Active Customer Accounts other than Variable Customer Accounts, in a quarter to the same quarter in the prior year. Dollar-Based Expansion Rate was 140 % and 120 % for the year ended December 31, 2018 and 2017 respectively. Twilio platform have following common use cases:

- **Anonymous Communications:** Enabling users to have a trusted means of communications where they prefer not to share private information like their telephone number. Examples include conversations between drivers and riders or texting after meeting through a dating website
- **Alerts and Notifications:** Alerting a user that an event has occurred, such as when a table is ready, flight is delayed, or a package is shipped.
- **Contact Center.** Improving customer support of powering customer care teams with voice, messaging and video capabilities that integrate with other systems to add context, such as a caller's support ticket history or present location.
- **Call Tracking.** Using phone numbers to provide detailed analytics on phone calls to measure the effectiveness of marketing campaigns or lead generation activities in a manner similar to how web analytics track and measure online activity.
- **Mobile Marketing.** Integrating messaging with marketing automation technology, allowing organizations to deliver targeted timely contextualized communications to consumers
- **User Security.** Verifying user identity through two factor authentications prior to login or validating transactions within an application's workflow. This adds an additional layer of security to any application.

- Twilio For Good. Partnering with nonprofit organizations through Twilio.org, to use the empower of communications to help and solve social challenges, such as an SMS hotline to fight human trafficking, an emergency to volunteer dispatch system and appointment reminders for medical visits in developing nations.⁵⁸

4. 2. Historical prices of Twilio

Cloud communications provider Twilio had unbelievable 2018 as TWLO stock price rose 278 %. In fact, of 3,400 stock with market cap over 300 million, Twilio stock was the sixth-best performer for the year. The Gains were deserved. Twilio delivered a series of blowout earnings reports in 2018 and heading into 2018, Twilio stock looked too cheap. Twilio stock has been on tremendous path since 2018.

Graph 4 – Comparison of historical prices of Twilio, S&P 500 and NASDAQ.



Source: Yahoo Finance

Twilio (TWLO) stock have been consistently beating and outperforming S&P500 index (^GSPC) as well as the NASDAQ index (^IXIC) since the beginning of 2018 by huge margins. Since the July of 2016 S&P500 and NASDAQ reported return of 42.14 % and 68.94 %, respectively. On the other side, Twilio reported in the same period return of 363.33 %.

⁵⁸ Twilio - 10-K Annual Report 2015-2018 [online]. [cit.2019-03-07]. Available online at: <<http://d18rn0p25nwr6d.cloudfront.net/CIK-0001447669/4d7bc903-acc2-43f8-9030-8d71171141ef.pdf>>

4. 3. Capital Structure

Total Shares Outstanding: 104.28 (*in millions*)

Market Capitalization: 13, 765 (*in millions*)

Total Debt: 436.67 (*in millions*)

Stock Ticker Symbol: TWLO

Stock price as of April 1st, 2019: \$ 132.00/per share

The cost of equity as well as cost of debt are key components of every discounted cash flow valuation. Both factors are inevitable part of weighted average cost of capital computation. For the cost of equity, Capital Asset Pricing Model was used with the following assumptions:

$$R_f = 2.5 \%$$

$$R_m = 7.51 \%$$

$$\beta = 1.33$$

$$R_e = R_f + \beta * (R_m - R_f)$$

$$R_e = 2.5 \% + 1.33 * (7.51 \% - 2.5 \%)$$

$$\mathbf{R_e = 9.17 \%}$$

For the risk-free rate, the U.S. 10 Year Treasury (US10Y) was used. The value of 7.51 % is the average of the total annual return on the S&P500 from 1928 until 2018. Beta of 1.33 was obtained from Yahoo Finance and seems to be standard for the industry. For the cost of debt, we obtained the interest coverage ratio of 7.6 from an article published on gurufocus.com. According to the table published by bondsonline.com Interest Coverage Ratio of 7.6 have typical default spread of 0.85 %. As a result of that we obtained following value for the cost of debt.

$$\text{Interest coverage ratio} = \frac{\text{Operating income} + \text{Lease expense}}{\text{Interest expense} + \text{Lease expense}}$$

$$\text{Interest coverage ratio} = 7.6$$

$$\text{Typical Default spread} = 0.85 \%$$

$$R_d = R_f + \text{Spread}$$

$$R_d = 3.35 \%$$

Once the cost of debt as well as the cost of equity was obtained, we can proceed to the calculation of our discount rate, therefore weighted average cost of capital. In assessment of WACC we assume tax rate of 34 %.

