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"VALUING A DISRUPTOR INNOVATOR: TESLA'S IMPACT ON THE ELECTRIC VEHICLE MARKET"

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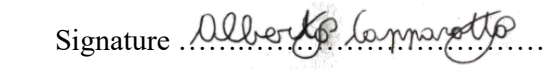
Signature 

A mia nonna,
ai miei genitori, a mia sorella,
ed alle persone a me più strette
che sono sempre state presenti
nell'arco di questi anni.

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CHAPTER 0

INTRODUCTION

Valuing Disruptor Innovators: Tesla Inc. in the Automotive Industry

In the ever-evolving scenario of the global economy, we observed many disruptive innovators emerging as powerful actor of change. These companies have been capable of reshaping whole industries and questioning the way traditional business models work. The concept of disruption has been coined and popularized by Clayton Christensen, a professor at the Harvard Business School. He described it as a process by which new technologies, products, or services enter the market and alter radically the way industries operate, often leading to the disruption of established incumbents.

Christensen noted that disruptors target existing market by offering more affordable, accessible, or user-friendly products. Alternatively, disruption may occur by creating entirely new markets.

However, after observing how disruptive companies have hit various sectors, from the rise of digital streaming platforms to innovative ride-sharing services, many economists moved some critics to the model introduced by Christensen. In the first chapter I will go deeper into these critics, introducing a further model which integrates the original one.

Moreover, the continued reshaping of industries by disruptors raises a pressing question: how can we accurately value these companies? Evaluating disruptors involve many issues, from the uncertainty about future growth to the changing risk profiles. Consequently, traditional valuation methods may not adequately capture the future potential of these innovative forces.

The primary objective of my thesis is to investigate the limitations of traditional models when applied to disruptors and enabling a more accurate valuation of disruptive entities by enhancing the Discount Cash Flow Model (DCF) and Multiple Valuation Model.

CHAPTER 1

DISRUPTOR INNOVATOR

Proposing an Enhanced Model Built Upon Christensen's Framework

The term "economic innovation" refers to the development and introduction of new products, processes, or business models that can improve economic performance and create economic value (Snihur, Y., 2019). It is often seen as a key driver of economic growth, as it creates new opportunities for businesses and consumers. Indeed, the president of Rollins College, Lewis Duncan, defined it from a company's perspective:

"Innovation is the ability to convert ideas into invoices."

It emphasizes the importance of not just generating ideas, but also successfully commercializing them to earn revenue.

Specifically, product innovation involves the implementation of ideas to bring positive significant change to the world, provides consumers with a greater choice, and transforms the way they live. It involves the development of existing products by enhancing or adding new features to them. They can create a new market and may lead to the disruption of an existing one.

Innovation can take many forms, but there are four types that stand out among organizations (Ottinger, R., 2021): incremental, adjacent, radical, and disruptive. The former, incremental innovation refers to the continuous improvements or adjustments of a product or service in its market. The focus is on enhancing the functionality and quality. Instead, adjacent innovation refers to the situation in which a company enters in a new market or appeal to a new audience using its existing capabilities. Then, radical innovation regards the creation of a new product or service that did not exist before, such as the invention of the television.

The last type represents the main subject of discussion in this thesis and needs to be defined from scratch. For what concern the meaning, the vocabulary defines 'Disruption' as:

"A radical change to an existing industry or market due to technological innovation."

Disruptors change the underlying structure of businesses and entire economic sectors, creating uncertainty in the market. It is not a new phenomenon: disruption has always been an integral part of

the evolutionary and transformation process of economies. Indeed, many of these cases happened in the last few years, and this term and definition gained more relevance with the rise of companies such as Netflix, Airbnb, Spotify which disrupted the industry in which they entered. However, for a deeper comprehension of the phenomenon, the disruptive innovation model of Christensen must be taken under consideration.

1.1 - THE DISRUPTIVE INNOVATION MODEL

The Disruptive Innovation theory has been developed in the mid-1990s by a professor of the Harvard Business School, named Clayton C. Christensen. According to his theory expressed in his book "The Innovator's Dilemma":

> *"Disruptive Innovation describes a process by which a product or service takes root initially in simple applications at the bottom of a market and then relentlessly moves up market, eventually displacing established competitors."*

He clearly explained how and why successful incumbent companies often fail when challenged by new disruptive technologies. This statement refers also to big corporations, because a great size and power has a lot of advantages, but it brings some disadvantages too.

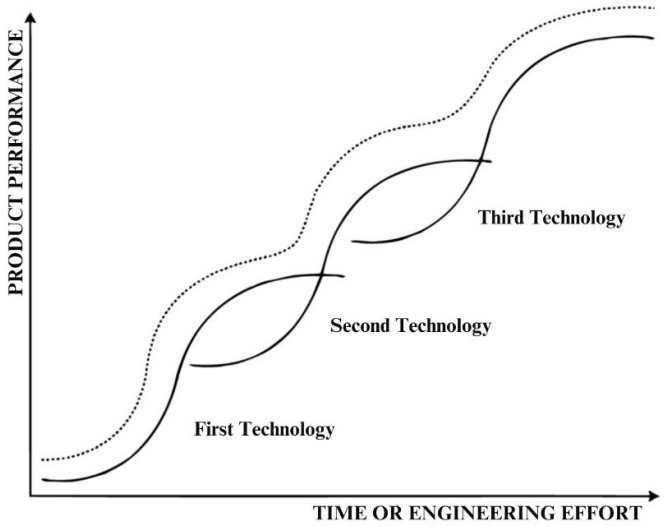
Since the disruption, generally, came from niches or small markets (Petzold, Landinez, Baaken, 2019), it happened that a new technology has not been taken into consideration since it has been seen as something not needed by the market. Incumbents tend to focus on current customers' needs, often driven by their consolidated products with high revenues and profitability. Indeed, this approach can lead to what Christensen called "Investor's Dilemma": these companies know that to survive they need to constantly innovate themselves to be able to satisfy the future needs of the market; at the same time, they also know that, if they create a new technology, they may disrupt their existing profitable product. Killing the golden goose is never an easy decision to make – but sometimes, not doing it is the worst decision ever.

This dilemma can bring companies, highly focused on their current affairs, to fail to invest in new disruptive technologies. On one hand these capabilities could become their primarily business in the future and, on the other hand, if that innovation would be introduced by another company, they may anticipate the disruption of their business.

1.1.1 - The Conventional Technology S-Curve

Christensen used the Conventional Technology S-Curve (Figure 1.1) to capture the life cycle of a product or technology.

Figure 1.1 – The Conventional Technology S-Curve



Source: Christensen (1992).

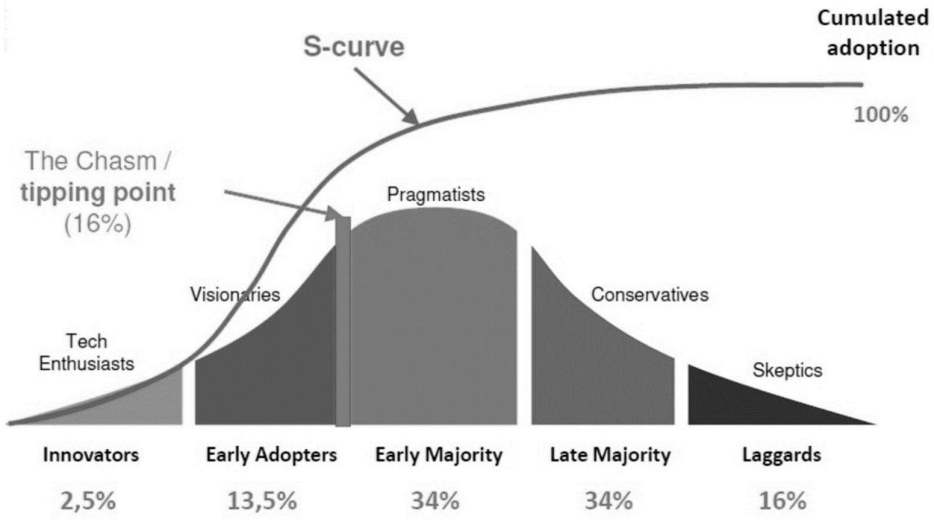
The model tracks the success of a technology, from its birth to its withdrawal, showing how rapidly the new product has been adopted and dropped by the market. The suggestion from this graph is that, as technologies mature, the extent to which a product's performance can be improved within a given timeframe or amount of engineering effort is expected to vary. During the initial phases of a new technology, the progress in performance will be relatively slow and, as it gains better comprehension, control, and diffusion, the rate at which it improves will start to accelerate. However, as the technology matures, it will approach a natural or physical limit, requiring a higher period of engineering effort to gain further improvements. When two technologies overlap, in the initial phase the newest one grows slowly, while the older is at its mature phase, i.e., it generates high profits for its company. As the new one grows, it will replace the old technology becoming the market leaders until another one replaces it. The length of innovation highly depends on the kind of industry and on the economic period.

The challenge that companies face is to predict, develop, and successfully adopt a new technology at the point in which the S-Curve of the old and new product intersect. One of the reasons why certain established companies failed and, instead, others gained a crucial advantage (Zaman, 2022).

The name of this model comes from the path followed by the technologies described. Each one follows through its lifetime a curve that can be compared to an “S”.

The path under the S-Curve has been explained by one of the oldest social science theories developed by Everett Rogers, a Professor of Communication Studies, in 1962. The theory has been presented in the homonym book called "Diffusion of Innovation". The demand S-curve hereunder, also known as adoption curve, shows the cumulated demand for a product over time (Figure 1.2).

Figure 1.2 – The Innovation Adoption Curve



Source: Rogers (1962).

Over time an innovation is communicated among a specific population or social system. When the result is that people adopt the new idea or product, the buying behavior of this population changes, following the innovation's rate of adoption. This process is not homogeneous but made of different "blocks" of demand. Some people adopt it in its first stage while other along its life. Researchers found out that people decide to adopt innovation according to some psychological traits. Five different categories of adopters have been observed and classified:

1. Innovators: people who do not mind taking risk and who want to be the first to try the new innovations.
2. Early adopters: people who enjoy leadership roles and is already aware of the necessity to change, which influences the facility with which they adopt a new idea.
3. Early majority: they are not leaders but, even though, they adopt innovation before the average person represented by the late majority. This category is composed by skeptical people willing to wait that the innovation is tested.
4. Laggards: very conservative individuals. Their skepticism towards change is the main reason why they represent the hardest group to bring on board.

Understanding the characteristics of the target population is crucial, even though most people generally belong to the middle categories, as shown by the % of the total buyers for those categories (Figure 1.2).

In today's rapidly evolving world, innovation has become critical to succeed. Organizations aim to stay ahead by constantly developing new ideas, products, and technologies that create new opportunities. In this context, three more laws stand out as fundamental drivers of innovation: Wright's Law, Metcalfe's Law, and Moore's Law. Each law represents a distinct aspect of the innovation ecosystem, depicting how costs decrease, networks values grow, and technology advances, all three at accelerated, rather than linear, paces.

Wright's Law, introduced by Theodore Wright in 1936, offers a useful method for predicting cost reductions based on the total production volume. During his study on airplane manufacturing, he found out that for every doubling of the cumulated number of airplanes produced, the labor needed to manufacture each unit decreased by approximately 10-15%. Wright documented his extensive findings in a paper entitled "Factors Affecting the Costs of Airplanes" which is now recognized as "Wright's Law" or experience curve effects (Wright, T. P., 1936). His research has brought to the attention the concept that as the cumulative number of units produced increases, the cost per unit decreases. This can be attributed mostly to fixed costs which are better spread over a larger production output, but also to the idea that we gain knowledge and expertise through practical experience, leading to improved efficiency and reduced unit costs. The effect can have significant implications for cost reduction (Winfred B. H., 1964), allowing a company to reduce its selling prices while maintaining – and in some cases even increasing - its operating margins, which, in turn, may lead to increased market share and competitive advantage (Henderson, B., 1973).

Robert Metcalfe formulated Metcalfe's Law in 1980, which is a principle widely used in computer networks and telecommunications to highlight the importance of a network (Simeonov, S., 2006). According to this law, the value of a network experiences quadratic growth as the square of the number of interconnected nodes within it. A larger network with more nodes holds greater worth for its users and bigger potential impact. This creates a positive feedback loop that stimulates the adoption of innovative solutions. As the network expands, it attracts more users, which in turn attract more developers and innovators. This collaborative environment fosters innovation by enabling the exchange of ideas, resources, and expertise among network participants.

Lastly, Moore's law is another empirical law described by Gordon Moore, the co-founder of Intel. He observed that the number of transistors on a fixed dimensions microchip (thus the processing power and storage capacity of computers) doubles approximately every two years (Moore, G. E., 1965).

This trend held true for several decades, when speaking about innovation, driving significant improvements in technology and in the way we live.

These three laws will be crucial to explain the way in which Tesla, our case study, is innovating and disrupting both the automotive and energy industries.

Going back to the theory of disruption innovation, Christensen focused on an important distinction that must be taken into consideration: sustainable and disruptive innovation.

1.1.2 - Sustainable and Disruptive Innovation

Christensen presented a clear distinction between what he considers two different types of innovations: sustainable and disruptive. A company that falls into the first definition cannot be called a disruptor innovator, in the idea of the Harvard's Professor.

The former type has been defined as a technology innovation that improves product performance of established product, along dimensions that have been historically valued by the primary customer base in major markets. Consequently, it does not create a new market or values.

Classical examples of sustainable innovations are the annual release of new version and features of smartphones, or the incremental change of features in the legacy automotive industry. This is what allows companies to remain competitive and to compete with other existing players over time. At the same time, they are not creating a new market, but simply bringing some new technologies or improvements to the products that they already have created.

Instead, with disruptive technologies a new value proposition is presented to the market, something significantly different from what was offered previously. Christensen described the resulting products as cheaper, simpler, and more convenient to use (Christensen, 2003).

In the 1970s, for example, mainframe computers were dominating the market. They have been invented in the 1960s and used especially by corporations and government agencies. Even if they were very powerful and able to process large amount of information, they were expensive and complex. This made them inaccessible to end consumers and small businesses. In the 1970s, the rise of personal computers (PCs) started creating difficulties to the technology of mainframe computers, even though, initially, they were less powerful and with limited functionalities. What characterized them in the first stage of their existence has been their cost and affordability, also for the mass market. Their simplicity and their user-friendly operating system represented another asset in the competition with mainframe computers. Over time, as the technology improved, PCs became more powerful and versatile, starting to be able to perform tasks that previously were performed only by mainframe

computers, such as data management. PCs began to decrease the market share of their principal product competitors when their price decreased significantly, making them accessible also to small businesses and individuals. These types of computers completely disrupted and transformed the computing industry, becoming essentials in our everyday life. Even though the mainframe computers have been disrupted, they still exist and are used by certain industries and applications with huge computing power needs, such as banking, finance, and government. The introduction of this cheaper, less powerful, and simpler technology targeted at the low end of the market represents a perfect example of disruptive innovation.

When a company can be classified as a disruptive innovator, another classification must be taken under consideration: disruption that comes from the low-end of an existing market or from the creation of a completely new market.

1.1.3 - Low-End and New-Market Disruption

The model focus on the idea that a company can be defined as a disruptor if and only if it is perfectly suitable in one the two different types of disruptive innovations (Christensen, 1997): low-end and new-market disruption.

The former refers to the situation in which a company introduces a product or a service that is cheaper or with a lower quality than existing products. The term low-end is explained by the fact that the target market is the lower end of it. The new entrant does not try to compete with established players, but, instead, it focuses on serving a different segment of customers characterized by limited budgets and less demanding in terms of performance, quality, or features. What they may prioritize is the convenience and the affordability over other factors. Indeed, because of the products offered, the company, generally, adopts a low-cost business model with simple and affordable solutions for meeting basic needs.

An example, that the father of the DI theory considers perfectly suitable, is the arrival of Netflix (Anindita, V., 2021), a streaming video platform that disrupted the traditional television and movie industries. This company was a DVD rental shop with a mail-in-subscription service. Customers were able to request and receive their dreamed DVD by mail. At that time, Blockbuster’s was the dominant player in the rental industry with an in-store rental business model. In the early-2000s, Netflix started the transition to the online streaming platform, through a subscription-based model that allowed its customers to access a vast library of movies, documentaries, and TV series. In addition, Netflix started to produce its own contents for reducing its reliance on licensing deals. Moreover, while the traditional television industry is based on a scheduled program, Netflix launched its algorithm to

personalize the content depending on what the user chose to see in the past and on its preferences. Then, this popular streaming video platform expanded its services to more than 190 countries worldwide, disrupting the traditional geographic boundaries of the entertainment industry. This innovation and the type of business model leaded to the decline of the established companies but also to the creation of several new opportunities. In fact, numerous competitors arrived after the launch of Netflix's platform, such as Amazon Prime Video, Disney+. The evolution of this case of disruption perfectly follows the path described by Christensen. Netflix gained its foothold in a low-end market that was ignored by the established companies, then moving upmarket to the mainstream market.

Instead, the new-market disruption occurs with the introduction of a product or service that serves a new or emerging market not actually served by existing incumbents in the industry. It refers to products that completely change the way a market operates and, it can happen, that lead to the disruption of existing players.

For example, as mentioned in the update of the theory by Christensen, in 1970 the introduction of personal copiers offered an affordable solution to individuals and small organizations. This created a new market. In that period, Xerox was dominating the copier market with its large, expensive machines that were mainly used by big businesses and government organizations. Xerox had little incentive to invest in a new technology that would have the potential to cannibalize the sales of its machines. Anyway, the personal copiers were smaller, lighter, and cheaper than Xerox's machines. This innovation offered a product that was not only cheaper, but also more convenient and accessible. While the US company continued to focus on large, expensive machines for big businesses, the personal copier makers gradually captured a significant position in the market for individuals and small organizations. Xerox eventually recognized the threat posed by the personal copiers and attempted to enter the market with its own machines, but by then it was too late.

This example highlights the importance for companies of being open to new markets and new opportunities for growth, even if they may seem small or unimportant at first. Established players need to be aware of emerging threats to be able to adapt and innovate to remain competitive.

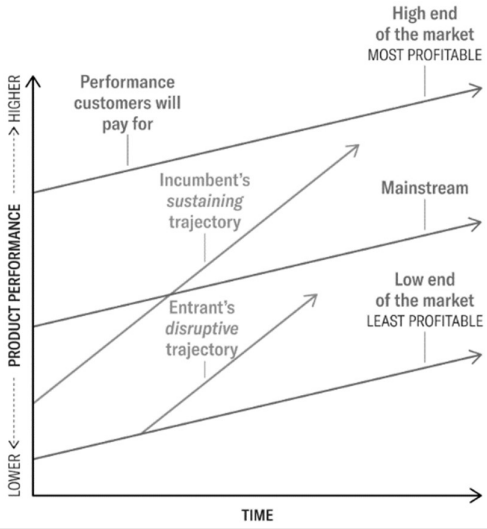
1.1.4 - The Disruption Innovation Model

As previously mentioned, there are different types of market (Christensen, 1997): low end, mainstream, and high-end.

The low-end market is the one at the bottom of the graph (Figure1.3), and the least profitable. Companies try to gain a segment in this market offering low-cost products to fewer demanding customers. Instead, mainstream refers to the mass market, when the target is large, and customers

have similar needs. The products, offered in this type, can be used by almost everyone. The last part of the histogram refers to the high-end market, characterized by premium products and services. This is also the most profitable market.

Figure 1.3 – The Low-End Model



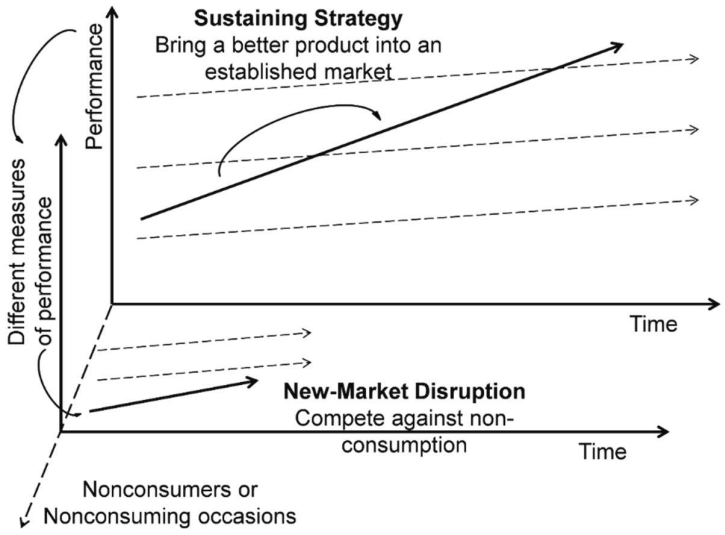
Source: Christensen (1997).

The three arrows of the market represent the trajectories of customer's demand, and, more specifically, the willingness to pay for performance. Instead, the arrows of the sustainable and disruptive innovator evidence the trajectory of the product's performance and improvements over time. Both innovators have the goal of moving upmarket. When incumbent's companies try to offer higher quality products or services to satisfy the high-end of the market, for gaining a higher profitability, they stop satisfying the needs of the low-end market and, also, of many mainstream customers. This process gives the opportunity to the new entrants to improve the performance of their products or services at a lower cost and to challenge the market share of the incumbents which move upmarket. It is when the entrants start to gain more and more market share that incumbents can recognize the low-end disruption (Bartman, T., 2015), but, for the case of new-market, the story is completely different.

Regarding these last ones, the model changes because innovative technologies emerge in a new market (Figure 1.4). The graph on the top shows the original market, the one on the bottom the new market created. The new product competes against what it's called "non-consumption", which refers to customers that were not active in the original market. The arrows show the development of a disruptor product, which starts from the bottom and goes in the direction of the existing market. Differently from low-end disruption, this is more difficult to spot by existing companies. This type of innovation often leads to make managers skeptical about the new products and the validity of the

entrant's business-model. Moreover, they may believe that their companies would have already exploited a new opportunity if there was one, leading them to not give enough importance to the new entrant. Lastly, managers for sure have seen numerous failure cases of new entrants. Indeed, as the previous example evidenced, by failing to recognize the potential of the new market and to adapt, established companies' risk of being left behind by more innovative competitors.