$$WACC = \frac{D}{D+E} R_d (1 - T_m) + \frac{E}{D+E} R_e$$

$$WACC = \frac{436.67}{436.67 + 13,328} * 3.35 \% * (1 - 0.34) + \frac{13,328}{436.67 + 13,328} * 9.17 \%$$

$$WACC = 8.95 \%$$

4. 4. Revenue Forecasting Model

Twilio derive their revenue primarily from usage-based fees earned from customers using the software products within their engagement Cloud and Programmable Video. Some examples of the usage-based fees for which Twilio charge includes minutes of call duration activity for their Programmable Voice products, number of text messages sent or received using their Programmable Messaging products and number of authentications from their Account security products. In the years ended December 31, 2018, 2017 and 2016, Twilio generated 84 %, 83% and 83 % of their revenue respectively from usage-based fees. Twilio except the usage-based fees also earn flat fees from certain-fee products, such as telephone numbers, short codes and customer support. Revenue generated in the United States in the years ended December 31, 2018, 2017 and 2016 was 75%, 77% and 84% respectively. Twilio so far have not reported any earnings yet and their EBIT had been in red numbers from 2015 until 2018 consequently, as it can be seen from the table.

Table 2 – Historical Values 2015 - 2018

All numbers in thousands	ACTUALS 2015	ACTUALS 2016	ACTUALS 2017	ACTUALS 2018
Total Revenue	166,919	277,335	399,020	650,067
		66%	44%	63%
(-) COGS	74,454	120,520	182,895	300,841
(-) SG&G	84,134	115,845	159,978	285,982
(-) D&A	1,388	2,829	10,357	26,095
EBIT	-34,228	-36,956	-64,592	-108,114
(-) Taxes	122	326	705	791
(-) NOPLAT	(34,350)	(37,282)	(65,297)	(108,905)
(+) D&A	1,388	2,829	10,357	26,095
(-) CapEx		26,323	23,346	39,088
(-) Change in NWC		13,186	-9,854	-2,930

Source: Excel and Twilio 10-k annual report

Cost of Goods Sold is very important line item that that might represent many costs depending on the industry and particular company. Cost of revenue of Twilio consist primarily of fees paid to network service providers. Cost of Goods Sold also includes cloud infrastructure fees, personnel costs, such as salaries and stock-based compensation for their customer-support employees and non-personnel cost such as amortization of capitalized software, development cost and acquired intangibles

Another important line item is "SG&A" which stands for Selling, General & Administrative. It is fluctuating around the 50 % of the total revenue, therefore it is important to know what other things are hidden behind this line item. General and Administrative expenses consist primarily of personnel cost for their accounting, finance, legal, human resources and administrative support personnel and executives. General and administrative also include cost related to business acquisition, legal and other professional services fees, sales and other taxes, depreciation and amortization and an allocation of their general overhead expenses. Twilio expect that they will incur costs associated with supporting the growth of their business and to meet the increased compliance requirements associated with both international expansion and their operation as a public company.

Table 3 - Free cash flow forecast for 2019 - 2023

All numbers in thousands	FORECAST 2019	FORECAST 2020	FORECAST 2021	FORECAST 2022	FORECAST 2023
Total Revenue	1,007,604	1,511,406	2,161,310	3,025,834	4,084,876
	55%	50%	43%	40%	35%
(-) COGS	433,270	634,790	886,137	1,240,592	1,674,799
(-) SG&G	443,346	649,904	907,750	1,240,592	1,633,951
(-) D&A	30,228	45,342	64,839	90,775	122,546
EBIT	-120,912	0	151,292	242,067	367,639
(-) Taxes	1,281	-	51,439	82,303	124,997
(-) NOPLAT	(122,193)	-	99,853	159,764	242,642
(+) D&A	30,228	45,342	64,839	90,775	122,546
(-) CapEx	37,852	53,881	74,403	101,486	129,544
(-) Change in NWC	27,099	20,152	25,996	34,581	42,362
(=) FCFF	(217,373)	(119,375)	(65,386)	(67,078)	(51,811)

Source: Excel and Twilio 10-k annual report

According to the table 3, it seems that Twilio will reach breaking point in 2020. If this is true, Twilio in 2020 will report positive earnings before interest and taxes for the first time. Twilio is very young company in new emerging industry. Revenue in 2020 should be around the level of \$1.5B. Twilio have still huge potential to grow which is reflected in our forecast for upcoming years. It is mainly due to their high retention rate of customers of 95 % as well as increasing base of active developers. These two non-GAAP measures are very important and often distinguish the success of the business in the CPaaS industry. Increasing base is very good sign that have strong predictive power when it comes to future growth of revenues. In 2028 Twilio will reach its mature phase and will grow thereafter at the rate of 2.5 %. Return on Invested Capital in maturing phase is equal to the company weighted average cost of capital. We assumed tax rate of 34 %. To use different valuation technique, we assessed value of company based on the exit multiples. For both methods, important and crucial line items were forecasted in order to come up with inevitable parts that are necessary to carry out our valuation.