Figure 1.4 – The New-Market Model



Source: Christensen (2003).

1.2 – CHRISTENSEN MODEL UPDATE

In 2015, twenty years after its introduction, the Disruption Innovation (DI) theory was updated (Christensen, C. M., Raynor, M. E., & McDonald, R., 2015). There are four significant points that they have identified as overlooked or misconstrued.

Disruption is a process. Most of the innovation, both disruptor and not, starts small and then become bigger. The process is not fixed, as the term of "disruptor" could let us think, but, instead, it involves an evolution over time. When a disruptor succeeds, moving from the bottom of the market to the mainstream, it can have the power of eroding the market share and profitability of the incumbents.

Disruptor often build business models that are very different from those of incumbents. Disruptors often build their stories and value around new business models that challenge traditional approaches. For example, many companies, like Netflix, have shifted from traditional one-time purchases to subscription-based models. This allowed them to create a recurring revenue stream while providing continuous value to customers. In addition, with the rise of digital platforms, companies have capitalized on the network effect to create value for their users thought platform-based model. Airbnb

disrupted the hospitality industry by offering an innovative platform able to connect travelers with hosts in a more efficient and convenient way. It has built its story around connecting users and facilitating transactions, earning revenue through commissions or service fees.

Some disruptive innovations succeed; many don't. Disruption is not strictly connected to triumph as triumph is not with disruption. Indeed, Christensen does not classify the success of Uber as a case of disruption innovation, even though many economic experts do (Berger, T., Chen, C., and Benedikt Frey, C., 2018).

Uber is a well-known ride-hailing service founded in 2009 that has changed the traditional taxi industry. The company is based on a mobile application that connects passengers with drivers in real time. Revenue stream comes from a fee equal to a percentage of the total price paid by the passengers when they request and book a ride from the mobile app. In any case, drivers have the power to accept or refuse the ride. The advantages for passengers are represented by the facility of finding a ride, the lower cost, its convenience, and its safety. Uber constricted the most traditional taxi companies to lower their tariffs and modernize or create their technology platform. The result has been that many taxi companies failed, leading to a more concentrated industry with fewer and stronger players. Anyway, the father of the DI theory classifies this company as a sustainable innovator. Uber expanded the traditional taxi service connecting riders with drivers thought its mobile app, and so not perfectly suitable in his definition of disruptor innovator that starts from low-end or new-market footholds. Consequently, the case of Uber has not been considered by Christensen a case of disruption innovation.

The mantra "disrupt or be disrupted" can misguide us. This statement focus on how incumbent companies should react to possible disruptions, or, more, to growth opportunities. Overreact by dismantling the core business, especially if still profitable, is not the right option. Instead, the creation of a new division focused on the new growth opportunities, coming from disruption, should be the path to follow to avoid being disrupted.

The main problem is the difficulty for a company of recognizing something that can disrupt its industry, especially if strictly correlated with its main business. A great example is the arrival of digital cameras in the late 1990s and the early 2000s when they became widely available to the mass market. The story starts in 1975 when Steve Sasson, an engineer at Eastman Kodak Company, invented the first digital camera. The US company failed to recognize the potential of digital camera for protecting its business that focused on photographic film products. They were scared to cannibalize its mainstream revenue product and they never believed digital will ever take over film photography. And so, they decided to keep the invention of Steve Sasson hidden. A few years later,

in the middle of the 1990s, company like Canon, Sony, Samsung and Nikon launched their digital cameras. These digital cameras had a relatively low resolution, and they were expensive, so only professional photographers or tech enthusiasts could afford them. But, in the mid-2000s started the "megapixel race" in which digital camera manufacturers began competing on megapixels, boosting higher and higher resolution of their models. This allowed them to rapidly increase the quality of photos and decreased prices, making them accessible to a wider audience. The market shares of Kodak fallen from 90% at its peak to 7% in 2010. Kodak completely missed the opportunity created by its employee Steven Sasson and then, its failure to adapt to digital cameras led them to decline (Ho, J.C. and Chen, H., 2018). In January 2012, Kodak went bankrupt. This is a clear example of a how digital cameras disrupted the traditional photography industry and, also, a big company, leading it to fail. This story shows also the difficult to recognize an innovation capable of destroying the main business of a giant company as Kodak.

1.3 - CRITICS TO THE THEORY

Constantinos Markides, a Cypriot management educator, published in 2006 an article called: "Disruptive Innovation: In Need of Better Theory". This paper represents a critic to the theory proposed by Christensen on disruptive technologies, in which he put technological innovation, business model innovation and radical product innovation together under the term of disruptive innovation. More specifically, Markides highlighted the importance of distinguish these three categories. They are different phenomenon that create different challenges for companies and implications for managers.

Business-model innovation is related to the success of a new and completely different business-model in an existing industry. Redefining what an existing product or service is and how it is provided to the customer is the key concept of this innovation's type. In fact, the focus is not on the discovery of a new product or service. According to the literature about this, existing firms would find advantageous to create disruptive business-model innovation in three main cases: when they enter a new market where entrenched competitors have first-mover advantages, when their current is bringing them in crises, or when they are trying to scale up a new product to make it available to the mainframe market.

If successful, the new business model will be able to decrease the market share of the incumbent companies going to increase its own portion of the market. Initially, existing players will not have high incentives to adopt it, until the performance of the new and disruptive business model would become higher than the incumbent one. These innovations are considered disruptive also because it

is not possible to keep both the old business model and the new one in the same organization. Indeed, one of the best ways for an incumbent to adopt such business model is through a separate unit.

Established firm are forced to face the new way of doing business and to find a way to respond. It does not mean that they must adopt it, they can also find another way. For example, they could invest in their existing business to make it more competitive according to the new one.

Some researchers found three cases in which incumbent firms find advantageous to create disruptive business-model innovation.

The story of Southwest Airlines suits perfectly to clarify the idea of the Cypriot management educator. This US company is one of the strongest airlines in the world thanks also to its introduction of an extremely efficient business model based on offering low-cost flights tickets. One of the key choices has been to have only one type of aircraft, the Boeing 737. Single training program for its crew and maintenance staff, higher power in negotiating better prices for spare parts, and more efficient operations are only some of the reasons under this choice. Then, the company decided to be present in smaller and secondary airports with lower charges. Finally, this Airlines operates a high-frequency schedule on many routes, maximizing the utilization of its aircrafts. These factors permitted Southwest Airlines to significantly decrease its costs, maximize revenues, and offer low-cost tariffs (Muduli, A., and Kaura, V., 2011). This company did not discover the airlines transportation, rather it redefined what the service was about, what’s the customer got out of it, and how the service was provided to the customer.

Radical product innovation, instead, refers to the introduction of a product or service that changes consumer habits and behaviors, disrupting the core business on which existing competitors have built their success. These types of innovation are rarely driven by the demand since the objective of their disruption is both consumers and producers.

The invention of television by Philo Taylor Farnsworth, a 21-year-old inventor, is a perfect case of radical product innovation disruption (Limburg, V. E., 2001). TV has been presented in San Francisco in September 1927 changing the traditional communication industry characterized by the only presence for decades of radio and newspapers. This innovation has transformed the way people receive information and entertainment.

Moreover, another improvement has been moved by Damodaran (2014). He argued how disruptor innovators generally affect value at two different levels: disruption in a targeted market, and expansion into a new market.

1. Disruption in a targeted market. At this level, a disruptor enters a specific market, disrupts the existing players, and captures excess profits. The disruptor introduces a novel business model, product, or service that fundamentally changes the way things are done in that market.

2. Expansion into a new market. Assuming the disruptor succeeds in the initial market, it may have the opportunity to enter a new and potentially larger markets in the future. At this level, the disruptor leverages its core competencies, brand, platform, or technology to explore new business opportunities beyond its initial market.

The most famous disruptive company's cases, which have been previously introduced, are Netflix and Uber, even though Christensen does not recognize Uber as a disruptor. Both represents a confirmation of Damodaran theory. Netflix disrupted the entertainment industry by introducing a streaming platform that allowed users to access to a vast library of movies and TV shows (level 1). Secondly, Netflix expanded into the content production, commissioning and creating its own TV shows and movies (level 2).

On the other hand, Uber disrupted the traditional taxi industry by introducing a ride-sharing platform that connected drivers with passengers through a mobile app (level 1). Later, Uber expanded into new businesses such as food delivery with Uber Eats and freight logistics with Uber Freight (level 2).

1.4 - MODIFIED VERSION OF THE MODEL

The definition of Christensen, as previously analyzed, received many criticisms and improvements from some economists.

As mentioned by the institution dedicated to Christensen:

> *"Disruptive Innovations are NOT breakthrough technologies that make good products better; rather they are innovations that make products and services more accessible and affordable, thereby making them available to a larger population."*

Standing on their definition, disruptive innovation refers to the process of transforming an expensive or highly sophisticated product into one that is simpler, more affordable, and accessible to a larger population.

The major weakness of the theory stands on the close definition of what is a disruptor innovation company. As previously mentioned, Christensen considers only companies that pursue a low-end or a new-market disruption as disruptor innovator, otherwise they are simply sustainable innovator. It

means companies that improve the product performance of existing product without completely revolutionizing them.

What should be taken into consideration is that disruption can also come from the upper part of the market, from the high-end market. Remaining inside the main goal of making a product or a service more affordable, simpler, and accessible, there is the need to take into consideration the different characteristics of each industry.

It is not possible for some sectors to start from the bottom part of the market offering a cheaper option. There are some limits represented, for example, by high fixed costs or by the necessity to invest huge amount of money in research and development. Moreover, one of the biggest limits is the necessity of developing strong economies of scale, otherwise it would be impossible to offer an affordable product and, at the same time, be competitive.

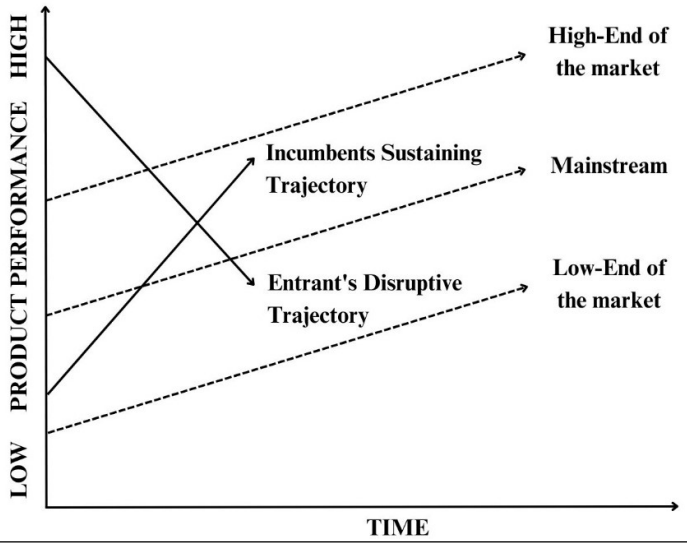
For example, the semiconductor's industry is dominated by few large vertically integrated firms that developed a strong competitive advantage in the years based on high-quality products. Semiconductors are electronic components made of materials that can conduct electricity under some conditions and insulate under others. They are used in a wide range of electronic devices, from smartphones and computers to cars and medical equipment. Semiconductors are highly complex products, which require important investments in R&D and the development of strong economies of scale to be competitive (Shin, N., Kraemer, K. L., Dedrick, J., 2017). Even though, the competition is not solely based on price, but also on offering a high-quality product.

For a new entrant would be a significant challenge to compete with these big players, but nearly impossible to do that starting from the low-end market. A new player should focus on specific niches bringing a high-quality product capable to innovate the industry. By initially targeting a high-end market segment, the new entrant can differentiate itself by offering superior performance or unique features. This strategy would allow the company to build a reputation based on quality and establish credibility among customers. While the product may initially be expensive and inaccessible to the mass market, over time, as the new entrant gains traction and develops economies of scale, it can leverage its position to drive down costs, to improve manufacturing processes, and to expand its market presence. As a result, the product can become more affordable and accessible, eventually disrupting the established players, and capturing a larger market share.

For these reasons, I am convinced that a new model is needed.

Starting from the model of Christensen and considering the trajectory of a possible disruptor innovator that starts from the high-end market, the model should be the following (Figure 1.5).

Figure 1.5 – High-End Disruptive Model



Source: Personal Elaboration (2023).

The incumbents still follow the trajectory from the low-end to the high-end market, but, instead, the company introducing the new technology, business model, or product, will start from the high-end market. The trajectory followed to be considered a disruptor should be in the direction of the mainstream market as described in the original theory of Christensen. The goal remains to offer a more convenient, affordable, and technological advanced product than the existing ones, but what changes is the way in which it is done.

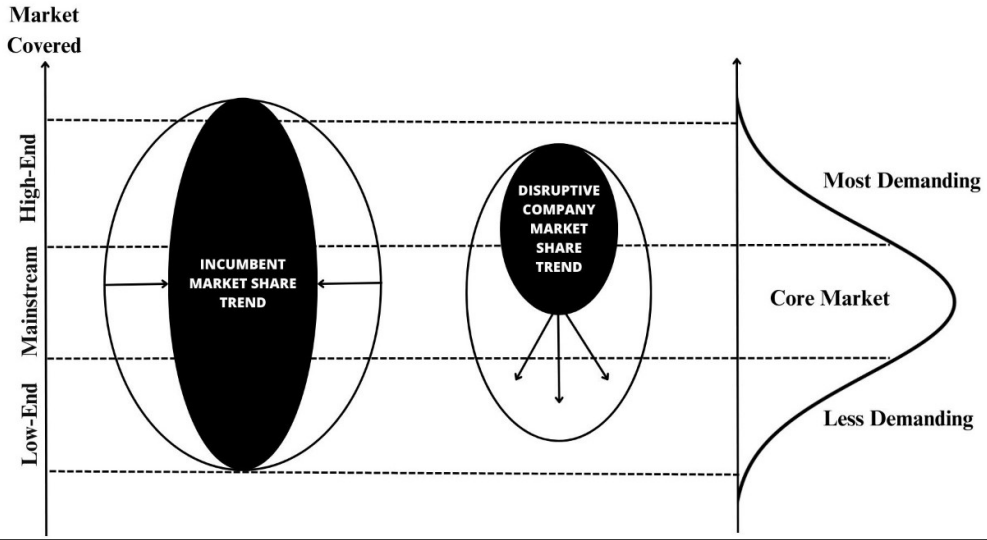
While the approach of starting from the high-end market may deviate from Christensen's original theory, it reflects the dynamic nature and characteristics of certain businesses and the evolving strategies adopted nowadays by disruptors.

In addition, after all these considerations, the model in my mind should analyze the situation in perspective. First, after a deep analysis of the industry, the low-end, mainframe, and high-end market should be clearly identified looking on the types and prices of products offered. The model should take into consideration the size and the strategic position among the three markets of the incumbents. What should be kept in mind is the principle of being a disruptor innovator (Christensen, 1997):

"Make products and services more accessible and affordable, thereby making them available to a larger population."

Obviously, the fact that someone new enters the industry is not necessarily connected to the fact that it is a disruptor. Indeed, the model should look to the possible disruptor in a prospective way, analyzing from where it has started, where it is going, and what is going on in the market (Figure 1.6).

Figure 1.6 – High-End Disruptive Model



Source: Personal Elaboration (2023).

The y-axis represents the market covered by companies, and the x-axis companies. Using the subdivision of low-end, mainstream, and high-end market, a company will be positioned in the graphic through a bubble that has the length ranging from its cheapest product (low-end) to the most expensive one (high-end). Instead, the volume of the bubble should be represented by the volume of the products produced, or, more precisely, by its market share.

In the model represented, the new company started from the higher part of the market introducing a high quality and high-performance product not accessible to the mainstream market. Moving down thought the market with the introduction of new and cheaper products, the company is expanding its market share reducing the one of the incumbents.

If the trend is to move through the industry, to end up with an innovative product affordable also to the low-end market and able to significantly reduce the market share of its incumbents, a company should be defined as disruptive, even though the path is not the traditional one of a low-end or new-market disruptor.

The concept of disruption is not limited to a specific path or strategy. Disruption can occur through various means, and this company's approach of entering the market from the high-end segment and progressively moving down-market can still be considered disruptive if it ends up in significant market share shifts and challenges the existing incumbents.

This discussion comes from a specific case study that will be analyzed in chapter 3, after the introduction of the main methods for valuing a disruptor innovator. Precisely, the company is Tesla

Inc., an automotive company focused on electric vehicles that is completely disrupting the automotive industry.

CHAPTER 2

VALUATION MODELS

Tools for Assessing the Financial Value of a Disruptor Innovator

Asset valuation has been an important concept in finance and investing for centuries. Assigning a value to an asset came from the ancient Greece and Rome, where lands and properties were valued based on their productive capacity. Nowadays, asset valuation is still a crucial part of many financial decisions, as it allows investors to make informed choices.

This chapter focuses on the traditional methods for evaluating a company and on their issues when the analyst is facing a disruptor innovator company. After the identification of the most famous and used methods, an analysis of the issues for valuing a disruptor will take place.

2.1 - TRADITIONAL METHODS

Valuation is an essential part of the investment process, and many methods have been created for this scope. Traditional methods have been used for decades to value companies, and they can be divided into two categories: intrinsic valuation, and relative valuation.

Intrinsic valuation is a method for estimating the fundamental value of an asset standing on its financial factors, such as cash flows, growth potentials and risks (Damodaran, A., 2011). The economic worth, based on its underlying fundamentals, is a concept partially different from the price assigned by the market, and it plays a key role in the process of decision making (Hagstrom, R. G., 2013). Indeed, Warren Buffet, one of the most famous investors in the world, once said:

"Price is what you pay. Value is what you get."

This phrase emphasizes the importance of distinguishing between the price that you pay for an asset, and the fair value of it. Market value is determined by the supply and demand, defining the current price. Instead, intrinsic value is based on the fundamental characteristics of the asset, and on the future cash flows that it will produce. The main models that follow these concepts, and help investors to identify the intrinsic value, are: Discounted Cash Flow Model (DCF) and Dividend Discount Model (DDM).

The second category is represented by the relative valuation method. Here, the story is different. The value of an asset is assessed looking at how the market is pricing similar assets, rather than on its inherent characteristics.

These methods can yield different estimates of value for the same asset. In addition, each model performs better and is more suitable for specific situation, depending on the characteristics of the asset.

In the next paragraphs, key inputs, characteristics, and differences of these valuation methods will be analyzed to understand better how to use them for the scope of valuing a disruptor innovator company.

2.1.1 - Intrinsic Valuation

The ideas behind the DCF model were introduced more than 2.500 years ago (Buffet, W. E., 2000). The value of an asset is a function, as follows, of the expected cash flows, discounted back to today at a rate that reflects the riskiness of these cash flows (Damodaran, A., 2008).

$$Value\ of\ Assets = \frac{\mathrm{CF_1}}{(1+\mathrm{r})^1} + \frac{\mathrm{CF_2}}{(1+\mathrm{r})^2} + \cdots + \frac{\mathrm{CF_n}}{(1+\mathrm{r})^n}$$

Where:

- CF = Cash flows
- r = Discount rate
- n = Life of the asset

However, it is important to consider an additional aspect in the formula mentioned above, the terminal value (TV), that it's not explicitly addressed. Unlike assets with a specific maturity or expiration date, the lifespan of a company is typically uncertain or can last indefinitely into the future. Therefore, to account for the infinite or extended lifespan of a firm, analysts must distinguish between two components: the projected cash flows that can be reasonably estimated over a specific period and the terminal value, which captures the value of the company's future cash flows beyond that period. The formula is:

$$Value\ of\ Assets = \sum_{t=1}^{n} \frac{CF_t}{(1+r)^t} + \frac{TV_n}{(1+r)^n}$$

Therefore, those are the four inputs of a Discounted Cash Flow Model (DCF): cash flows, their growth, discount rate, and terminal value. Inputs will differ depending on whether the analyst performs a firm or an equity valuation.

2.1.2.1 - Cash Flows

Discounted cash flow valuation can be done starting from two different types of cash flows: the one to the equity and the one to the firm.

In the first case, the initial input is the cash flow to equity investors, and the valuation is just of the equity stake in the business. The strictest measure is dividends, one of the two components that an investor expects to get from an investment in a company. Myron J. Gordon of the Massachusetts Institute of Technology developed in 1956 the famous Dividend Discount Model (DDM) based on that type of cash flow (Gordon, M. J., 1956). In the model, the value of a company is the present value of the expected dividends, as follows:

$$Fundamental\ Value = \frac{D_1}{(1+r)^1} + \frac{D_2}{(1+r)^2} + \cdots + \frac{D_n}{(1+r)^n}$$

Where:

- D = Dividends
- r = Discount rate
- n = Life of the asset

The limitation of focusing just on dividends is that many companies do not pay any dividends, making useless the model proposed by Gordon. A new model based on potential dividends has been created to solve this problem. Specifically, the cash flow is the estimation of what managers could have returned to equity investors, named cash flow to equity investors. Indeed, cash flows from assets after debt payments and after making reinvestments for future growth are considered. The calculation is computed as follows:

$$FCFE = Net\ Income - (Capital\ Expenditure - Depreciation$$
$$+ Change\ in\ Non - Cash\ Working\ Capital)$$
$$- (Principal\ Repayments - New\ Debt\ Issues)$$

With the discounted cash flows to equity investors, the cost of equity is the discount rate that reflects only the cost of raising funds thought equity.

The second refers to the valuation of the entire business, in which the analyst considers both existing assets and growth assets. Therefore, cash flows from assets are considered here, but prior to any debt payments, and after the firm has reinvested to create growth assets. One estimation method is to add to the cash flow to equity investors the cash flows to debt holders, composed by interests and net debt payments. The other method starts from operating earnings, as follows:

$$FCFF = After\text{-}Tax\ Operating\ Income - (Capital\ Expenditure - Depreciation$$

$$+ Change\ in\ Non\text{-}Cash\ Working\ Capital)$$

Another way is to express the free cash flow to the firm in terms of the reinvestment rate and after-tax operating income:

$$Reinvestment\ Rate\ = \frac{(Capital\ Expenditure - Depreciation + \Delta\ in\ Working\ Capital)}{After - Tax\ Operating\ Income}$$

$$FCFF = EBIT(1-t)\ (1 - Reinvestment\ Rate)$$

In this case, in the valuation process, the cost of capital represents the discount rate to be used, being the one reflecting the cost of raising funds using both equity and debt.

The value of equity can also be derived from the firm value by subtracting the value of all non-equity claims. This process ensures that the value of equity remains consistent whether it is directly valued (by discounting cash flows to equity at the cost of equity) or indirectly valued (by valuing the entire firm and then subtracting the value of all non-equity claims).

2.1.2.2 – Growth

A crucial ingredient of the discounted cash flow model is the growth rate, an input that, differently from the others which rely on historical data, require to look to the future. It represents the rate at which the company is expected to grow over a period.

First, the number of forecasted years must be decided. The main method commonly used by analysts is to develop an explicit year-by-year forecast for a period long enough to reach a steady state, and then value the remaining years by using a perpetuity formula. Analysts often split the model into two periods: a detailed forecast period of a N years (from 3 to 10 or longer, typically 5), which develops complete financial statements, and a simplified forecast for the remaining years, focusing just on a few significant variables.

Koller (2020) identified three main steps to forecast the growth path followed by the firm:

1. Build revenue forecast.
2. Forecast the IS.
3. Forecast the BS.

1. Build revenue forecast. Estimating revenues growth starting from past performance is a common approach used by analysts to predict future growth. By examining the past growth rates in revenues, analysts try to gain information about the historical performance of a company to use them as a reference point for projecting future growth. Damodaran (2009) argues that historical growth rates

can yield different estimates for the same company. Indeed, many studies concluded that the relationship between past and future growth is weak, especially when looking to companies characterized by growth cycles, in which high growth periods are followed by low growth ones.

To create a more reliable and detailed revenue forecast, Koller (2020) highlighted two approaches: top-down and bottom-up.

The former method can be applied to any company, and it starts with the estimation of the total market size in which the company operates. The second step is to determine the firm's market share, or the desired market share based on competitive positioning and industry dynamics. Lastly, the analyst must forecast the pricing strategy for the company's products or services. Analyzing its production cost's structure, value proposition, major competitors' prices, customer willingness to pay, and looking to the market future projection can allow to assess the trend that prices will follow.

Conversely, the bottom-up approach relies on the company's own forecasts of demand from existing customers, customer turnover, and potential new customers. Assessing the customer demand can be done by analyzing historical sales and customers' behaviors, to better understand the patterns, seasonality, and trends of the demand. The turnover, instead, involves assessing how many existing customers are likely to continue purchasing from the company. In addition to existing customers, the potential for new customer acquisition is a crucial factor in the bottom-up approach. It involves evaluating the company's market penetration strategies, and the attractiveness for acquiring new customers. Finally, the revenue can be calculated by multiplying the estimated demand by the average transaction value or price per unit.

Employing both methods, when possible, helps establish a revenues' forecast range, providing a clearer picture.

2. Forecast the IS. Analysts directly link most items to the forecasted revenues, by simply multiplying a forecast ratio to them. Some others, instead, can be linked to PP&E, total debt, excess cash, or any other appropriate item. Computing the historical value for each ratio permits to assess the trend followed and make an estimation of the forecast ratio. The table below (Figure 2.1) highlights the most significant voices of the income statement, the typical forecast driver and forecast ratio.

Figure 2.1 – Forecast Drivers for the Income Statement

	Line item	Typical forecast driver	Typical forecast ratio
Operating	Cost of goods sold (COGS)	Revenue	COGS/revenue
	Selling, general, and administrative (SG&A)	Revenue	SG&A/revenue
	Depreciation	Prior-year net PP&E	$\text{Depreciation}_t / \text{net PP\&E}_{t-1}$
Nonoperating	Nonoperating income	Appropriate nonoperating asset, if any	Nonoperating income/nonoperating asset or growth in nonoperating income
	Interest expense	Prior-year total debt	$\text{Interest expense}_t / \text{total debt}_{t-1}$
	Interest income	Prior-year excess cash	$\text{Interest income}_t / \text{excess cash}_{t-1}$

Source: Koller (2020).

3. Forecast the BS. In the case of the balance sheet, the method proposed by Koller (2020), is pretty the same of the income statement. Each item can be forecasted by linking it to the most appropriate item, as the table below suggests (Figure 2.2).

Figure 2.2 – Forecast Drivers for the Balance Sheet

	Line item	Typical forecast driver	Typical forecast ratio
Operating line items	Operating working capital		
	Accounts receivable	Revenues	Accounts receivable/revenues
	Inventories	Cost of goods sold	Inventories/COGS
	Accounts payable	Cost of goods sold	Accounts payable/COGS
	Accrued expenses	Revenues	Accrued expenses/revenue
	Net PP&E	Revenues or units sold	Net PP&E/revenues
	Goodwill and acquired intangibles	Acquired revenues	Goodwill and acquired intangibles/acquired revenues
Nonoperating line items	Nonoperating assets	None	Growth in nonoperating assets
	Pension assets or liabilities	None	Trend toward zero
	Deferred taxes	Operating taxes or corresponding balance sheet item	Change in operating deferred taxes/operating taxes, or deferred taxes/corresponding balance sheet item

Source: Koller (2020).

2.1.2.3 - Discount Rate

The parameter r, in the asset value formula, represents the vehicle for conveying all concerns about risks not reflected in the CF projections, i.e., the market risk to apply to the expected cash flows. More particularly, it is a measure of the required rate of return that an investor expects to earn in order to compensate for the risk associated with investing in a particular project or business.

Depending on how we look to the company, there are two different ways of thinking to risk: looking just to the equity, or on the whole business. In the former, the business' risk in the equity is measured with the cost of equity, and the most commonly method used is the Capital Asset Pricing Model (CAPM). In the latter, we think about the risk in a firm's business, and, since a company raises funds thought both equity investors and lenders, the rate should reflect the riskiness of both equity and debt. In this case, the approach is to consider a weighted average of the cost of equity and of debt, in which the weights reflect the proportional use of each source of funding. The model is named Weighted Average Cost of Capital (WACC) and it is the most used approach for estimating it.

Since each valuation method focus on different cash flows, the choice determines the appropriate risk measure to use. When using the Free Cash Flow to Equity (FCFE) approach, which focuses on the cash flows available to equity holders, the appropriate risk measure is the cost of equity. Instead, when considering the Free Cash Flow to Firm, which focuses on the cash flows available to all capital providers (both debt and equity), the correct one would be the cost of capital.

Measuring the cost of equity, which is also a central building block of the cost of capital, is an extremely difficult task, even though many models have been created. The most used by analysts, as previously mentioned, is the Capital Asset Pricing Model (CAPM). The model provides a framework for estimating the cost of equity, considering three variables: risk-free rate, market risk premium, company's beta. The formula is:

$$k_e = r_f + \beta_i(ER_m - r_f)$$

Where:

- k_e is the cost of equity.
- r_f is the risk-free rate.
- β_i is the beta.
- $(ER_m - r_f)$ is the market risk premium.

The risk-free rate is the expected return on an investment considered without any risk. The definition is a bit misleading since it is no possible that an investment is completely risk-free. Generally, government treasury bonds are used for this scope and, more specifically, analysts tend to use the 10 years' treasury bond with the higher volume of trading. These assets have a low default risk, that in some cases is nearly zero.

The unique variable in the equation that vary across companies, is the measure of systematic risk, i.e., beta. CAPM focuses on the non-diversifiable risk, defined as systematic risk. It arises from factors that affect the overall market, such as economic conditions, political events, inflation, and global

market trends. Even a highly diversified portfolio cannot eliminate it, as in the case of unsystematic risk. This refers to specific factors to the particular asset. It can be reduced or eliminated by diversifying the investment portfolio by holding a mix of unrelated assets. The standard approach for the estimation of beta is to run a statistical regression of returns on the stock against returns on a broad equity market index.

$$R_j = a + bR_m$$

Where:

- a is the intercept from the regression
- b is the slope of the regression

The slope of the regression line represents the beta, which indicates how much the stock's returns tend to move in response to changes in the overall market. The unlevered beta obtained is then adjusted for capital structure to obtain the levered beta of the firm.

$$\beta_L = \beta_U + \frac{D}{E}(\beta_U - \beta_D)$$

This method relies on historical return data and estimates the stock's sensitivity to market movements based on past performance. It assumes that the relationship between the stock's returns and the market returns will continue in the future.

Another approach to estimate beta is the bottom-up beta method, which addresses the challenges associated with statistical noise and the availability of individual historical returns. This method relies on industry averages specific to the firm's business and incorporates adjustments for variations in financial leverage. Instead of relying solely on individual historical returns, this approach considers the risks' characteristics of companies operating in the same industry as the firm that has been analyzed. This broader perspective helps mitigate statistical noise and provides a more reliable estimate of the firm's beta.

The market risk premium is estimated by subtracting to the market return the risk-free rate. It measures the premium demanded by investors for investing in risky assets than in risk-free assets. A common practice is to use the historical premium earned by investors, investing in equities rather than risk-free assets, over long periods. Koller (2020) suggested to add the historical estimate of the market risk premium to today’s long-term government bond rate, to incorporate current interest rates and avoid including past inflation rates.

Instead, for measuring the risk of both equity and debt, the method used is the Weighted Average Cost of Capital (WACC). It is equal to the weighted average of the after-tax cost of debt and cost of equity, as follows:

$$WACC = \frac{D}{EV} k_d (1 - t_i) + \frac{E}{EV} k_e$$

Where:

- k_d is the cost of debt.
- k_e is the cost of equity.
- t_i is the company's marginal tax rate on income.
- D is the value of debt.
- E is the value of equity.
- EV is the enterprise value.

Since many businesses finance themselves using a combination of both equity and debt, the cost of capital should also consider the cost of debt. The cost of debt measures the current cost for the company of borrowing funds to finance its projects. The main method widely used for estimating it is to look up to the rating for the firm and use it as a proxy for estimating the default spread (Damodaran, A., 2023). Since different bonds, even though are from the same firm, can have different ratings, it is better to use a median of their rating. Logically, as the company's default risk increases, the cost of debt will increase. The formula for the estimation of the cost of debt is the following:

$$k_d = \textit{Risk-Free Rate} + \textit{Company Default Spread}$$

Since the interests paid on the borrowed funds are tax deductible, the after-tax cost of debt is a function of the tax rate, and it must be estimated. The benefit will increase as the tax rate increases, making the cost of debt after-tax lower than the pre-tax.

$$\textit{After-Tax Cost of Debt} = \textit{Pre-Tax Cost of Debt (1 – Tax Rate)}$$

After the estimation of the cost of debt and equity, it is now time to get the target weights of debt (net of excess cash) and equity to enterprise value. Koller (2020) argues that the cost of capital should rely on a forecast of target weights, rather than current weights. The risk, especially in cases in which there have been short-term swings, is to overestimate the value of the tax shields. In addition, Damodaran (2009) argues that would be better to use the market value of debt and equity instead of their book value. Market value, with its volatility, represents a much better reflection of the true value, especially considering that the true value changes over time. Equity is just the multiplication of the company's price by the total number of shares outstanding. Instead, market value of debt is a hard task to get. Damodaran (2012) suggested to treat it as one coupon bond, with the coupon equal to the

interest expenses on the all debt, and the maturity equal to the face-value weighted average maturity. If not possible, an acceptable proxy can be its book value, but considering only the interest-bearing debt.

2.1.2.4 - Terminal Value

Publicly traded companies do not have a finite life, they can last forever. Since it would not be possible to estimate cash flows forever, analysts stop their estimates at some point in the future, and then computing a terminal value that reflects all cash flows beyond that point.

To perform discounted cash flow (DCF) valuation, it is necessary to estimate either a going concern value or a terminal value. Treating a firm as a going concern at the end of the estimation period means to assume that cash flows will grow at a constant rate thereafter. This concept of stable growth refers to a phase where the company's operations and financials have reached a relatively steady state.

Damodaran (2014) argues that three critical assumptions should be made on stable growth:

1. Is the firm currently in a stable growth phase? Or when is it expected to enter this phase?
2. What are the expected characteristics of the firm during the stable growth phase (especially in terms of return on capital and cost of capital)?
3. How does the firm plan to move from a high growth phase to a stable growth phase?

The length of the high growth period is not related to whether, but to when. All firms will ultimately become stable growth firms. As they grow larger, it becomes increasingly challenging to sustain high growth rates. This is because the firm's size itself can become a barrier to further rapid expansion and, for this reason, it is necessary to take it into account. Smaller firms have a better chance of earning and sustaining excess returns compared to larger firms. This is because they have more growth opportunities and a larger potential market to explore. It is important to consider not only its current market share, but also its growth potential in the overall market. In addition, the value creation process is driven by the firm’s ability to earn returns higher than the cost of capital, and, in a competitive market, it will attract new competitors. Their entry can lead to eroding the excess returns since they will try to enter and expand their presence in the market. When an industry has strong barriers to entry and the firm has a sustainable competitive advantage, it has a better chance of maintaining high growth over an extended period. In contrast, if there are few barriers to entry or the firm's competitive advantage is weakening, a more cautious approach is necessary when considering its going concern value.

As companies’ transit from a high-growth phase to a stable-growth phase, their risk characteristics also tend to change. It is important to adjust these risk characteristics to reflect the characteristics of

stable-growth firms, typically perceived as less risky for their more predictable and steadier stream of cash flows (Damodaran, A., 2009). On the other hand, high growth firms tend to be more exposed to market's risks for their risky and unpredictable cash flows, ending up with higher beta. Indeed, the beta during the stable-growth phase should be lowered toward one. Additionally, Damodaran (2014) argues that high growth firms tend to use less debt than stable growth firms. As firms mature, their cash flows became more stable, allowing them to increase their debt capacity and easily manage it. Finally, stable growth firms, having just established a strong competitive advantage and market present, typically reinvest less than high growth firms, focusing more on maintaining their market position.

Lastly, as the firm approaches the stable growth, there are three distinct scenarios to be considered:

1. Two-stage model: this model is suitable for firms with moderate growth rates, where the shift from high growth to stable growth is not expected to be too drastic. The firm maintains its high growth rate for a certain period and then, abruptly move to stable growth.
2. Three-stage model: here, the firm maintains its high growth rate for a period and then enters a transition phase where its growth rate gradually decreases. This model is more appropriate for firms with very high growth rates in operating income, allowing smoother adjustment towards stable growth levels.
3. N-stage model: in this scenario, the firm's characteristics change each year from the initial high growth period to the stable growth period. This model is suitable for very young firms or firms with negative operating margins. Allowing for changes in each year provides a more prudent approach, considering the evolving nature of these firms.

Therefore, the moment in which a company reaches a stable growth phase is a hard task to address. The terminal value tries to provide a means to capture the long-term value of the company's cash flows when the firm is expected to have a stable growth forever (O'Connell, B., 2019). The formula, introduced in the 1950sby the professor Myron Gordon, is the following:

$$Terminal\ Value_n = \frac{Cash\ Flows_{n+1}}{(Discount\ Rate - Perpetual\ Growth\ Rate)}$$

Conversely, Koller (2020) suggests using the value driver formula as follows:

$$Terminal\ Value_n = \frac{NOPAT_{n+1}(1 - \frac{g}{RONIC})}{(Discount\ Rate - Perpetual\ Growth\ Rate)}$$

Where:

- NOPAT = Net Operating Profit After Taxes

$$NOPAT = EBIT(1 - Tax\ Rate)$$

- RONIC = Return on New Invested Capital

$$RONIC = \frac{NOPAT_n - NOPAT_{n+1}}{IC_n - IC_{n*1}}$$

The level of NOPAT, especially in cyclical business, is influenced by several factors, first of all, revenues. A normalized level of revenues that exclude any extraordinary or non-recurring revenue spikes or dips should be considered in the calculation, otherwise, it may distort the value. In addition, a margin which is not significantly impacted by temporary factors or cyclical fluctuations should be used. Finally, NOPAT should be based on the return on invested capital (ROIC).

Regarding the RONIC, its determination should consider the expected competitive conditions beyond the explicit forecast period. Economic theory suggests that, in competitive industries, abnormal returns are unlikely to be sustained in the long term as competition tends to erode these advantages. Therefore, setting RONIC equal to the WACC is a common practice. On the contrary, firms with sustainable competitive advantages should set RONIC equal to the return the company is forecasted to earn during the later years of the explicit forecast period.

Instead, to estimate the terminal value in an economic-profit valuation, Koller (2020) suggests the following formula:

$$TV_t = \frac{IC_t(ROIC_{t+1} - WACC)}{WACC} + \frac{PV(Economic\ Profit_{t+2})}{WACC - g}$$

Where:

$$PV(Economic\ Profit_{t+2}) = \frac{NOPAT_{t+1}(\frac{g}{RONIC})(RONIC - WACC)}{WACC}$$

The problem of the perpetual growth model is that it can be easily misused. The terminal value is heavily influenced by the assumptions made on the growth rate. Even small adjustments to this input parameter can have a significant impact on the resulting terminal value.

Consequently, a cap on the growth rate should be put. When estimating the constant growth rate in a discounted cash flow valuation, it is crucial to consider realistic inputs. No firm can sustain growth indefinitely at a rate higher than the overall growth rate of the economy in which it operates. Therefore, the maximum stable-growth rate used in a valuation should not exceed the economy's growth rate (Velez-Pareja, I., 2004). This approach ensures not only consistency but also that the growth rate remains lower than the discount rate.

2.1.2 - Relative Valuation

Relative valuation is arguably the most popular approach used, since it is easier to perform, less-time, and resource intensive (Bhojraj, S., Lee, M. C., 2002). While this method is based on intrinsic data, where the value of an asset was based on its capacity to generate future cash flows, relative valuation focuses, instead, on valuing a company comparing it to other firms with similar characteristics, better known as peers. While the two methods have different approaches, they both aim to determine the fair value of an asset. In an efficient market, where prices reflect all available information, the market's pricing of assets should align with their intrinsic values (Fama, E., 1970). In such a (rather ideal) world, the relative valuation method and the DCF method should converge and provide similar estimates of the asset's value. However, the market is not always efficient, and there can be discrepancies between the market price and the intrinsic value of an asset, as it may be overpricing or underpricing such asset. Factors such as information asymmetries, transaction costs, market psychology, and human emotion, can lead to deviations between the two valuation methods (Hayes, A., 2022).

The relative valuation model can be de-composed into 5 phases:

1. Identifying comparable companies.
2. Selecting the most significant multiples.
3. Calculation of selected multiples.
4. Applying Multiples to the Target Company.
5. Assessing the range of values.

1. Identifying comparable companies. Relative valuation, based on looking how much investors are paying for similar firms, relies on the premise that companies with similar characteristics and in the same industry tend to have similar valuation multiples (Koller, T., 2010). More specifically, a comparable firm, as defined by Damodaran (2011), is:

> *"A firm is with cash flows, growth potential, and risk similar to the firm being valued."*

Finding such firms is a hard task, that's why analysts commonly use the companies in the same industry or sector to which the firm belongs. Even though, a broad industry average would not be a good peer of the group, since differences in risk, growth, and cash flow profile across firms in the same sector are, usually, large. The peers' group should be formed by companies that not only operate in the same industry but also have similar performances, as described by Damodaran. Marc Pentacoff (2018) suggested that, frequently, the best companies to compare to the target firm are those mentioned in the 10-K financial statement, allowing the analyst to gain insights into the firms that the company itself considers as competitors. Even though, companies may not disclose all competitors

in the 10-K or may focus on specific competitors that they perceive as most relevant. Therefore, while it is a useful starting point, it's important to conduct further research.

2. Selecting the most significant multiples. A multiple is a ratio used to compare one financial metric to another. It is calculated by dividing one financial metric by another, providing a relative benchmark. When it comes to valuation, there are two main types that are commonly used: equity multiples and enterprise value multiples (Corporate Finance Institute, 2018). Each of these approaches offers unique insights, allowing investors to assess its attractiveness from different perspectives.

Equity multiples are ratios that focus on the market value of a firm's equity in the numerator. Some of the most widely used are:

- Price to Earnings Ratio (P/E): it is one of the most widely used equity multiples and provides insights into how much investors are willing to pay for each dollar of earnings generated by the company.
- Price to Book Value Ratio (P/BV): the book value used in the ratio represents the value of assets after all the liabilities have been paid off. This multiple is used to assess whether a company's stock is trading at a premium or discount to its book value.
- Price to Sales Ratio (P/S): it provides insights into how the market values a company's sales. It indicates the amount investors are willing to pay for each dollar of revenue generated by the company.
- Price to Cash Flows Ratio (P/OFCF): it uses the operating free cash flow per share, obtained by summing to net income the depreciation and amortization, and subtracting the increase in net working capital.

Even though equity multiples are widely used by analysts, they mix capital structures and non-operating items with expectations of operating performance, leading to a less reliable valuation (Koller, T., 2010).

The asset side multiples, instead, focus on the firm's enterprise value (EV) in the numerator, providing insights into how the market values the entire business rather than just its equity. The EV is defined as:

$$EV = Market\ Value\ of\ Equity + Non\text{-}Controlling\ Interest + Debt\ \&\ Equivalents - Cash\ \&\ Other\ Non\text{-}Operating\ Assets$$

Damodaran (2013) argues that, while the conventional practice is only to multiply the shares outstanding in the company by the share price to get the market value of equity, there is also the

necessity to value equity options, such as management options and convertible securities. Instead, for "Debt & Equivalents", even though its market value should be used, a common practice is using its book value. The reasons are the problem of non-traded debt and of off-balance sheet debt. Damodaran (2013) suggested also adding the present value, discounted by the pre-tax cost of debt, leases, and other commitments, and of underfunded pensions to the debt input. In the case of capital leases, they should already be in the interest-bearing debt. Lastly, the non-operating assets involve the estimation of the market value of minorities. If not possible, book value represents a good proxy.