Table 4 - Free cash flow forecast 2024 - 2028

All numbers in thousands	FORECAST 2024	FORECAST 2025	FORECAST 2026	FORECAST 2027	FORECAST 2028
Total Revenue	5,310,339	6,637,924	7,633,613	8,206,134	8,616,440
	30%	25%	15%	7%	5%
(-) COGS	2,177,239	2,721,549	3,129,781	3,364,515	3,532,741
(-) SG&G	1,858,619	2,323,273	2,290,084	2,461,840	2,584,932
(-) D&A	159,310	199,138	229,008	246,184	258,493
EBIT	743,448	1,128,447	1,832,067	1,969,472	2,067,946
(-) Taxes	252,772	383,672	622,903	669,621	703,102
(-) NOPLAT	490,675	744,775	1,209,164	1,299,852	1,364,844
(+) D&A	159,310	199,138	229,008	246,184	258,493
(-) CapEx	164,659	205,877	234,961	254,935	263,844
(-) Change in NWC	49,019	53,103	39,828	22,901	16,412
(=) FCFF	117,688	286,657	705,367	775,832	826,095
Terminal Value					25,046,292
TV - EBIT Multiple					40,793,331
TV - REVENUE Multiple					42,242,099
WACC	8.95%	8.95%	8.95%	8.95%	8.95%
Years from today	6	7	8	9	10
PV of FCFF	70,380	157,351	355,392	358,796	350,668
PV of TV					10,631,865
PV of TV - EBIT Multiple					17,316,302
PV of TV - REVENUE Multiple					17,931,288
Enterprise Value	11,492,421				
EV - EBIT Multiple	18,176,859				
EV - REVENUE Multiple	18,791,844				
Total Debt	436,000				
Shares Outstanding	104,289				
Price per Share DCF	\$ 114.38				
EBIT Multiple 19.7x	\$ 178.47				
REVENUE Multiple 4.9x	\$ 184.37				

Source: Excel and Twilio 10-k annual report

In our valuation process, we used different valuation techniques, so we can compare the outcomes. As we can see in the table 4, using discounted cash flow valuation, we ended up with the result of \$ 114.38 per share. As expected, most value is hidden in the Terminal Value. Important to note that, terminal value is very sensitive to changes to perpetuity growth rate, weighted average cost of capital and few others. Therefore, any changes of these components may lead to sizeable change of the entire enterprise value. Using different words, we can say that we attribute lot of weight to our assumptions we made down the road. However, we also used Multiples to see how much the value we obtained in our DCF valuation deviates from the value using Exit Multiples. We used EBIT Multiple of 19.7x, which was industry average and our outcome was \$ 178.47/share. For comparison we also used Revenue Multiple of 4.9x, which was median for the industry and obtained result of \$ 184.37/share. Surprisingly, both estimates were substantially higher in comparison with our DCF valuation, however very close to each other. With the further inspection, we can conclude that both multiples might be little overstated due to the fact that our few observations might not represent the reality, as well as the fact that it is very young industry and majority of the firms are in their early stage.

Conclusion

Valuation is the analytical process of determining the current worth of asset or a company. It is a complex process that requires one to input large numbers of assumptions in order to get to the bottom line, which is the intrinsic value of company. Value investing is an investment tactic where stocks are selected which appear to trade for less than intrinsic, or book values. A postulate of value investing is that an investor does not pay more for an asset than it is worth. This statement may seem logical and obvious, but it is forgotten and rediscovered at some time in every generation and in every market. There are those who are disingenuous enough to argue that the value is in the eyes of the beholder, and that any price can be justified if there are other investors willing to pay that price. However, in discounted cash flow valuation, we begin with the premise that the value of an asset is the present value of the expected cash flows on the asset.

In the first part we provide extensive overview of the publications that have had an impact on the development of the valuation process over the time as well as the overview of the authors who published books on the subject of valuation. We distinguished and explained difference between price and value as well as identify main drivers behind the value creation. The end of the first part is dedicated to the cost of capital as inevitable part of every discounted cash flow valuation.

Second chapter is dedicated to the goals and methodology. The main purpose of this thesis was to describe different valuation methods and then use selected valuation methods to estimate the intrinsic value of Twilio. In order to achieve this main goal, it was inevitable to set and achieve partial sub goals: explain details about the company and the industry, assess Beta, calculate cost of debt and cost of equity, calculate weighted average cost of capital etc.

Third part is dedicated to the various valuation techniques. Every valuation method is explained in detail, very thoroughly and systematically. Every valuation method has its different use case and can be suitable for different type of situation or business. We attempt to underline the advantages and use cases for every different valuation technique since it is crucial to choose right valuation method for particular situation.

The last part is devoted to the valuation of Twilio and applicability of the selected valuation methods. First, we introduced the company and provided brief business overview of their activities and potential. Later, we look at the capital structure and assessed discount rate. Then, Discounted Cash Flow valuation is carried on and Enterprise Value is computed based

on the numbers provided by Revenue Model Forecast. The value of \$ 114.38 /share is just few dollars off the current trading price. Twilio was trading at the \$132/share at the time. We also computed enterprise value using exit multiple. Enterprise value to EBIT as well as the Enterprise value to Revenues was used to determine the enterprise value. We used 19.7x EBIT 4.9x Revenue as average and median values in the particular industry. The last part is devoted to the explanation of discrepancies between estimates.

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