Some of the most used EV multiples are:

- Enterprise Value to Earnings Before Interest and Taxes (EV/EBIT): even though it is widely used by analysts, Koller (2010) argues that would be better to use EBITA or NOPAT to avoid the distortion caused by amortization.
- Enterprise Value to Earnings Before Interest, Taxes, and Amortization (EV/EBITA): when analyzing companies in industries where depreciation is an important factor, using EBITA can be more appropriate. Including depreciation expenses, it provides a clearer view of a company's operating performance and cash-generating capacity.
- Enterprise Value to Net Operating Profit After Taxes (EV/NOPAT): when the companies in the peer group does not have the same operating tax rate, it would be better to use NOPAT. It's calculated by subtracting the tax effect on EBITA, as follows:

$$NOPAT = EBITA\ (1 - t)$$

- Enterprise Value to Earnings Before Interest, Taxes, Depreciation and Amortization (EV/EBITDA): excluding depreciation and amortization is a practice generally used in industries where D&A does not play a significant role, since they reflect sunk costs rather than future investments. In that case, it would be better than the previously ratio EV/EBITA.
- Enterprise Value to Sales (EV/SALES): the approach of using revenues is far less affected by accounting choices and allow to easily compare firms across different markets and accounting systems, rather than using earnings or book value multiples (Damodaran, A., 2009). Moreover, since revenues cannot be negative, it can be used as a multiple even for companies with negative profits or book value, such as young and money-losing companies.
- Enterprise Value to Operating Free Cash Flow (EV/OFCF).

3. Calculation of selected multiples. Typically, multiples are calculated using the financial data from the current year or the projected data for the next year. Last Twelve Months (LTM) multiples, better known as historic multiples, are considered more reliable as they use past period data. For businesses with uniform growth prospects LTM multiples are a better metric. On the other hand, when growth prospects are not uniform, Next Twelve Months (NTM) multiples, or forward multiples, may provide

a more reliable picture (Corporate Finance Institute, 2022). However, it is possible to vary the time horizon for calculating multiples based on the specific circumstances of the firm and the context of the valuation.

4. Applying Multiples to the Target Company. Multiples used for peers is aggregated into a standardized figure using the mean or the median. By multiplying the relevant financial metric of the target company by the corresponding multiple, the value of the target company can be estimated.

5. Assessing the range of values. After the application of the multiples selected, considering the minimum and maximum value obtained permits to determine the potential range of the target company's valuation. It permits to assess the potential value of the company compared to how much the peers are valued.

Multiples offer a simple and efficient method for valuing a company, providing a way to validate the value obtained through intrinsic valuation methods. However, multiples can be influenced by market sentiments and may result in values that are either too high or too low. In addition, they change over time, both for individual firms and the entire market, leading again to a distorted picture of the situation. Firms' fundamentals, market interest rates, or changes in the market perception led to changes in multiples (Damodaran, A., 2009). A stock that might look underpriced today can become overpriced in few months just for these characteristics of multiples. Moreover, McKinsey & Co. (2023) highlighted how they can be wildly misleading especially when industries are facing a significant one-off shock, like COVID-19. The result is that intrinsic valuation methods are inherently more stable than relative valuation approaches. As a result, it would be better to combine the two approaches, on a way that analysts can gain a more robust understanding of a company's value.

2.2 – VALUING A DISRUPTOR

Valuing disruptor firms requires careful consideration of their specific dynamics, characteristics, and challenges they face, requiring a modified version of the traditional valuation models.

The major issues are related to short and volatile operating histories, uncertainty about future growth, and changing risk profiles. These characteristics, commonly shared by all disruptor firms, have implications for both intrinsic and relative valuations. Fortunately, both methods are flexible and can be easily modified to reflect the framework of the firm under analysis (Damodaran, A., 2019).

The focus here is on intrinsic and relative valuations of disruptive innovator companies that have profoundly shaped the market landscape in the last decade, such as Netflix (2018), Uber (2014, 2019), Airbnb (2020), Spotify (2018), Facebook (now known as Meta) (2022), and Tesla (2013, 2018, 2019,

2023). Regarding books and research, the focus is on both studies on disruptor innovators and high-growth companies.

High-growth firms are those that have demonstrated above-average growth rates and possess the potential to outperform their competitors. Moreover, they are characterized by a higher level of uncertainty and risk. These features are shared also by disruptor innovator companies.

2.2.1 - Intrinsic Valuation

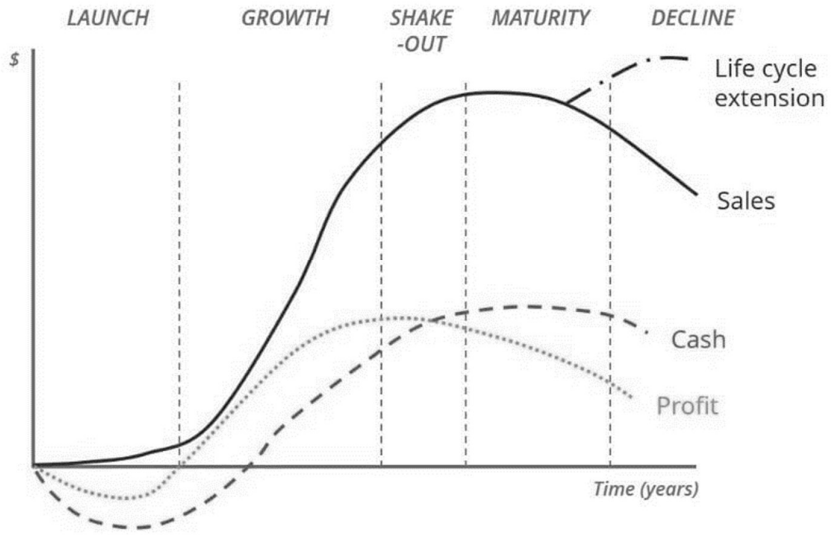
As disruptive companies continue to reshape industries and push boundaries, the need for a tailored intrinsic valuation method becomes increasingly evident. A rigid model would not capture the changes that occur over time in the years in which the firm transits from a growth phase to a mature one. Therefore, there is a necessity to adjust the DCF Model and make it more flexible to accommodate the specific dynamics and characteristics of the target company.

My studies concentrated initially on the business life cycle, moving to the four components of the DCF Model previously analyzed: cash flows, growth, discount rate, and terminal value. By adjusting them, taking into consideration each life cycle, I ended up with an adjusted cash flow model for valuing a disruptor. In addition, I found out the necessity and importance of some further improvements, such as to run a weighted scenarios analysis, a valuation based on the specific characteristics of the firm's business model, to account for the probability of failure, and to consider the value of entering in new markets.

2.2.1.1 – Life Cycle

The life cycle of a disruptor innovator refers to the journey that the company goes through. Valuing that kind of company involves a deep understanding of the stage in which the disruptor is. Its life cycle, typically, consists in five phases: launch, growth, shake-out, maturity, and decline (Figure 2.3).

Figure 2.3 – Business Life Cycle



Source: Corporate Finance Institute (2020).

To explain these concepts, two disruptor innovator companies that have experienced those stages almost during the same period will be considered: Amazon and Netflix. By studying their story, and by analyzing their financial statements, I identified some key points.

Amazon has been founded in July 1994 by Jeff Bezos in Washington, and its growth stage can be estimated to have started in the early 2000s and continued well till the 2010s. Amazon experienced significant growth during that time, becoming one of the largest e-commerce companies globally. The shakeout stage for Amazon can be considered to have occurred in the early to mid-2010s, when it faced increasing competition from other e-commerce platforms, like Alibaba and eBay. Even that, Amazon continued to innovate and expanded its services, which is the main reason why Amazon did not enter the mature stage yet. It represents perfectly the case explained in chapter 1 with the S-curve. As a service reached a more mature stage, Amazon has been able to innovate itself by developing new services and exploring new businesses.

On the other hand, Netflix started its journey in 1997 as a DVD rental-by-mail service. Its growth stage can be considered to have begun in the mid-2000s when it introduced online streaming, even if during the 2010s Netflix experienced explosive growth by expanding its content library and international presence. In the late 2010s, streaming competitors, such as Amazon and Disney, entered the market starting the shake-out phase. Like Amazon, Netflix is still in its growth phase, as it has been able to innovate itself by changing its business model recently, and by constantly launching successful contents on its platform.

More specifically, the five stages of a disruptor innovator are characterized by some features.

1. Launch. The launch, or birth phase begins with the inception of the disruptive idea. Innovators identify an opportunity or problem in the market and come up with a unique solution or product that can create a significant impact. Once the idea is solidified, the disruptor innovator establishes the business entity to bring the concept to life. After the development of a proof of concept, which is a realization of the idea to demonstrate its feasibility, the disruptor innovator enters the market by targeting early adopters who are willing to try new and innovative products or services.

At this stage, revenue generation might be limited as the company is just entering the market and establishing its customer base by targeting early adopters. Contrarily, it may incur higher expenses relative to revenue, as it invests heavily in research, development, marketing, and other activities to launch and promote its disruptive offering. Profitability is often not the primary focus at this stage, as the disruptor innovator prioritizes market validation. Consequently, the company may experience net losses.

Below is a comparison table outlining the growth paths followed by Amazon and Netflix, focusing on selected components of their income statements.

COMPANY	RATIO	1999	2000	2001	2002
NETFLIX	Revenues	5 mln	36 mln	76 mln	153 mln
	Operating Costs on Revenues	700%	258%	150%	107%
	Gross Margin	-40%	3%	17%	36%
	Net Margin	-600%	-158%	-51%	-14%
AMAZON	Revenues	1.640 mln	2.762 mln	3.122 mln	3.933 mln
	Operating Costs on Revenues	137%	131%	113%	98%
	Gross Margin	18%	24%	26%	25%
	Net Margin	-44%	-51%	-18%	-4%

After the launch, limited revenues, substantial operating costs, and negative net margins for both companies confirm the challenges faced during this phase. Consequently, obtaining debt financing can be challenging as the business risk is significant in the early stages and the performance history is limited. These companies may seek funding from angel investors to support initial startup costs.

Lastly, cash flows are typically negative during the launch phase. Initial capital investment for product development, marketing, and operations may not be immediately accounted for in net profit, resulting in even lower cash flows. Both Amazon and Netflix experienced negative free cash flows during this period.

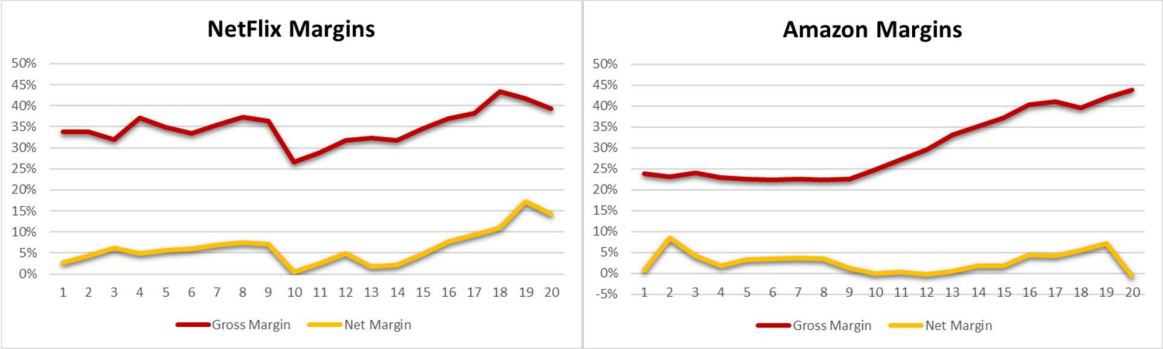
COMPANY	VOICE	1999	2000	2001	2002
NETFLIX	Free Cash Flow	-29.7 mln	-52.8 mln	-7.2 mln	13.3 mln
AMAZON	Free Cash Flow	-378 mln	-265 mln	-170 mln	135 mln

2. Growth. During the growth stage, the disruptor innovator moves beyond the early adopters and starts to gain traction with a broader segment of the market. As more customers adopt the disruptor innovator, its market share expands rapidly. Indeed, this phase is characterized by a significant growth in revenues, where the disruptor may experience a period of hyper-growth.

To keep up with the rising demand, companies focus on scaling their operations by expanding production capacity, optimizing supply chains, and improving distribution channels. Still operating costs do not stop to increase, while margins may benefit some improvements as the firm achieves economies of scale and proportional cost reductions. Hence, the business risk starts to decrease along the way to the mature phase.

As a result, both Amazon and Netflix experienced positive margins since the end of their birth stage (Figure 2.4). While revenues growth attested, in average, around 29% yearly for both, operating costs constantly decreased.

Figure 2.4 – Stage of the Business Life Cycle



Source: Personal Elaboration (2023).

Cash flow becomes a vital consideration during the growth phase. Positive operating cash flows are essential to ensure that the company can finance its day-to-day operations without relying heavily on external funding sources.

On the other hand, the company needs to constantly invest a significant amount of money in capital expenditures to sustain its rapid expansion and growth initiatives. As a result, cash flows from investing activities are typically negative.

In contrast to the birth phase, where obtaining debt financing was challenging, the growth phase often sees an increased reliance on debt funding. As the company demonstrates strong growth potential and

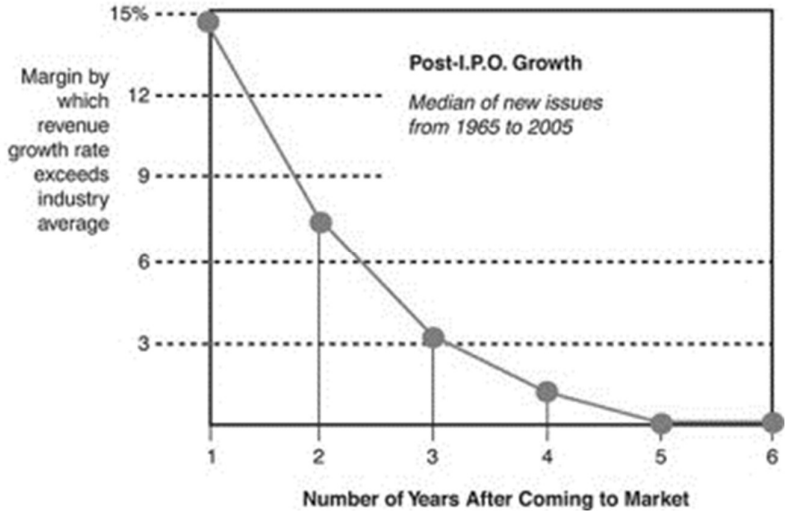
a proven market presence, it becomes more attractive to lenders and investors. Therefore, the cash flows from financing activities are often positive during this stage.

3. Shake-out. The success of a disruptor innovator often attracts competitors and/or imitators. As the market recognizes the potential of the innovation, other companies may attempt to replicate its success by offering similar products or services.

As the industry becomes crowded, weaker players and less successful companies may find it challenging to survive. This can lead to a process of consolidation and a natural "shaking out" of weaker participants in the market. The result is often an industry with few companies but strong enough to dominate the market. If the disruptor survives the shake-out, its growth phase can last until it will not be able to innovate itself again. Indeed, both Amazon and Netflix successfully survived in the late 2010s, when they faced the arrival of new competitors, and they are still in their growth phase.

4. Maturity. As a company grows larger, sustaining high growth rates becomes increasingly challenging, if not nearly impossible. The main reasons are that the innovation has reached its peak level of adoption, and the firm's presence in the market is well-established. The process is known as the scaling effect on growth, and it is explained by four main reasons: market saturation, increasing competition, lower returns, and organizational complexity (Murphy, C. B., 2022). Furthermore, research conducted by Andrew Metrick (2006) examined the revenue growth rate of high-growth firms following their initial public offerings (IPOs) (Figure 2.5)

Figure 2.5 – Revenue Growth in the Years After the Initial Public Offering

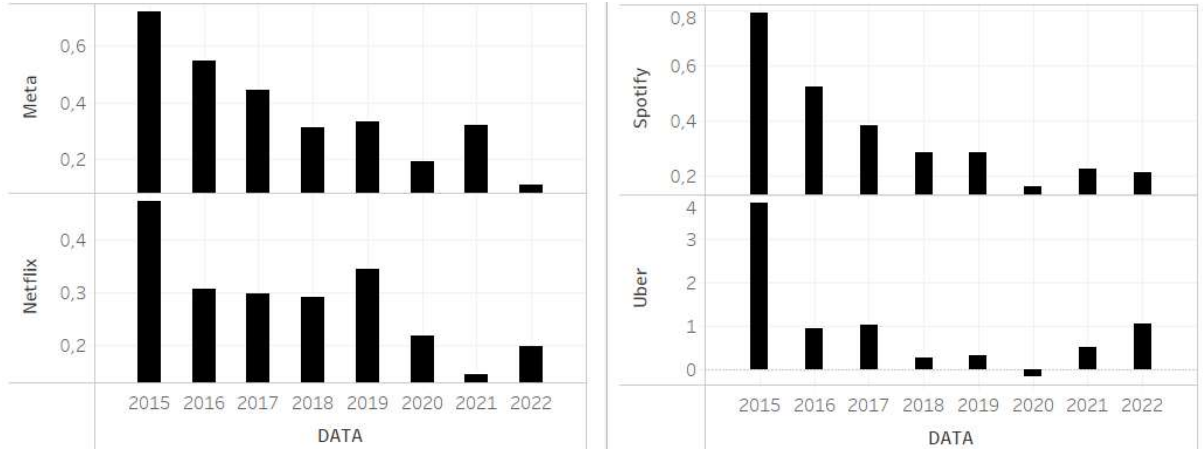


Source: Andrew Metrick (2006).

The research evidenced how quickly the revenue growth at these high-growth firms moves toward the industry average. Indeed, if we consider four disruptor innovators of the last decade, such as Meta,

Netflix, Spotify, and Uber, the scaling effect becomes clear. Even though they are not in a mature phase yet, they represent a good example of what the scaling effect means. The growth path is decreasing as the company transit to a more mature phase, as evidenced in the following graph (Figure 2.6).

Figure 2.6 – Revenue Growth Moving to a More Mature Phase



Source: Personal Elaboration (2023).

In the mature stage, in addition, margins and profitability tend to stabilize, particularly when the company has reached a well-estabilshed market presence.

As companies reach a more stable performance level, they often prioritize the use of debt financing due to its higher availability and lower cost. This shift is a result of reduced risk associated with this stage of the business life cycle.

Moreover, debt financing becomes more attractive than equity financing, which tends to have higher costs. The company's improved financial stability and market position make it more appealing to lenders, allowing them to secure debt at favorable terms.

Finally, while operating cash flows often remains relatively stable and consistent during the mature stage, investing cash flows may decrease as the need for significant capital expenditures diminishes. The company might focus on maintaining and optimizing existing assets rather than aggressive expansion. Moreover, consequently to the missing growth opportunities, the company may start to pay dividends, and, as a result, financing cash flows would start decreasing.

In the mature phase, the company may face two cases: the decline, or the extention of its life cycle.

5. Decline or Extension. The decline stage is the final phase of a company's life cycle, where the company experiences a decline in its market share, and the overall business performance. In that case,

the valuation model for valuing a distressed and declining company of Damodaran should be followed.

In the extension scenario, the company may innovate itself by developing a new product or services, as Amazon did with Amazon Prime or Amazon Web Service.

Clearly, the life cycle represents a fundamental step to be taken into consideration when valuing a disruptor innovator. Each phase presents unique characteristics that are essential for a comprehensive analysis.

2.2.1.1 – Cash Flows

The approach of incorporating the reinvestment rate in the free cash flow calculation requires additional attention when the firm under analysis is a disruptor innovator. The risk is to overvaluate.

Following the method of assuming that net capital expenditure and working capital changes will grow at the same rate as revenues, based on the last fiscal year, would be unrealistic and inconsistent. Instead, Damodaran (2009) identified four paths to follow, depending on the life cycle in which the firm is:

1. Early Phase: young growth company can fall under this category. The reinvestment rate is calculated by considering the change in revenues and the sales-to-capital ratio:

$$Reinvestment_t = \frac{Change\ in\ Revenues_t}{(Sales/Capital)}$$

2. Intermediate Phase: firms with more established track record of earnings and reinvestment. Here, the relationship between fundamentals and growth rates explained under the traditional method approach can be used:

$$Expected\ Growth\ Rate\ in\ EBIT = RONIC * Reinvestment\ Rate$$

3. Advanced Phase: when the firm has already invested in capacity for future years and is able to easily grow in the following periods;
4. Mature Phase: when the firm reaches the mature phase, the reinvestment rate should be:

$$Reinvestment_t = \frac{Growth\ Rate_{Stable}}{RONIC_{Stable}}$$

The final formula for free cash flows remains the one explained in the cash flow paragraph.

2.2.1.4 – Growth

When analysts use historical growth rates as forecasts of future growth, by the assumption that the same growth rate can be sustained as the firm expands and becomes larger, they risk to overvaluing the firm under analysis. Looking at past growth rates can help to understand how growth rates have

changed as the company size changes. Instead, growth rates experienced by more maturefirms in the same sector can give a reasonable sense of how firms became larger in that industry (Damodaran, 2018).

Keeping in mind that companies, typically, experience a scaling effect, a 3-stage or n-stage model for growth should be used. These models recognize that a company's growth trajectory is rarely linear and uniform throughout its lifecycle.

Instead of assuming a constant growth rate over the entire forecast period, it breaks down the growth into different phases depending on the one in which the firm is, each one with its own unique growth rate assumption. The n-stage model can have more than three stages and is flexible in accommodating the specific characteristics of a company's growth pattern. The 3-stage model is a specific case where growth is divided into three stages: an initial high-growth stage, a transitional stage, and a long-term stable growth stage.

2.2.1.4 – Discount Rate

The company life cycle influences also the discount rate calculation, represented by the weighted average cost of capital (WACC).

As previously seen, the business risk tends to decrease along the way to become mature, and different betas should be assumed. At the end of the valuation period, more likely when the company reaches a stable phase, the company's specific risk factors become less dominant as it becomes more similar to other mature companies in the industry. Indeed, the industry beta can serve as a reliable proxy for the company's systematic risk in the last valuation year, while it can be assumed a gradual convergence of the beta in the previous years. The industry beta can be estimated by averaging betas of a sample of competitors, otherwise, many economists update their estimates every single year.

Another implication of the changing risk profile is that it can lead to a potential improvement in creditworthiness and a lower cost of debt. A company that was perceived as high risk, during its growth stage, might gain credibility and stability as it matures, becoming capable to access debt capital at more favorable terms. Therefore, the cost of debt estimation should be different as the firm grows, based on its possible evolving credit ratings, default risk, and borrowing conditions.

Finally, regarding the equity and debt weights, the main issue is represented by the changes that the firm’s structure can have in moving from a growth phase to a mature one. The equity and debt weights used in the calculation of the weighted average cost of capital (WACC) should also be adjusted to reflect the changing capital structure of the company. In line with what previously seen, the analysts

should estimate a gradual shift toward a more debt-heavy capital structure. As a result, taking on more debt can lead to a lower overall cost of capital and WACC.

2.2.1.4 – Terminal Value

Estimating the terminal value involves making assumptions about when the firm will move from a high-growth phase, characterized by uncertain conditions, to a stable growth one, with moderate-growth rates and more predictable cash flows.

Being characterized by a period of high growth potential, the terminal value of a disruptor innovator generally represents a significant proportion of the overall value, particularly when using a valuation model that looks ahead for a 3-year or 5-year prospective period.

Achieving stable results, where the company generates consistent and sustainable profits, typically takes time and can be expected to occur between 10 and 15 years in the future (Koller, T., Goedhart, M., Wessels, D., 2016). This timeline allows the company to establish its market presence, scale its operations, refine its business model, and achieve a level of maturity where it can generate stable and predictable cash flows.

The timeline can vary significantly depending on the industry, the market conditions, the competitive landscape, and the specific strategies and execution of the company under analysis. Some companies may achieve stability earlier than others, while some may take longer or even fail to reach that stage. For example, Damodaran (2008) argued that companies in larger market with less aggressive competition, or that are protected, can maintain for a longer time high growth rates in revenues.

Indeed, for a disruptor innovator company the valuation should be run keeping in mind in which life cycle's stage the firm is. Specifically, if the disruptor is in its launch phase, the analysis should be at least of 10 years, if not 15. Instead, if it is in the growth phase, it should be looking in 10 years in the future. Finally, if it is in the mature stage, 5 years forward are enough.

As we venture into an analysis that spans 10 or 15 years into the future, the valuation becomes inherently less precise. Koller (2020) identified three common errors that analysts might make when estimating the continuing value.

1. *Erroneously extrapolating base-year cash flow.* Since a common mistake is to assume that the investment rate is constant, the value driver model, which, implicitly computes the required investment based on expectations of growth and ROIC, can help to avoid that kind of error.

2. *Naive over conservatism on RONIC.* While a common practice is to assume that the RONIC during the continuing value period will equal the WACC, for some businesses, it would understand their values. Anyway, a projection of a RONIC higher than the WACC requires a careful analysis. As seen previously, growth will drop as the market and the company matures. As a consequence, any assumptions that RONIC exceed WACC should be followed by an economic reasonable growth rate.
3. *Purposeful over conservatism on ROIC.* The uncertainty linked with continuing value, and the considerable size that it can have, are the main reasons under being over conservatism "purposely". Naturally, uncertainty counts significantly in the valuation, but the analyst should not deal with it thought conservatism in growth or ROIC. Rather, building a scenario analysis, better if weighted, would allow to model it.

2.2.1.5 – Further Improvements

This paragraph aims at adding some fundamental tools and improvements to the analysis that can enhance the valuation process and provide a more comprehensive understanding of the potential value of a disruptor innovator.

First of all, develop probability-weighted scenarios is a way to deal with uncertainty associated with disruptor innovator companies. A common approach is to build a model with three different scenarios:

1. Base case: it represents the most likely or expected outcome, as it typically reflects a realistic view of the company's potential performance.
2. Best case: an optimistic view of the disruptor innovator's future performance. It involves assuming favorable conditions and outcomes that could lead to accelerated growth, increased market share, or other positive developments.
3. Worst case: a pessimistic view that considers adverse conditions, challenges, or risks that could significantly impact the company's growth or survival.

Since scenario probabilities are unobservable and highly subjective (Koller, T., Goedhart, M., Wessels, D., 2016), the probabilities assigned to each of them should be based on the analyst's judgment and knowledge regarding the likelihood of each scenario.

Alternatively, the value can be computed under a number of different scenarios built around a specific factor that can range from the state of the economy, the response of the competitors, or some other factors depending on the specific case. In this case, the probabilities assigned can be based on the opinion of an expert regarding the specific case, or on the knowledge of the analyst.

Another approach that can be useful in valuing a disruptor company is to link the entire model to the specific business model of the firm. For example, Damodaran valued Netflix (2018) and Spotify (2018) linking its value with the number of subscribers, and, in the case of Uber (2014), with the value of its users.

Moreover, as described in chapter two, Damodaran (2014) argued that disruptor innovators generally affect value at two levels: disruption in a targeted market and expansion into a new market. While the former can be captured by the discounted cash flow valuation, the latter has the characteristics of an option. When a disruptor succeeds in its initial market, it gains the flexibility to explore and potentially to enter in a new and larger markets in the future. These markets are undefined now but may have the potential to represent a significant part of the overall value. An approach identified by Koller (2020) is the Decision Tree Analysis (DTA). It consists of discounting back the project's contingent payoffs net of the investment required, as follows.

$$Contingent\ NPV = \frac{\%\ Prob.(P_1 - I) + (1 - \%\ Prob.)(P_2 - I)}{(1+r)^n}$$

where:

- % Prob.: probability in percentage for the first case.
- P_1: payoff in the first case.
- P_1: payoff in the second case.
- r: discount rate

The value obtained from the growth option is an add-on to the intrinsic value obtained in the DCF (Damodaran, A., 2014).

Finally, when assessing a company in its initial phases, such as during its launch or growth stage, it is crucial to consider the presence of elevated and substantial risks. These risks should be accounted into the valuation process, assuming a probability of failure and the relative potential outcomes.

In this context, the term 'distressed proceeds' gains relevance. Distressed proceeds represent the capital generated from the sale of assets or securities belonging to the company. Indeed, a fraction of the total cash flows can be reasonably estimated as potential distressed proceeds. In such scenarios, the value of operating assets would be:

$$Value\ of\ Operating\ Assets = PV\ of\ Cash\ Flows * (1 - Prob.of\ Failure) + Proceeds\ if\ the\ firm\ fails * Prob.of\ Failure$$

2.2.2 - Relative Valuation

Unlike traditional valuation methods, a modified relative valuation approach emphasizes factors beyond historical financials, conventional multiples, and classical peers' comparison in the same industry. Specifically, three main possibilities have been identified: forward multiples, sector-based multiples, and a different approach to selecting peers.

2.2.2.1 – Forward Financials

Disruptor companies can initially have small revenues and negative profits, requiring a different approach for relative valuation. Forward multiples use forecast values for revenues and earnings that reflect the expected future performance of the company. The rationale behind it is to capture the future potential of a company rather than solely relying on its current financial situation, as current multiples do.

Damodaran (2009) argues that the multiples attached to revenues or earnings in a future year should be based on the expected characteristics of the company during that period.

For example, in the case of forward enterprise value to sales (EV-to-sales), the calculation involves the estimation of future revenues for the target firm and the level of EV-to-sales of more mature firms in the same industry. The multiplication of those two values, discounted back to today, will be the value of the target firm.

2.2.2.2 – Sector-Based Multiples

Since different sectors have different characteristics, using sector-specific multiples can provide a more accurate benchmark for valuation. They consider the unique characteristics and dynamics of different industries, and, in the case of a relative valuation using peers within the same industry, it would permit a more reliable output.

Damodaran (2012) identified some general characteristics for valuing companies using sector-specific multiples:

- The numerator is usually the enterprise value (EV).
- The denominator is defined in terms of the operating units that generate revenues and profits for the company.

The specific choice of the denominator depends on the industry and the most relevant measure for evaluating the company's performance.

For example, companies like Netflix or Spotify, which rely on a subscription-based business model and derive their revenues from the number of subscribers to the base service provided, can be valued using a multiple based on subscribers, as follows:

$$Value\ per\ subscribers = \frac{Enterprise\ Value}{Number\ of\ subscribers}$$

2.2.2.3 – Peers Selection

In the context of pricing, the selection of comparable companies plays a critical role, and when valuing a disruptive company, it becomes even more crucial. Even though the common practice is to remain within the boundaries of the target firm industry without considering outside companies, a broader selection of comparable companies would enable a more accurate and comprehensive assessment of the disruptive company's value. It would permit a comparison with companies that have:

- Similar Growth Prospects: disruptive companies often operate in rapidly evolving markets with unique growth potential. It is important to select peers that also exhibit high growth rates, allowing for a more relevant comparison.
- Similar Business Models: disruptive companies often have unique business models that differentiate them from traditional industry players. When selecting peers, it is crucial to consider companies with comparable business models or innovative approaches that can provide insights into the disruptive company's value.
- Comparable Market Dynamics: a good peer should have market dynamics that align closely with the disruptive company being valued. This ensures that the valuation reflects the specific dynamics and competitive landscape of the target company.

For example, when Damodaran (2014) priced the ride-sharing platform Uber, he considered it as a young and technology firm. Firstly, he valued Uber in comparison to social media companies, and secondly with other non-public big companies of that time, such as Airbnb, Pinterest, and Snapchat. The output obtained, in both valuations, was ranging between 8.5 and 10 billion dollars. It would have not made sense to compare Uber with other taxi companies, even though they compete in the same industry.

CHAPTER 3

TESLA INC.

A Comprehensive Analysis of Tesla's and Its Disruption Innovation

The Chapter intends to present the history of Tesla, from its birth till the establishment of the company that we know nowadays. The aim is to investigate deeply into its business model to understand how it works, and the sources of its competitive advantage.

3.1 - HISTORY

Tesla Inc. is an American Electric Vehicle (EV) and clean energy company, headquartered in Austin, Texas. Founded in 2003 by Martin Eberhard and Marc Tarpenning, it drew inspiration from the renowned Serbian American inventor Nikola Tesla, a visionary electrical and mechanical engineer known for his groundbreaking contributions to the modern alternating current electricity supply system.

From its funding, Tesla is working on the goal of creating a mass-market of electric cars, as clearly mentioned on its website:

"Our goal when we created Tesla a decade ago was the same as it is today: to accelerate the advent of sustainable transport by bringing compelling mass market electric cars to market as soon as possible."

The first car presented and produced by Tesla has been the Roadster (Ramey, J., 2017). In Santa Monica, California, Tesla officially revealed it inviting 350 persons in Barker Hangar. The production started in 2008 and the next year the volume of roadster's sales reached 147 cars. Although the Roadster is no longer in production since 2012, Tesla announced a new concept of the Roadster in 2022, planning to produce and deliver it to customers in 2023.

After Ford Motor Company in 1956, Tesla was the first US car company to become public. In June 2010, Tesla Inc. issued 13.3 mln shares of common stock at a price of $17.00 per share through an Initial Public Offers (IPO), successfully raising at $226 mln.

In 2012, Tesla launched its pioneering luxury sedan, the "Model S," which played a fundamental role in positioning the company in the automotive industry. It was the first mass-produced electric vehicles with a long range, which could reach over 400 km per charge. The limited range of an EV represented the major reason why people were refusing to buy an electric vehicle, but the Model S addressed the anxiety generated both by that, and by the impossibility to recharge the vehicle along the way. Even though the principal goal of Tesla is to produce vehicles for the mass market, Model S established Tesla as a premium brand focused on innovation and sustainability. It brought also significant improvements in performance, compared to other EV and many gasoline-powered vehicles on the market at the time. Its powertrain permitted an instant torque and acceleration making it one of the fastest cars in the world.

Following the Model S, Tesla introduced the luxury SUV "Model X" in 2015, equipped with Falcon Wing doors and advanced safety features, including autopilot capabilities.

In April 2015, Tesla officially entered the energy storage market with the launch of the Tesla Powerwall for homes and the Tesla Powerpack for businesses. A significant milestone in Tesla's journey was the acquisition of SolarCity in November 2016, enabling the American company to enter also in the photovoltaics market.

To further enhance production efficiency, Tesla opened its first Gigafactory in Nevada, in 2016. These factories are massive facilities principally dedicated to the manufacturing of batteries and other components of Tesla’s EVs. Gigafactories have been functional for in developing significant economies of scale, drastically reducing production costs for Tesla's EVs.

Tesla continued to innovate, unveiling a new type of solar panels designed to resemble traditional roof tiles, known as the "Solar Roof." Additionally, in 2017, the company announced the new model of Roadster and the Tesla Semi. The Roadster was introduced as the fastest car ever made, boasting a top speed of over 400 km per hour, while the Semi emerged as an all-electric, heavy-duty truck designed for freight transportation.

In 2017, Tesla also presented the "Model 3," representing a significant milestone as the company's first mass-market vehicle. With a starting price of around $40,000, the Model 3 became the most affordable Tesla ever produced at that time, expanding the accessibility of electric cars to a broader audience.

The unveiling of the "Cybertruck" in 2019 further solidified Tesla's position as a pioneer in the EV industry. Its futuristic design and impressive performance garnered tremendous attention, resulting in over 1 mln pre-orders.

In 2020, Tesla introduced the "Model Y," a mid-size SUV built on the same platform as the Model 3. Combining the practicality of an SUV with the efficiency and performance of an electric vehicle, the Model Y has become a popular choice for families.

3.2 - OWNERSHIP STRUCTURE

As previously mentioned, Tesla Inc. is a public traded company listed on the NASQAD stock exchange under the symbol TSLA. The US firm is also a component of the major index in the world, such as: S&P500, Nasdaq 100, Nasdaq, and dozens more. The company is owned by 3 different types of investors: insider (14%), institutional (42.84%), and retail (43.16%).

Insider investors are shareholders that have the access to inside information about the company. This came from their relationship with the firm itself, in fact, generally they are director, officer, or principal shareholders. In Tesla there are four main insider investors: Elon Musk, Lawrence J. Ellison, Zachary J. Kirkhorn, and Kimbal Musk.

The largest investor in the company is its famous CEO Elon Musk, who owns, currently, the 12.4% of the firm. Musk arrived the year next to the creation of the company, in 2004. He became since the first stage of the life of Tesla the largest shareholder after an investment of $6.5 mln in the company's Series A funding round. Thanks to the sale of PayPal for 180 mln he could invest in Tesla that sum of money, and the remaining profits from the famous tech company, have been completely invested in SpaceX ($100 mln) and SolarCity ($10 mln). In the next few years, his investment reached $70 mln in Tesla.

Taking over from co-founder Martin Eberhard, in 2008 Elon Musk became the CEO of Tesla. Musk immediately set about transforming Tesla from a niche sports car maker into a company that could produce electric vehicles for the mass market.

Contrarily to what everyone believes, Elon Musk is not one of the initial co-founders. A lawsuit settlement agreed by Eberhard and Tesla in September 2009, allowed the 2 real founders Eberhard and Tarpenning, the first employee Ian Wright, Elon Musk, and the Chief Technical Officer J. B. Straubel to call themselves co-founders.

Then, Lawrence J. Ellison is one of the top insider shareholders of Tesla, owning 1.5% of the company. Ellison is the co-founder, executive chairman, chief technology officer (CTO), and former chief executive officer (CEO) of Oracle Corporation.

Finally, the actual CFO of the company Zachary J. Kirkhorn owns 0.05% and Kimbal Musk, the younger brother of Tesla CEO Elon Musk, owns the remaining 0.05%.

Regarding the institutional investors, The Vanguard Group Inc. is the second-largest shareholder of Tesla and the largest institutional holder of the company's shares, with a 6.55% stake. Vanguard is one of the world's largest asset managers, and it has a large influence over the companies that it owns. The investment in Tesla is not direct, since it is thought an investment fund composed by two of their funds: 500 Index fund, and Vanguard Institutional Index Fund. The main characteristic of these investments is that they are passively managed index funds tracking the performances of the most important index in US: Standard & Poor's 500 (S&P500). This index is composed by the biggest and most important companies in USA, including Tesla.

Natixis Investment Managers International SA, instead, represents the second largest institutional investor in the ownership of Tesla, with a 6.01% of stake. Its philosophy is to invest in firms with consistent growth over years. It prefers to avoid trading strategies, even though these investments can yield high returns in the short term. The reason is because, obviously, high returns are accompanied by high risks, and so a higher possibility to suffer losses with the similar timing.

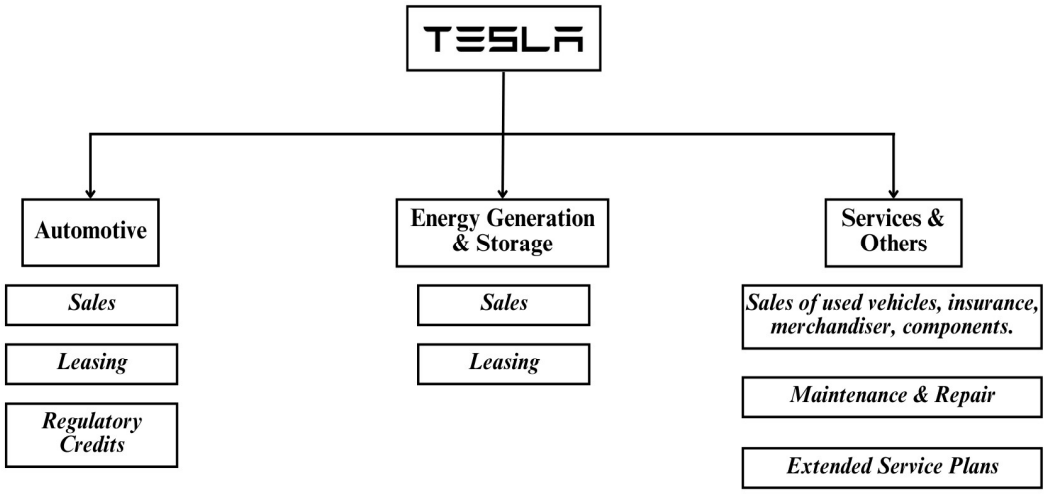
The last major institutional investor is BlackRock Fund Advisors, the largest asset manager in the world, with a stake of 3.61%.

Finally, the percentage of retail investor is represented by the floating capital, better known as free float. This refers to the number of shares available to the public for trading. The percentage of retail investors in Tesla can be considered medium-high, increasing its trading volumes, and making the company more vulnerable to the volatility of the stock price. Another risk is represented by the facility with which an investor can accumulate a significant stake, and so potentially influence its strategic decisions.

3.3 - PRODUCTS

Tesla Inc. is an automotive and energy company structured in three different units (Figure 3.1): automotive, energy generation and storage, services, and others. Each business unit has its own teams and departments to manage and support its operations. Even though the breakdown of Income Statement revenues is in five voices: automotive sales, automotive regulatory credits, automotive leasing, energy generation and storage, services, and others. For explanation purpose, the structure of this chapter has been shown on the following graph (Figure 3.1), reallocating to automotive business unit the revenues from automotive leasing revenues and automotive regulatory credits.

Figure 3.1 – Tesla's Business Units



Source: Personal Elaboration (2023).

3.3.1 - Automotive

The automotive unit focuses on the design, manufacture, and sale of electric vehicles (EV). More specifically, the division is divided into three branches: sales, leasing, and regulatory credits.

The part of sales earns its revenues from the activity of selling the electric vehicles produced and, on the other hand, the leasing part gets its revenues stream from 2 methods: direct leasing, and leasing with a resale value guarantee.

Currently, the company produces 4 main types of cars: Model S, Model X, Model 3, and Model Y. In addition, within the end of 2023, the Cybertruck presented in 2019 will start to be produced for the over one mln people that pre-ordered it. Then, Tesla also announced the production of the Semi and of the Roadster, a fully electric semi-truck and supercar respectively.

The table below analyzes the different models and their main characteristics:

Model	Type	Production Year	Range*	Price**
S	Luxury Sedan	2012	627 to 652 km	80K to 130K
X	Luxury SUV	2015	547 to 580 km	100K to 130K
3	Mid-Size Sedan	2017	423 to 568 km	45K to 69K
Y	Compact SUV	2020	488 to 524 km	54K to 63K
Cybertruck	Pickup	2023	400 to 800 km	40K to 70k
Roadster	Supercar	2024	800 to 1000 km	200 to 250K
Semi	Truck	2022	480 to 800 km	150K to 200K

** "Range" depends on the type: plaid or long range or performance.*

***"Price" depends on the type chosen.*

The table helps to understand the path that Tesla is following. Regarding the most traditional automotive business, the company is pursuing its goal of making its cars available to the mass market with the introduction of new and cheaper vehicles, but without give up performances. From 2012 to 2020 Tesla started the production of four different types of vehicles, each one cheaper than the previous one.

Instead, the new futuristic Cybertruck wants to compete with the existing huge pickups highly demanded in the US. For example, the Ford F-Series has been the best-selling pickup in the US for 46 years, counting over 650 thousand units sold only in 2022. In addition, in the top 5 cars sold in the US, the first four vehicles are pickup with a total of 2 mln units sold. These data give a clear idea of the importance of this type of vehicle for the US market, and, for this reason, Tesla decided to enter in the market with a completely new electric truck.

As previously mentioned, Tesla started its story with the production of the Roadster. Last year, the 2022, the company presented a new version of its first vehicle, the new Roadster, able to do 1000 km with a single charge. Moreover, the acceleration from 0 to 100 is estimated to be just of 1.9 seconds with a top speed of 400 km per hour. Again, what can be the reason for introducing that kind of vehicle? Tesla wants to be present also in the higher part of the market introducing a fully electric supercar capable to beat numerous records and ICE vehicles.

The Semi is a fully electric truck designed to provide a sustainable alternative to the traditional diesel-powered trucks. The advantages would be having lower operating costs, longer range, and better performance. The range is estimated to be around 800 km fully loaded with a single charge, meaning that it would be equal to the range of most of the diesel truck. In addition, Tesla stated that it takes only 30 minutes to recover up to 70%.

Finally, Tesla announced the arrival of a RoboTaxi in 2024 with a full-service driving system. Elon Musk described it as:

"A vehicle without pedals and without a steering wheel, designed from scratch, taking into account the specific requirements of the service it will offer."

The plan is to create the taxi with the lowest operative cost in the world, making it more convenient than the traditional means of transport. Anyway, Tesla did not give any specific information about that yet.

Also considering these latest products, it is crystal clear how Tesla is planning to reach its objective of accelerating the advent of sustainable transport. Tesla is trying to cover all the major forms of terrestrial transport, as the table below highlights.

Luxury/SUV	Mid-Size	Truck	Commercial	Public
Model S	Model 3	Cybertruck	Semi	RoboTaxi
Model X	Model Y			

In addition, these vehicles can be also purchased through a leasing agreement, introduced by Tesla in 2016. It allows customers to lease a vehicle for a fixed period in exchange for a monthly payment. In 2020 Tesla reported that 8% of the total production has been sold thought this type of agreement, which is common in the US. In the same year, the percentage of cars sold in the US market though a leasing contract has been of 25%. Indeed, the leasing revenues of Tesla are growing each year, permitting more and more people to access its vehicles, and so decreasing the environmental impact of traditional gasoline-powered cars.

Finally, the last source of automotive revenues counted hundreds of millions of dollars every quarter. This fount is created literally out of this air. Automotive Regulatory Credits are credits given by the federal governments for contributing zero pollution to the environment.

Car manufacture companies are required to meet some minimum emission standards issued by certain federal states in the US, such as California and others. The risk is to lose the license for selling their cars in these states. There are three main ways to meet these standards for automotive companies:

1. Improve the vehicles offered to meet all the requirements.
2. Switch to manufacturing emission-free electric vehicles.
3. Purchase regulatory credits from other auto manufacturers that have accumulated excess credits.

Since Tesla over the years is earning more credits than the minimum amount required, the company is selling them to other auto manufactures, allowing them to comply with all emission standards requirements issued by the federal governments.

3.3.2 - Energy Generation and Storage

The Energy Generation and Storage division is the business unit focused on the development, manufacture, selling, and installation of solar panels, solar roofs, and battery storage systems that allow homeowners, businesses, and utilities to generate, store, and use renewable energy. This division has been created after the acquisition of SolarCity in November 2016 and is divided into two different branches: sales and leasing.

Tesla Energy’s major source of revenue comes from the sale of its product to residential, small and large commercial, and utility grade customers. On the other hand, the second source is represented by leasing both solar energy system and energy storage product. Tesla customers have also the option

to purchase only electricity from the energy division of the company. The agreement between both parties is known as a Power Purchase Agreement (PPA), and revenues are recognized under "operating leases". The amount is based on the volume of electricity delivered at pre-agreed rates specified in the PPA.

Regarding the products offered by Tesla Energy, the following table summarizes and classifies them depending on their final purpose: home, commercial, or utilities.

Product	Home?	Commercial?	Utilities?
Solar Panels	X	X	
Solar Roofs	X		
Powerwall	X		
Powerpack		X	X
Megapack		X	X

Starting from the solar panels, Tesla designed this durable, low-profile, and minimal aesthetic solar panels for residential and commercial use. They can be installed only on an existing roof. The goal is to create and use solar energy and reduce the dependence on the grid.

In addition, Tesla offers Sola Roofs, an innovative product that combine solar panels and roofing tiles into one. The Solar Roof is designed to look like a traditional roof while it is also able of generating electricity from the sun. This type of product is available only for houses and it can pay for itself over time through energy savings and potentially even earn money by selling excess energy back to the grid.

The Tesla Powerwall is a rechargeable battery system designed to store excess energy generated by solar panels for use in another moment or if the grid is down. This system is scalable, meaning that house owners can install multiple units to increase the storage capacity. The Powerwall allows to maximize energy savings and to reduce the dependence on the grid.

Finally, Powerpack and Megapack are two similar products available for companies and utilities that principally differ in capacity. They have large-scale energy storage system capacities up to 3 and 4.5 MWh respectively. Both can be integrated with solar energy systems, allowing excess energy generated by solar panels to be stored and used later.

Regarding all these products, Tesla offers also the service of installation and maintenance. The installation process involves a site survey, where the installer evaluates the site and determine the best location for the specific product and associated equipment. After this phase, Tesla provides periodic maintenance and support to ensure an optimal performance over time of the product installed.

Tesla Energy also offers an online portal called “Tesla App”, which allows customers to monitor their energy usage and production, view real-time energy generation, and receive alerts for maintenance or system issues.

The plan to achieve its goals is crystal clear also among this division. Tesla is manufacturing and developing constantly new ways to generate and store clean energy across every sector, from the residential to commercial, and even the utilities one. Moving from coal and oil to a form of renewable energy is fundamental to transform our economy in one that is more sustainable and that protect our environment.

3.3.3 - Services and Others

The last category under the revenues voice in the Income Statement, and the last division of Tesla, is “Services and Others”. This business unit gets its revenue streams from these main activities: sale of used vehicles, insurance, merchandises and components, repair and maintenance, and superchargers.

Tesla offers a “Used Vehicle Program” in which its customers can purchase a used Tesla vehicle directly. These vehicles undergo a rigorous inspection and refurbishment process to ensure they meet Tesla's high standards for quality and performance. Customer can also sell their used Tesla vehicle through the program. The company will provide a trade-in value for the vehicle based on its condition and market demand, and the customer can then use this value towards the purchase of a new or used Tesla’s vehicle.

In addition, the company sells a variety of merchandise related to their brand, such as apparels, accessories, scale model of its vehicles.

Finally, regarding the first category, Tesla sells components and spare parts for their vehicles to authorized repair and service centers, as well as individual customers through their online Tesla Parts Catalog. Tesla also offers a range of accessories and upgrades for its vehicles.

Tesla also provides repair and maintenance services through their network of service centers, staffed by trained technicians to ensure the highest level of quality and performance of the vehicles.

For solving the problem of EV’s limited range, Tesla developed a huge network of rapid charging machines. Tesla’s Superchargers are electric vehicle chargers, specifically designed for being able to recharge an EV battery in under an hour (Pritchard, T., 2022). In each location there are multiple charging points, allowing multiple EVs to be plugged in together. Totally, Tesla installed more than 45 thousand superchargers worldwide.

The last component is the new business in which Tesla entered, insurance. Tesla started to offer an insurance program based on a real-time driving behavior. As mentioned by the company:

"Unlike any other telematics or usage-based insurance products, Tesla Insurance does not require an additional device to be in your vehicle. Tesla uses specific features within the vehicles to evaluate the premium for your vehicle."

Using real-time behavior of the specific Tesla owner, the company is able to offer a tailored premium based on what it calls "Safety Score". This ratio is the result of the safety with which the driver uses its Tesla: the higher the score, the lower will be the premium requested.

The Safety Score is based on 5 main factors: forward collision warnings per 1,000 miles, hard braking, aggressive turning, unsafe following, and forced autopilot disengagement.

It is worth highlighting that Tesla's innovative approach to electric vehicles and sustainable energy has allowed the company to establish a strong position in the market and create a diverse product portfolio.

3.4 - VERTICAL INTEGRATION

A fundamental role of Tesla's success has been played by the corporate strategy of being highly vertically integrated. This involves the development and the control of most of the production process, from the production of raw materials to the distribution network.

Initially, when Tesla started with the production of the Roadster, the company followed the usual auto industry's practice of relying on other companies for key components, and even for vehicle assembly. Instead, in the Model S and X period, Tesla gradually started to do more and more operations by itself. The main reason has been the fact that external suppliers were not able to keep up with its rapid growth and innovation.

Tesla gained a strong and sustainable competitive advantage from this type of business model, and it permitted to significantly reduce the operating costs ensuring, at the same time, a high level of quality. Contrarily, in the past several decades, auto manufacturing companies have largely relied on suppliers. Recent research conducted by Goldman Sachs estimated how much Tesla is vertically integrated, stating a percentage of around 80% on the whole production. Indeed, the CEO of Tesla, Elon Musk, once said:

"Tesla is a chain of startups"

This highlights Tesla's approach of creating as much as possible inside the company and the importance of innovation. In comparison, the same analysts estimated an average of vertical integration of 20% for Tesla's competitors, meaning that their percentage of outsourced products is roughly 80%. In the short term this strategy reduces production costs, but in the long-term the risk is not to being able to adapt and innovate.

One of the major advantages of vertical integration is the greater control over the supply chain and manufacturing process. This, if performed well, may lead to develop important economies of scale and of scope, with the consequence of significantly reducing the production costs. In addition, the company can achieve a lower level of reliance on external parties. Indeed, Tesla has a small number of carefully selected suppliers.

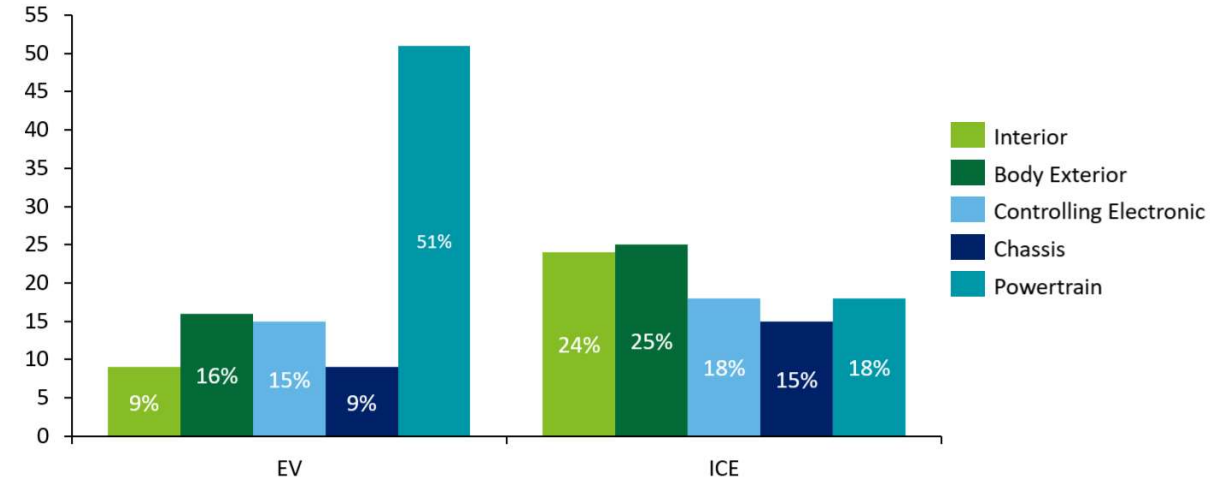
Even though being vertical integrated can have many advantages, there are also some disadvantages to consider. This approach requires large upfront capital investments to be implemented, and it may reduce the flexibility in the long-term.

Anyway, the Tesla's strategy of being highly vertically integrated can be analyzed in three different parts: raw materials, production, and vehicle distribution.

3.4.1 - Raw Materials

Electric vehicles have a totally different cost breakdown than Internal Combustion Engines (ICE), as the following graph highlights (Figure 3.2).

Figure 3.2 – EV and ICE Cost Breakdown



Source: Munro (2020).

The major cost comes from the system that propels the car, i.e., the powertrain. Unlike traditional internal combustion engines (ICEs), EVs use electric motors that draw power from a battery pack.

Standing again to what Munro posted on its blog, the battery pack would undoubtedly be the major cost in the cost breakdown of the powertrain components (Munro, 2020). Riccardo Ferrario, general manager of Idra Group, told Reuters in an interview that battery packs currently make up from 25% to 40% of the total cost (Piovaccari, 2023).

Tesla's batteries rely on critical minerals such as lithium, nickel, cobalt, copper, graphite, manganese, iron, and phosphorus. The most significant part of the costs comes from three of them, more precisely from lithium, nickel, and cobalt.

Tesla implemented an approach of going directly to the source, which is based on two pillars: direct sourcing from mining companies and direct local engagement.

The former allows Tesla to engage directly in local contexts instead of having to rely on multiple intermediaries. In 2021, Tesla procured >95% of lithium hydroxide, >50% of cobalt and >30% of nickel, and in 2022 it has been able to increase the percentage of nickel to more than 45% and of cobalt to 55%. Tesla also reported its commitment to increase further the procurement of these raw materials.

With the latter, direct local engagement, Tesla wants to build direct supplier engagement to continually improve the conditions of the communities affected by Tesla's operations.

Raw materials are a key part of EV's powertrain, being the major cost of its vehicles. By controlling its supplies, Tesla can ensure a consistent and constant supply of high-quality materials for building its batteries.

3.4.2 - Production

The second aspect of Tesla's vertical integration strategy is about production. More specifically, this paragraph wants to analyze the economies of scale built, and how Tesla developed them.

First, the decision to create unique factories in terms of size and manufacturing output played a significant role in Tesla's success. The term "gigafactory" has been used for the first time by Tesla in 2013 to refer to its large-scale battery manufacturing facilities. The first building has been in Nevada, covering 1.9 mln square feet of land and, also counting the various floors, it has 5.3 mln square feet of operational space. Nevada's factory was intended to produce batteries and recycle old batteries into new. Currently, gigafactories are 5 and 2 more has been announced, for the production of the Cybertruck, Semi, Roadster and RoboTaxi. Indeed, they are not only used for batteries, but under the same roof, EV's and energy products components are produced and assembled. As

evidenced in the following table, gigafactories permitted to significantly increase the total EVs production capacity.

Gigafactory	Product Produced	2019	2020	2021	2022	2023
California	Model S / Model X	90.000	100.000	100.000	100.000	100.000
	Model 3 / Model Y	400.000	500.000	500.000	550.000	550.000
Shanghai	Model 3 / Model Y	150.000	450.000	450.000	750.000	750.000
Berlin	Model Y	-	-	-	250.000	350.000
Texas	Model Y	-	-	-	250.000	250.000
Nevada	Semi	-	-	-	-	-
Mexico	Roadster	-	-	-	-	-
	Robotaxi and others	-	-	-	-	-

Source: Tesla's annual and quarterly reports.

A fundamental step was to design scalable factories. For example, the gigafactory of Shanghai started with 150.000 cars per year and reached in 2022 750.000 cars per year. Gigafactories are designed to allow Tesla to increase their production capacity rapidly, as demand of EVs and energy products grows.

Gigafactories employ highly automated technologies to minimize the human error, and, at the same time, optimize the production efficiency. Specifically, Tesla uses advanced robotics and artificial intelligence in the production, significantly reducing production costs. Establishing gigafactories in strategic location played also an important role in cost savings. For example, locating one of them in Shanghai permitted to expand Tesla's global presence in the Chinese market, and to break down importing costs.

Quoting again the general manager of Idra Group (Piovaccari, 2023):

"Battery packs currently make up 25%-40% of the total cost of BEVs. You need to make the rest cost less."

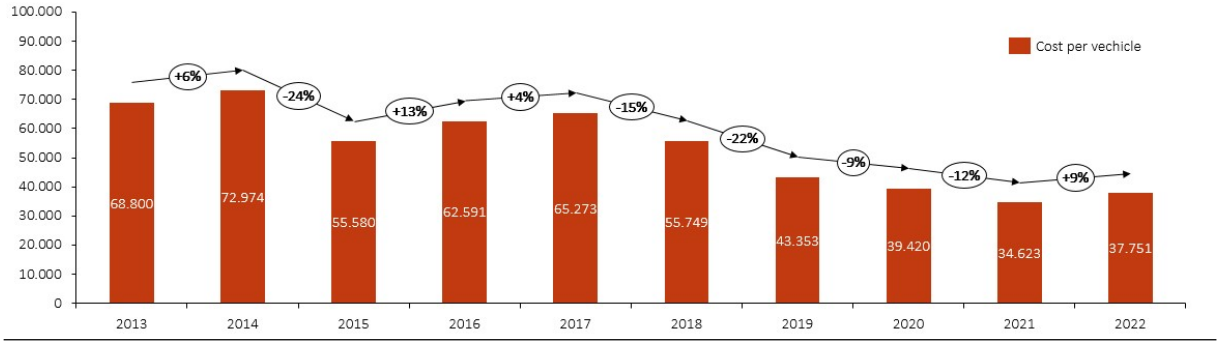
Idra developed a tailored product for Tesla, the Gigapress. It is a high-pressure die casting machine capable of producing large and complex parts in a single piece, rather than having to assemble multiple smaller parts. This technology permits to significantly decrease the operating cost of producing an EV, indeed, Tesla is increasingly focusing on it. Fremont factory has been the first to use it, for producing front and rear underbody castings for Model Y (Evannex, 2022). Currently, the majority of Tesla's gigafactories are using this technology.

Lastly, Tesla's success and rapid growth permitted to reach a significant bargaining power over suppliers. In addition, the level of vertical integration reached, implies few suppliers but carefully

selected. These factors played a key role to negotiate better deals with them, which has helped to reduce costs and increase profit margins.

Indeed, after all these considerations, the production cost per vehicle (cost of goods sold divided by the amount of auto produced) is decreasing over years, even though in 2022 there was an increase due to raw materials crises (Figure 3.3).

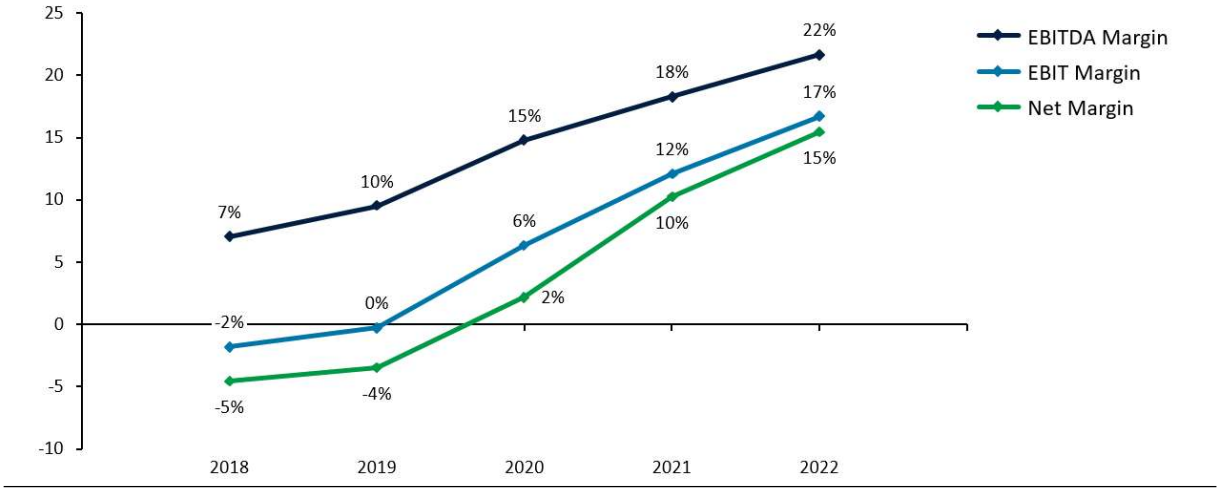
Figure 3.3 – Production cost of Tesla's vehicles



Source: Tesla annual reports (from 2013 to 2022).

In addition, the gross margin, EBIT margin, and net margin are constantly increasing (Figure 3.4).

Figure 3.4 – Tesla's Margins



Source: Tesla annual reports (from 2013 to 2022).

While Tesla is reaching important results in its margins, other competitors obtained completely different performances in 2022, as the following table evidences.

Margin	MIN	MAX	AVERAGE	MEDIAN
Gross Margin	10.9%	38.9%	19.5%	19.4%
EBIT Margin	-0.3%	15.2%	6.3%	5.3%
Net Margin.	-4.1%	12.6%	4.5%	4.7%

The net margin average registered is 10% below than Tesla, and only BMW and Daimler had a value over 10%. Regarding the gross margin, only Tata Motors registered a value higher than Tesla, but it ended up with a negative net profit of 4% due to the significant amount of operating costs.

3.4.3 - Vehicle Distribution

Unlike other car manufacture companies who sell their vehicles through a network of independently dealerships, called car dealers, Tesla adopted a Direct-To-Consumer sales model (Gupta, M., Maurya, N., 2017). The company sells its vehicles through its website, in which customers can place an order and decide the delivery location or through its showrooms. Tesla developed a network of showrooms in many locations where customers can see the products, ask questions, and also test the vehicle before placing an order. Moreover, Tesla provides services and maintenance through a network of service centers directly owned by the company.

Tesla gained a strong and sustainable advantage deciding to use this kind of new and innovative approach, especially in the automotive industry. Rather than having a Business to Business (B2B) model, Tesla through the Direct-To-Consumer sales model developed a Business to Consumer (B2C) model. The major implication is the possibility to collect immediately its revenues, rather than pass through car dealers and having at least 30/60 days between the sale and the payment. This represents a source of funding for the company, since it collects immediately money from customers, but it will pay its suppliers in 30/60 days. Indeed, after a comparison with a large sample of 23 companies in the automotive industry, I found out the implications in four main ratios.

Ratio	Tesla Inc.		Competitor's Average	
	2021	2022	2021	2022
Cash and Equivalents/Total Assets	28.5%	26.9%	18.9%	16.7%
Receivables/Total Assets	3.1%	3.6%	15.6%	16%
Receivables/Revenues	3.6%	3.6%	27.7%	29.5%
Total Debt/Total Assets	11.0%	3.8%	40.2%	36.1%

Collecting immediately revenues brought Tesla to register a low number of receivables, as the percentage of receivables on total assets and, respectively, on total revenues, of 3.6% and 3.1%, highlight. The important amount of cash reached, allowed Tesla to significantly decrease the amount of debt. Indeed, the net debt, obtained by subtracting the cash and equivalents from the total debt, is negative since the 2020. Contrarily, its competitors registered, both in 2021 and 2022, a worse value in each ratio.

Moreover, by avoiding having intermediaries between the company and the final customer, Tesla is able to capture more profit margin.

Lastly, the Direct-To-Consumer sales model allows Tesla to have a complete control over the customer experience, leading to a better understanding of the customer's needs and to a higher level of customer's satisfaction and loyalty (Andersen et al., 2016). Indeed, research conducted by Beepi Inc., on the consumer's perceptions of auto dealer, found that 87% of American consumers dislike the traditional car buying experience thought car dealers. In addition, the research points out that 54% of respondents would love to buy or sell a car without ever leaving their home.

Concluding, Tesla is not only gaining more from its Direct-To-Consumer sales model, but it is also preferred by people. Indeed, many historical auto makers are moving or thinking to move to this sales model.

3.5 - COMPETITIVE ENVIRONMENT

Tesla operates in several industries and has revolutionized the way we think about sustainable transportation and renewable energy. The company also completely changed the way of doing business, bringing into the market a disruptor business model. Nevertheless, for fully understanding Tesla's position compared to other companies, it is important to evaluate the competitive environment in which it operates.

Being the automotive the primarily market in which Tesla operates, with an 85% of the total revenues that come from the sale of electric vehicles and a 13% directly attributable to it, I will concentrate the analysis only on that industry.

I identified a large sample of 24 competitors mainly focused on the automotive market.

N.	Company	Year	Ticker	Region	Country	Revenues	Market Share
1	Volkswagen AG	1937	VOW3	Europe	Germany	293.512	13,3%
2	Toyota Motor	1937	TM	Asia	Japan	279.340	12,6%
3	Stellantis N.V.	2021	STLA	Europe	Netherlands	188.777	8,5%
4	Ford Motor	1903	F	USA	United States	158.057	7,1%
5	Daimler AG	1926	DAI	Europe	Germany	157.689	7,1%
6	General Motors	1908	GM	USA	United States	156.735	7,1%
7	BMW	1916	BMW	Europe	Germany	149.903	6,8%
8	Honda Motor Co.	1948	HMC	Asia	Japan	129.548	5,9%
9	SAIC Motor	1955	600104	Asia	China	110.577	5,0%
10	Hyundai Motor	1967	5380	Asia	South Korea	110.316	5,0%

11	Tesla, Inc.	2003	TSLA	USA	United States	81.462	3,7%
12	Nissan Motor Co.	1933	7201	Asia	Japan	74.996	3,4%
13	Kia Corporation	1944	270	Asia	South Korea	66.997	3,0%
14	BYD Auto	2003	2594	Asia	China	63.021	2,8%
15	Renault S.A.	1899	RNO	Europe	France	48.764	2,2%
16	Tata Motors Limited	1945	TTM	Asia	India	37.385	1,7%
17	Suzuki Motor	1909	7269	Asia	Japan	31.766	1,4%
18	Mazda Motor	1920	7261	Asia	Japan	27.777	1,3%
19	Subaru	1953	7270	Asia	Japan	24.432	1,1%
20	NIO Inc.	2014	NIO	Asia	China	7.322	0,3%
21	Li Auto Inc.	2015	LI	Asia	China	6.730	0,3%
22	XPeng Inc.	2015	XPEV	Asia	China	3.991	0,2%
23	Rivian Automotive	2009	-	USA	United States	1.658	0,1%
24	Lucid Group, Inc.	2007	LCID	USA	United States	608	0,0%

Aggregating their revenues, I found out the composition of the total market, equal to 2.211.365 billion dollars, and their market share.

For understanding better, the industry, I will consider the biggest auto producers by revenues, one for each continent: Volkswagen AG (Europe), Toyota Motor (Asia), and Ford Motor (USA).

Volkswagen AG, based in Germany, is globally the largest automotive manufacturer with a market share of 13.3% in 2022. Its strength lies in its extensive manufacturing capabilities, global distribution network, and established brand reputation, even though the diesel emissions scandal has impacted its image. Volkswagen, already vertically integrated, is investing significantly in the battery manufacturing sites in Europe and in battery producer companies to guarantee security of supply for its EV fleet (Ouerghi, D., 2021). Even tough, currently, Volkswagen takes almost 30 hours for producing its ID3 full-electric hatchback in Zwickau plant, while Tesla takes only 10 hours for its Model Y in its Berlin factory (Rauwald, C. 2021). In terms of the sales model, Volkswagen traditionally follows the classical car dealer business model, relying on a network of dealerships to sell its vehicles. However, in 2020 Volkswagen published on its website an article saying that all of its partners agreed to the new sales model for the ID. family. It is an agency model for private customers and small commercial enterprises where they can order directly from Volkswagen, while their preferred car dealer assumes the role of agent and receives a commission for this service. Even though Volkswagen it is far away from the numbers of Tesla regarding its direct sales model, the German firm is starting to experience the effects of this choice. The strategy brought to increase the level of cash and cash equivalents (from 11% in 2019 to 14% in 2022), while receivables are starting to decrease (from 17% in 2019 to 16% in 2022).

Toyota Motor, headquartered in Japan, is the major player in the Asian automotive market with a market share of 12.6% in 2022 and it has revolutionized the industry in the 70s with the concept of "lean manufacturing". It involved the outsourcing of a great percentage of components to specialized suppliers. Tesla followed this same process in the development of its first vehicle: Tesla Roadster. In some cases, there have been automotive firms that were performing only the final assembly process (Parkhani, P., 2019). Currently, while Toyota has been a leader in hybrid vehicles, it has been relatively slower in the electric vehicle segment. Indeed, big players like General Motors and Volkswagen started sooner to invest in the development of full electric cars, while Toyota lagged and continued to invest in its traditional hybrid vehicles. However, recently, it has set a goal to sell 3.5 million of EV per year by 2030, that would represent more than a third of its current sales (Wayland, M., 2022). The strategy is to cover the upper part of the market with its brand Lexus, while Toyota vehicles will cover the broadest parts of the industry (Toyota, 2023). In addition, it sets a goal for its Lexus cars to be 100% electric by 2035. As Volkswagen, Toyota follows the classical car dealer business model and relies on dealerships to sell their vehicles, even though some rumors are predicting a possible change to the agency model.

Ford Motor, based in the United States, has a long history in the automotive industry, starting with the "Tin Lizzie", better known as Model T. It was the first mass-produced car, and it played a significant role in revolutionizing the automotive industry. Moreover, Ford has a strong presence in the American market, with a market share of 7.1% in 2022. It can count on its strong brand loyalty, well-established dealer network, and manufacturing capabilities. In the electric vehicle space, Ford is known for its development of the Mustang Mach-E and the upcoming electric version of the Ford F-150, the F-150 Lightning. The company is actively working on guaranteeing itself a constant commodity supply for producing its batteries, especially regarding lithium and nickel (Ferrari, B., 2023). Ford follows the classical car dealer business model, using a network of dealerships for vehicle sales. Currently, it introduced in its business model the agency model. Its car dealer will cover the role of allowing customers to touch with their hand Ford's cars, and of facilitating purchasing by using Ford's prices. As in the case of Volkswagen, they earn a commission for each car sold. In addition, the e-commerce platform, permits to buy directly from Ford's website.

As seen in these big players, the automotive industry is changing. Electric vehicles, as projected by McKinsey (2021), will shape the future. Each company is moving toward a more sustainable fleet of vehicles and is setting challenging goals for the next decade. In addition, for decades the car-dealership sales model represented the car buying experience, a process characterized by an environment in which customers had to haggle with salespeople and try different car dealer shop

before finding the one with the desired price. Currently, the trend is moving to Tesla's direction, involving the risk of disrupting the whole car dealership industry by being forced to adapt to the changing landscape. In addition to the important players analyzed, others, like General Motors, Daimler, Volvo, and BMW, have introduced or announced the plan of using the direct sales model (Eichenberg, P., 2023). Tesla is innovating the mature automotive industry by introducing the direct-sales model with all the advantages saw previously, and by accelerating the process of moving to a more sustainable means of transport.

In the large sample identified, there are six car makers specialized in the production of electric vehicles: BYD Auto, NIO Inc., Li Auto Inc., XPeng Inc., Rivian Automotive, and Lucid Group, Inc. All of them are still young and suffering losses each year, except of BYD, the major player in the EV market after Tesla.

BYD Company Limited, a Chinese automaker, with a market share of 2.8% in 2022 represents the biggest competitor of Tesla. Indeed, BYD accounted in 2022 revenues for 63 billion dollars. It can count on its large battery facilities that allow it to cover the second place in the podium for battery production, after the big Chinese firm CATL (Contemporary Amperex Technology Co., Limited) (Ciriaco, R., 2022). Specifically, BYD developed 7 EV battery factories in China, and it's planning to build a new one in Europe to pursue its goal of expand in the European market (Cox, N., 2021). In addition, BYD is highly vertical integrated, indeed, Tesla and BYD are the only big firms in the automotive market with a significant percentage of PPE. They account for the 40% of total assets, while other car manufacture companies are around the 25%. Unlike the tendency of moving to the direct sales model, BYD has decided against adopting an agency sales model. It signed an agreement with a range of car dealer groups to make its cars available in physical shops. Indeed, the value of receivables on total revenues is equal to 18% for BYD, and 4% for Tesla.

3.6 - 5 FORCES ANALYSIS AND SWOT

In order to gain a comprehensive understanding of Tesla's position in the market, it is essential to conduct an analysis of the company's strengths, weaknesses, opportunities, and threats, commonly known as SWOT analysis. Before evaluating the competitive environment in which Tesla operates, a Porter's Five Forces analysis can define the industry's dynamics and the company's competitive advantage. By examining these analytical frameworks, we can gain valuable insights into Tesla's strategic positioning, its ability to navigate challenges, and the opportunities it can leverage to maintain its market leadership in the rapidly evolving electric vehicle industry.

3.6.1 – Porter's Five Forces

Porter's Five Forces is a framework developed by Michael Porter that helps analyze the competitive environment of an industry. It examines five key forces that shape the industry:

1. Threat of New Entrants

   Low vs Medium. The automotive industry requires are large amount of capital to enter, and the development of significant economies of scale to be able to compete with incumbents. In addition, the level of competition is high, with a concentration of some big corporation. The strong brand loyalty built by incumbents in decades of investments can also create many difficulties to new entrants. Auto makers, besides, are deeply dependent on complex supply chains. New entrants may have problems to find reliable suppliers and, especially, to negotiate favorable pricing. This can increase the cost of production and limit again their ability to compete with incumbents. Finally, it is characterized by a high level of regulatory requirements, related to safety and emissions standards. Those factors are particularly present in Europe and US, while in Asia the situation is a bit different. New competitors are constantly entering in the market, creating a potential threat of new entrants.

2. Bargaining Power of Suppliers

   Strong. Tesla developed a high level of power with suppliers, thanks to its highly integrated business model. Producing by itself the key components for its electric vehicles, Tesla reduced significantly its dependence on external suppliers.

3. Bargaining Power of Buyers

   Moderate. It does not cost anything for buyers to switch to another brand, and, in addition, they are price sensitive. Buyers often weights their decisions on the vehicle's cost.

4. Threat of Substitutes

   Low. While there are various alternatives to cars, such as public transportation, biking, or walking, they often lack the same level of convenience and practicality. While these alternatives almost always cost less, they may not provide the same level of flexibility, comfort, and accessibility as owning a car.

5. Intensity of Competitive Rivalry

   Strong. The automotive industry has many players, some of them huge in terms of vehicles produced and sales. Moreover, they are moving to the production of electric vehicles, directly competing with Tesla. Even though Tesla developed an important competitive advantage for its innovative business model, the risks coming from other players remains significantly high.

3.6.2 – SWOT Analysis

The SWOT analysis is a valuable framework used to evaluate the internal strengths and weaknesses of a company, as well as the external opportunities and threats it faces.

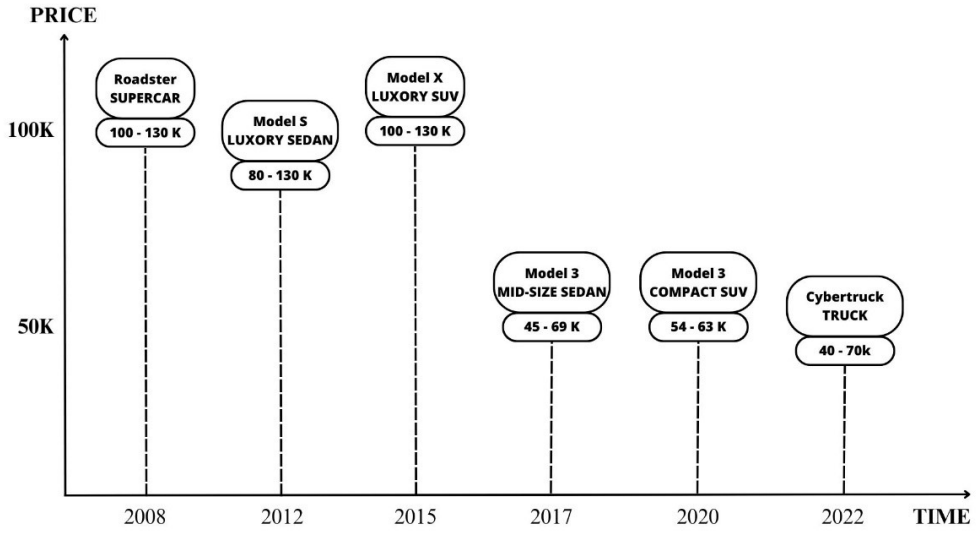
1. Strengths
    a. Strong market position.
    b. Brand recognition.
    c. Economies of scale.
    d. Direct Sales Model.
    e. Vertical Integration.
2. Weaknesses
    a. Dependence on its CEO Elon Musk.
    b. Limited production capacity.
3. Opportunities
    a. Expansion to Europe and Asia.
    b. Insurance market.
    c. RoboTaxi.
    d. Autonomous driving technology.
4. Threats
    a. Intense Competition.
    b. Supply chain risks.
    c. IT risks connected to all data collected on customers.

3.7 - IS TESLA A DISRUPTIVE INNOVATOR?

As analyzed previously, the automotive industry is a highly competitive and complex market, with significant barriers to entry for new players. Introducing a new disruptive product (new-market disruption) or innovate an existing one (low-end market disruption) that is cheap and more affordable than the existing offers would be nearly impossible.

Indeed, Tesla is not following any of the original path studied by Christensen. Tesla started with the production of a supercar called “Roadster” in 2008, for then introducing in 2012 the Model S, in 2015 the Model X, in 2017 the Model 3, in 2020 the Model Y, and, starting from this year, the Cybertruck. Each one of these vehicles is cheaper than the previous one (Figure 3.5), but still having a high level of technology inside that comes from the knowledge acquired in the development of the previous ones.

Figure 3.5 – Tesla Vehicles History



As Elon Musk stated, its goal has been always to accelerate the advent of sustainable transport by making its electric vehicles available to the mass market, and its crystal clear from the path followed in the last two decades. Indeed, Elon Musk published in Tesla's website its mission:

"If we could have done that with our first product, we would have, but that was simply impossible to achieve for a startup company that had never built a car and that had one technology iteration and no economies of scale. Our first product was going to be expensive no matter what it looked like, so we decided to build a sports car, as that seemed like it had the best chance of being competitive with its gasoline alternatives."

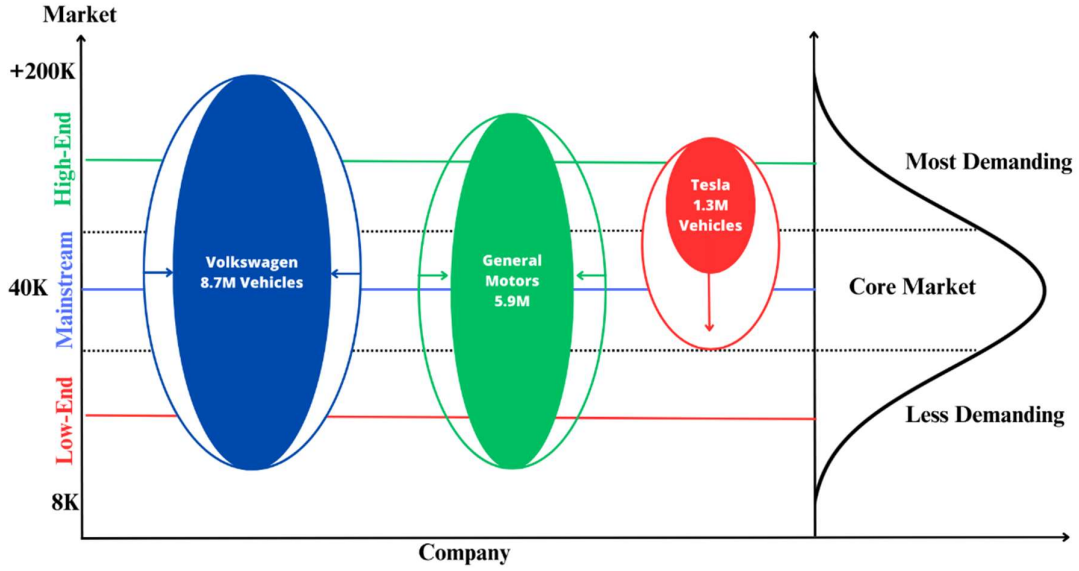
Tesla produced only 22.442 cars in 2013, while in 2022 1.3 million. In addition, standing on the maximum capacity reached this year with the implementation of new giga-factories and of the existing ones, Tesla will be able to produce 1.9 million vehicles in 2023.

If, for example, we consider two of the biggest players in the automotive industry, such as Volkswagen Group and General Motors, the picture becomes even clearer. Both have sales concentrated mainly in North America, Europe, and Asia, which are the same regions where Tesla operates. Volkswagen experienced a drop in its total vehicles sold of 25%, moving from 10.8 mln in 2017 to 8.7 mln in 2022 of cars. Simultaneously, General Motors moved from 9.6 mln to 5.9 mln, with a drop of 62%. On the other hand, Tesla increase its vehicle's volume from 203 k, to 1.3 mln. The growth has been of 1175%.

In addition, considering the range of vehicles sold that, for Volkswagen, goes from €15.000 to millions of euros, if we think to Bugatti or Lamborghini's cars, and from €9.000 to more than

€100.000 for General Motors, a representation of what's going on in the automotive industry can be created (Figure 3.6).

Figure 3.6 – The New Model



The main problem for its competitors, is the economies of scale that Tesla developed regarding the most important components of an electric vehicles: batteries.

The model built shows the three main markets and how the company are positioned in them. The length of the bubble goes from the cheapest vehicles of a company to its highest, the volume is represented by the number of vehicles sold in the last reported year (2022). It becomes crystal clear that Tesla is disrupting the automotive industry starting from the top of the market, with the introduction of highly performance vehicles, for then moving in the low-end part. On the contrary, incumbents are just positioned along the whole market, while their market share is constantly decreasing.

By targeting the high-end market, Tesla established itself as a premium brand associated with superior performance and environmental sustainability. This allowed the company to build a loyal following of early adopters who were willing to pay a premium for its electric vehicles. This strategy permitted also to gain credibility and paved the way for its expansion into the mass market with the introduction of more affordable vehicles: Model Y. Model 3, and Cybertruck.

In addition, the approach used was not only about introducing a new technology, but also about changing the way people think about transportation. Tesla's vision for a sustainable future and its huge investments in battery technology, charging infrastructures, and renewable energy have created a powerful narrative that has captured the imagination of people around the world.

CHAPTER 4

VALUATION AND FINANCIAL ANALYSIS

A Comprehensive Analysis and Valuation of Tesla's and its Disruption

The Chapter intends to analyze the financial statements of Tesla, and value the automotive company through the methods presented previously, such as Discounted Cash Flow model (DCF) and relative valuation model.

4.1 – DISCOUNTED CASH FLOW MODEL

This model follows the structure of capital two. The initial step was to reorganize the balance sheet, income statement, and cash flows statement in order to clearly understand the historical and current situation of Tesla.

Furtherly, a three case scenarios model helped in assessing different assumptions. The projection of a base case scenario started from experts' hypothesis, while the best one involved more optimistic inputs, and the worst more pessimistic.

In particular, the steps followed will be deeply discussed in this chapter. They have been:

1. Life cycle experienced.
2. Revenue projections for each business run by Tesla.
3. Explicit forecast of the financial statements.
4. Weighted Average Cost of Capital calculation.
5. Discounted Cash Flow Model for the three scenarios built.

4.1.1 – Tesla's Life Cycle

The life cycle of a disruptor innovator is a crucial framework for understanding the evolution and being able to value a company like Tesla.

1. Launch. Tesla's "launch" phase started with its founding in 2003, but it reached a significant milestone in 2008 with the introduction of the Tesla Roadster as the first electric sports car. It primarily targeted early adopters in the automotive market. Even though the data available starts from 2008, the income statement shows evident signals of the launch phase.

VOICE	2008	2009	2010	2011	2012
Revenues	15	112	117	205	413
Gross Margin	0,0%	9,8%	27,4%	31,2%	7,3%
EBIT Margin	-520,0%	-45,5%	-125,6%	-122,4%	-95,4%
Net Margin	-546,7%	-48,2%	-132,5%	-123,9%	-95,9%

Limited revenues, until the beginning of the second phase, characterized the launch of the business. Tesla accounted revenues in 2008 for 15 million, with a peak of 413 in 2012, mainly generated by the sale of the roadster and by the related services. Even though the limited sales, the gross margin has never experienced negative values, while, on the other hand, the EBIT margin had. Sales, general and administrative expenses, combined with a consistent amount of research and development, explain the result. Consequently, the net margin registered was negative too.

2. Growth. The "growth" phase for Tesla can be traced back to the expansion of its electric vehicle offerings. The introduction of the Model S in 2012 began to attract a broader market segment, while other vehicles allowed Tesla to experience a rapid and significant revenue growth.

The following table resumes the key components of the income statement.

VOICE	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Revenues	2.014	3.198	4.046	7.000	1.759	1.461	24.578	31.536	53.823	81.462
Gross Margin	22,7%	27,5%	22,8%	22,8%	18,9%	18,8%	16,6%	21,0%	25,3%	25,8%
EBIT Margin	-3,0%	-5,9%	-17,7%	-9,5%	-13,9%	-1,8%	-0,3%	6,3%	12,1%	16,7%
Net Margin	-3,7%	-9,2%	-22,0%	-8,2%	-20,5%	-4,5%	-3,5%	2,2%	10,3%	15,4%

These data, which comprises a period of 10 years, evidences a stabilization of the gross margin around the 22.2% in average. Even though, EBIT margin was still negative until 2020, Tesla is currently improving it each year. The expenses cited earlier now carry significantly less weight. Consequently, the net margin has also experienced a substantial improvement, reaching the 15.4% in 2022.

3. Shake-Out. This phase, characterized by consolidation and the survival of stronger competitors, is not evident. Unlike some industries where a few dominant players emerge after a shake-out phase, the EV market remains highly diversified and competitive. Tesla faces competition from a wide range of automakers, including both traditional manufacturers and newer entrants. This diversity suggests that a clear consolidation of the market has not yet occurred. Indeed, market share among EV manufacturers is still widely dispersed. Additionally, they began the production of their first EVs in different periods, which makes difficult to determine the exact point at which this phase started.

4.1.2 - Revenue Projections

Tesla generates its revenue from several sources. Specifically, it has five streams of revenues with different weights, as the following table highlights.

Revenue	2018	2019	2020	2021	2022
Automotive regulatory credits	0,0%	0,0%	0,0%	2,7%	2,2%
Automotive leasing	4,1%	3,5%	3,3%	3,1%	3,0%
Energy generation and storage	7,2%	6,2%	6,3%	5,2%	4,8%
Automotive sales	82,2%	81,2%	83,0%	82,0%	82,5%
Services and other	6,5%	9,1%	7,3%	7,1%	7,5%

EV revenues cover the 82.5% of the total sales, which bought me to develop a deep estimation model for this revenue stream. I began with the total units sold and the price of each model currently produced by Tesla, including Model S/X and Model 3/Y. Since Tesla does not report a complete subdivision of those products, I used an average price considering that both categories have similar prices. From 2023, the analysis takes into consideration the price cut announced in 2023. The following table highlights these changes.

Model	2022	2023	% Change
Model S	$99.740	$94.990	- 5%
Model X	$104.990	$99.990	- 5%
Model Y	$50.898	$49.900	- 2%
Model 3	$48.440	$47.490	- 2%

The prices used in 2022 are the average of different models. For example, The Model Y is produced in three versions: base, long range, and the performance. The price has been cut in early April and, currently, it is, respectively, $46.990, $49.990 and $53.990. In my projection I used the price for the long range, assuming that its price is the average revenue for each Model Y sold by Tesla.

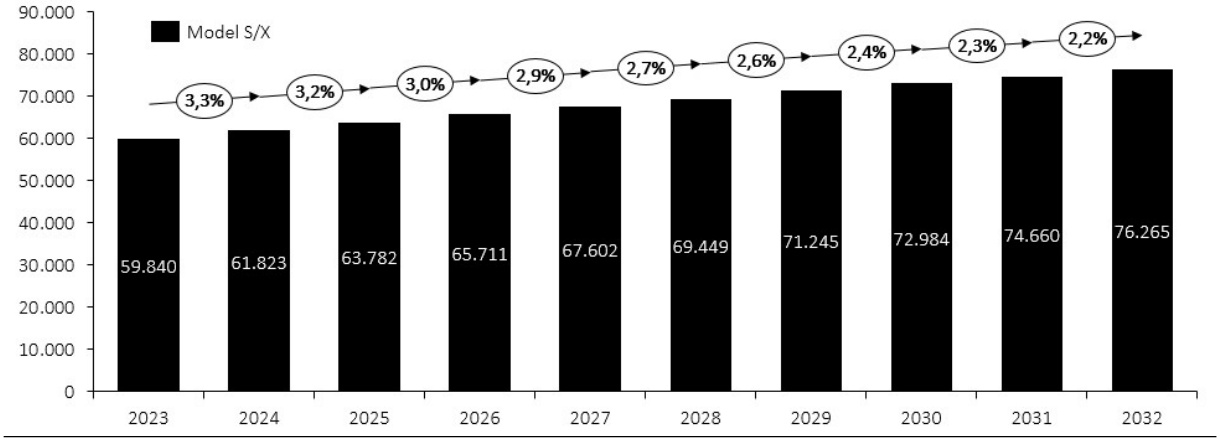
Subsequently, the price was multiplied by the estimated quantity of vehicles sold each year. For 2023 I started from the reports released by Tesla for the first and second quarters (Tesla Inc., 2023). I assumed that Tesla would sell the same amount of EV in the third and fourth quarters. Precisely, Tesla obtained the following results.

Model	Q1 2023	Q2 2023	2023E
Model S/X	10.696	19.225	59.840
Model Y/3	412.180	446.915	1.718.190

Finally, I projected the growth rates for the next 10 years using an n-stage model in which the final growth rate in 2032 is equal to the risk-free rate of that period, which is expected to be 2.15%. Instead,

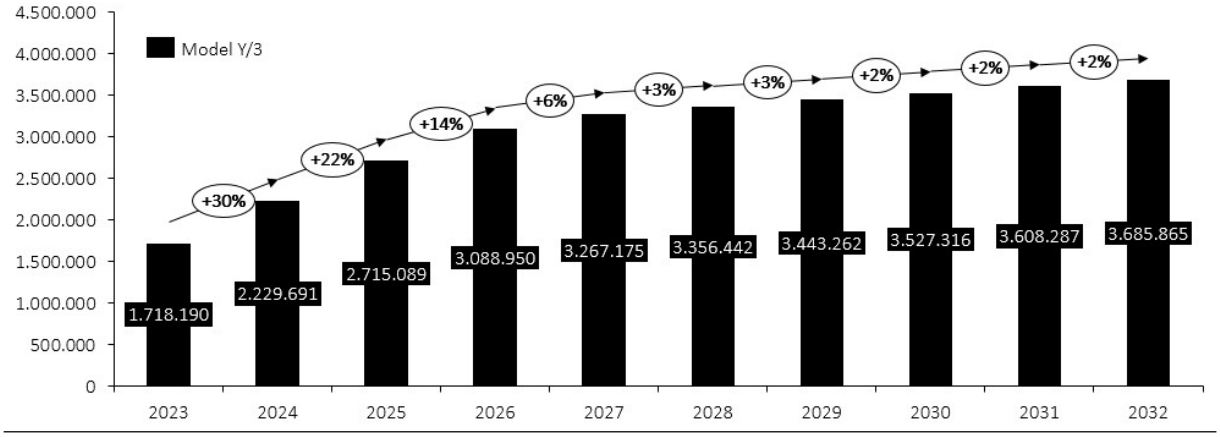
in the best-case scenario it will be 25% higher, and in the worst case 25% lower. Specifically, on one hand Model S/X are expected to grow at the same rate of the risk-free rate starting from 2024 (Figure 4.1).

Figure 4.1 – Expected growth in Tesla's Model S/X



While, on the other hand, model Y/3 are expected to grow at the same rate of the risk-free rate starting from 2028. In the period 2023-2024, I assumed a decrease in the growth rate of an annual 8% as soon as it will reach the risk-free one (Figure. 4.2).

Figure 4.2 – Expected growth in Tesla's Model Y/3



Between 2024 and 2029 the global EV market is expected to experience a CAGR of 33,9%, and, in the US, of 36.7% (C. Barnes & Co., 2023). Using these growth rate for the model S/X and Y/3 would mean to reach unrealistic production numbers. Considering their historical performance, model S/X is reaching its mature stage, while model Y/3 still has the potential to grow until 2028.

The Cybertruck, instead, started to be produced this year, in 2023, and it will be delivered, hopefully, from 2024. The price announced for single, dual, and trimotor is, respectively, of $39,990, $49,990, and $69,990. In my model I considered the price of the dual motor as a proxy. Regarding the amount

of EV produced each year, I used the projection made by Tesla Reservation Tracker (2023) as a capacity production cap, in which Tesla will be able to produce 500.000 Cybertruck per year within 1 year from the initial start, and 1 mln within 3 years. I assumed an initial start of 50.000 in 2024 for the base case in 2023 for the best case, and 2025 for the worst. Following the first year of production, I assumed an amount produced of 375.000, as requested by Elon Musk to its suppliers (Randall, C., 2023). This will be increasing each year of 100.000 EV as soon as it will reach a value of 525.000 for the base case, 675.000 for the best case, and 475.000 for the worst case. Since the Ford F-Series, which is the most sold pick up for 46 following years, reached 650.000 deliveries in 2022, I assumed that only in the best case the Cybertruck will beat the F-Series. In any case, projections consider the 1.5 million Cybertruck pre-ordered by customers.

Tesla Semi, the innovative full electric truck, is expected to reach 50.000 vehicles sold per year in 2024 (Mihalascu, D., 2023). Indeed, in my best-case scenario I assumed that amount in 2024, in the base case starting from 2025, and in the worst in 2026. I furtherly assumed an increase in the production of 50.000 units after 5 years. According to Kothari (2023), the price will be around 250.000 dollars.

The new Tesla Roadster, instead, will have a price of $200.000, while, the related demand, or the maximum capacity of production is still unknown. My estimation started with the identification of the sport cars market. Statista (2023) projected the market in the next few years of Germany, India, United Kingdom, Europe, and United States. For China, instead, there no available estimates. Starting from the total car market of US and China, I estimated the China's sport car market proportionally to the US one. Then, assuming a market share of 3.50% for Tesla, I obtained an initial amount of Roadster sold of 15.795. At the end of the valuation, in 2032, I assumed a market share of 10%, resulting in a total unit sold of 53.342. Additionally, I developed three scenarios, in which the production will start as announced in 2025 in the best case, in 2026 in the base case, and in 2027 in the worst one.

Regarding RoboTaxi, announced by Elon Musk in 2022, they need to be estimated using a growth option. Currently, there are not much information about their release, price, and production. Even though, an important equity analyst of the RBC Capital Markets, Tom Narayan, has taken part in a YouTube podcast (SumZero Channel, 2023) about this topic. He's specialized in the automotive industry, having a deep understanding and knowledge about it. Moreover, his primary responsibility is to conduct equity research on automakers, involving the necessity to be in constant contact with the key industry figures. He pointed out how RoboTaxi can have many issues to be regulated in some areas of the planet. For example, in San Francisco it would be relatively easy, while in cities like

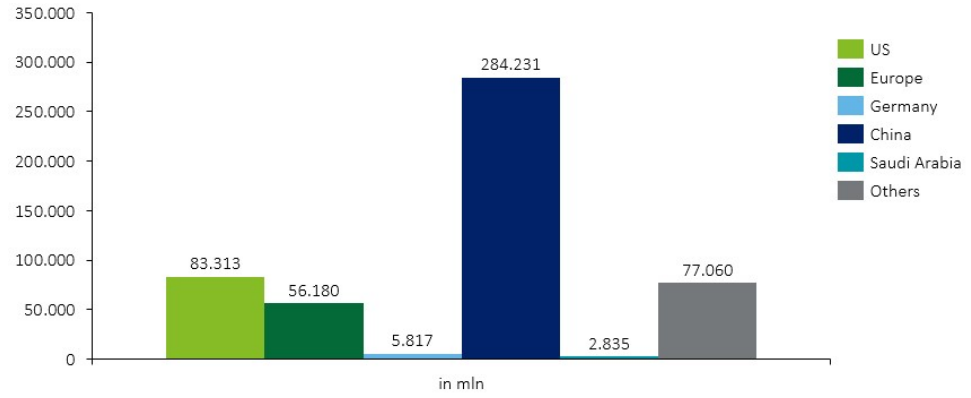
Mumbai, in India, or Ho Chi Min, in Vietnam, would be nearly impossible. Additionally, in his view, and in the view of the maximum experts of the industry, RoboTaxi will be not largely regulated until 2035. Currently, California is the only state which is experimenting this new technology. Cruise and Waymo are the ones which introduced RoboTaxi in San Francisco, Phoenix and Austin.

About the estimation of Tesla's RoboTaxi business, the RBC analyst shared with Financial Times (2023) some of its projections. The percentage of penetration in the US, Europe, and China market will be, respectively, of the 25%, 8%, and 7%. To account the risk and uncertainty related to the entering in this new market, I developed three scenarios, where the base case account for the expectation of the RBC analyst, while in the worst and best the percentages are, respectively, a bit lower and higher, as follows.

Region	Base Case	Best Case	Worst Case
US	25%	27%	23%
Europe	8%	10%	6%
China	7%	9%	5%

Statista (2023) published a report of the worldwide and regional market related to ride-hailing and taxi, which I used to estimate the value of Tesla's RoboTaxi business. In 2037, 15 years from now, the market is expected to be as follows.

Figure 4.3 – Ride-hailing & Taxi Market in 2037



China currently is in the podium, and it is expected to still be the largest taxi market in 2037. US follows, which represent the principal market for Tesla. Indeed, using the estimated penetration percentages, Tesla is expected to generate $45.684 mln in sales in the base case in 2037. Precisely, $20.828 mln in US, $4.960 mln in Europe, and $19.896 mln in China.

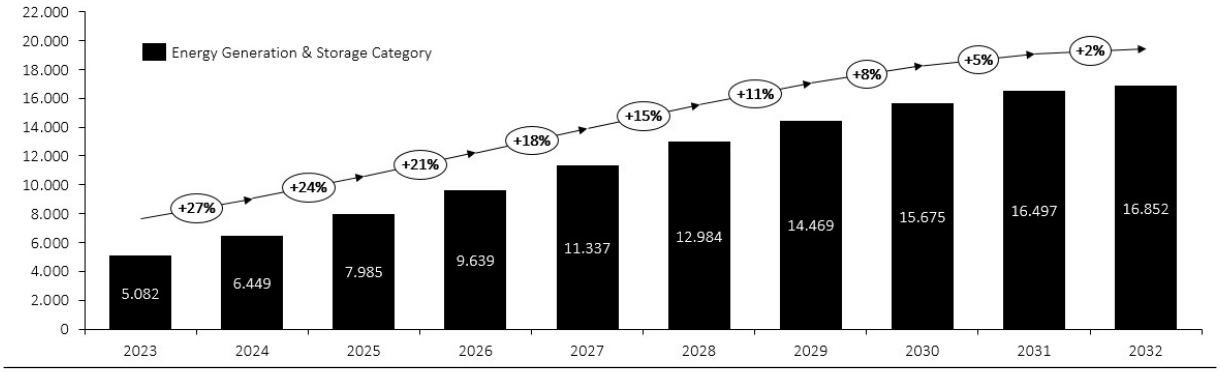
The enterprise value has been estimated from the EV/Sales. Damodaran (2023), published research highlighting the EV/Sales ratio for each industry. The RoboTaxi market can be assumed to be

comprised under the software industry, as projected by the RBC analyst. The related multiple is 7.59x. Regarding the cost of capital, the WACC related to the same industry has been used (Damodaran, A., 2023). The EV obtained in the three scenarios, as follows, will be added to the ones obtained from the valuation of operational assets through the DCF.

Voice	Base Case	Best Case	Worst Case
EV/Sales	7.59x		
Sales 2037	45.684	54.275	37.093
EV	346.744	411.948	281.540
WACC	11.91%		
Years	15		
PV	64.117	76.174	52.060

For the energy generation and storage category, I estimated revenues by averaging historical growth rates. Instead, the final growth rate is assumed to be equal to the risk-free rate expected in 2032 (2.2%).

Figure 4.4 – Estimates for Energy Generation & Storage Category



In the case of other revenue categories, I estimated their values as percentages of total revenues, and I kept them fixed for the all-time period of the valuation. Specifically, 3.0% for automotive regulatory credits, 4.2% for automotive leasing, and 9.1% for services and others.

4.1.3 - Explicit Forecasts

Income statements, balance sheets, and cash flow statements have been estimated based on three different scenarios.

For income statements, revenues are the result of the model described before, while other components have been projected looking on past data, on current information, and analyst's estimations. The best case assumes that Tesla continue to develop its strong competitive advantage, which basically comes from the vertical integration and cost reduction, while worst case involves that Tesla will move in the

direction of its competitors with a decrease of all margins. All the projections take into consideration the recent news of the price reduction, and the 2023 has been estimated starting from the two quarterly reports. The following table highlights the sales growth and the most important margins.

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
BASE CASE										
Sales Growth	51,4%	34,0%	29,9%	42,1%	16,1%	8,1%	3,2%	3,0%	8,2%	2,4%
Gross Margin	25,8%	17,9%	18,9%	19,9%	20,9%	21,9%	22,9%	24,0%	25,0%	26,0%
EBITDA Margin	21,7%	13,8%	15,8%	17,2%	18,5%	19,9%	21,2%	22,6%	23,9%	25,0%
Net Margin	15,4%	7,4%	9,2%	10,5%	11,3%	11,8%	12,3%	12,9%	13,7%	14,1%
BEST CASE										
Sales Growth	51,4%	46,1%	53,4%	22,6%	14,0%	4,1%	2,6%	8,2%	2,5%	2,3%
Gross Margin	25,8%	19,0%	20,1%	21,2%	22,3%	23,4%	24,5%	25,6%	26,7%	27,8%
EBITDA Margin	21,7%	14,9%	17,0%	18,5%	19,9%	21,4%	22,8%	24,2%	25,7%	26,8%
Net Margin	15,4%	8,5%	10,7%	11,5%	12,3%	12,8%	13,3%	14,2%	14,8%	15,3%
WORST CASE										
Sales Growth	51,4%	-10,4%	50,7%	30,6%	39,6%	16,2%	8,1%	3,1%	2,9%	8,0%
Gross Margin	25,8%	17,0%	17,9%	18,8%	19,7%	20,6%	21,5%	22,4%	23,3%	24,2%
EBITDA Margin	21,7%	12,8%	14,7%	16,0%	17,3%	18,5%	19,8%	21,0%	22,3%	23,2%
Net Margin	15,4%	5,2%	7,9%	9,1%	10,4%	11,1%	11,6%	12,0%	12,5%	13,1%

Regarding the balance sheet, it has been reorganized following the operating and financing methods. In the former, account receivables, inventories, and account payables, have been estimated using the ratio “days on sales” and kept constant until the end of the valuation period. Also operating fixed assets and capex have been projected on sales. In the latter, short-term debt is assumed to remain constant, and long-term debt, to remain relatively low in the next three years, due to the high amount of cash generated by Tesla, and then to start increasing as previously studied in the business life cycle. The following table highlights the main ratios.

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
BASE CASE										
NFP/EBITDA	-99%	-85%	-51%	-31%	-34%	-47%	-66%	-88%	-106%	-132%
ROIC	28%	18%	22%	26%	25%	24%	22%	21%	22%	21%
Sales/IC	224%	236%	233%	243%	222%	200%	179%	164%	158%	148%
Capex/Sales	-12%	10%	12%	12%	12%	12%	12%	12%	12%	12%
BEST CASE										
NFP/EBITDA	-99%	-74%	-36%	-34%	-43%	-62%	-84%	-102%	-128%	-155%
ROIC	28%	22%	28%	28%	27%	25%	23%	24%	23%	22%
Sales/IC	224%	249%	263%	242%	219%	193%	174%	165%	153%	144%
Capex/Sales	-12%	10%	12%	12%	12%	12%	12%	12%	12%	12%
WORST CASE										
NFP/EBITDA	-99%	-157%	-74%	-47%	-30%	-34%	-47%	-66%	-87%	-105%
ROIC	28%	10%	17%	20%	24%	24%	23%	21%	20%	20%
Sales/IC	224%	183%	213%	218%	229%	213%	194%	174%	160%	155%
Capex/Sales	-12%	10%	12%	12%	12%	12%	12%	12%	12%	12%

4.1.4 - Weighted Average Cost of Capital

By capturing the average return that the company needs to provide to its investors to satisfy both equity shareholders and debt holders, and by accounting for the associated tax benefits on interest payments, the WACC covers a key role in the DCF valuation.

$$WACC = \frac{E}{EV}k_e + \frac{D}{EV}k_d(1 - t_i)$$

Tesla's capital structure is the result of its innovative business model and its success in the stock market. Currently, on the 21 of October 2023, the shares outstanding are 3.166 mln and its share price 211 dollars. Consequently, the market value of equity is roughly $668.026 mln. On the other hand, the market value of its straight debt is approximately $1.860 mln. Those values lead to a E/EV of 99.7% and D/EV of 0.03% in the first valuation year.

Considering the life cycle followed by disruptor innovators, in which they prefer to prioritize the use of debt financing as they reach a more stable performance level, I assumed that Tesla will progressively increase its level of debt. Indeed, at the end of the valuation period the D/EV ratio is expected to be 5.00%.

The cost of equity (k_e), one of its key components, is estimated using the following formula:

$$k_e = r_f + \beta_i(ER_m - r_f)$$

The risk-free rate has been assumed standing on the level of the 10-year treasury rate of United States (YCharts.com, 2023). At time of the estimation, the six-months average attested around 3.46%. The ratio behind the choice of the 6-month average is to avoid counting the Ukraine war effect. Additionally, in consideration of the current economic situation of interest rates, I assumed that the risk-free rate in 2032 would reach a level equal to the 10-years average, which is 2,15%. The rate will approach that value linearly with a constant decrease each year.

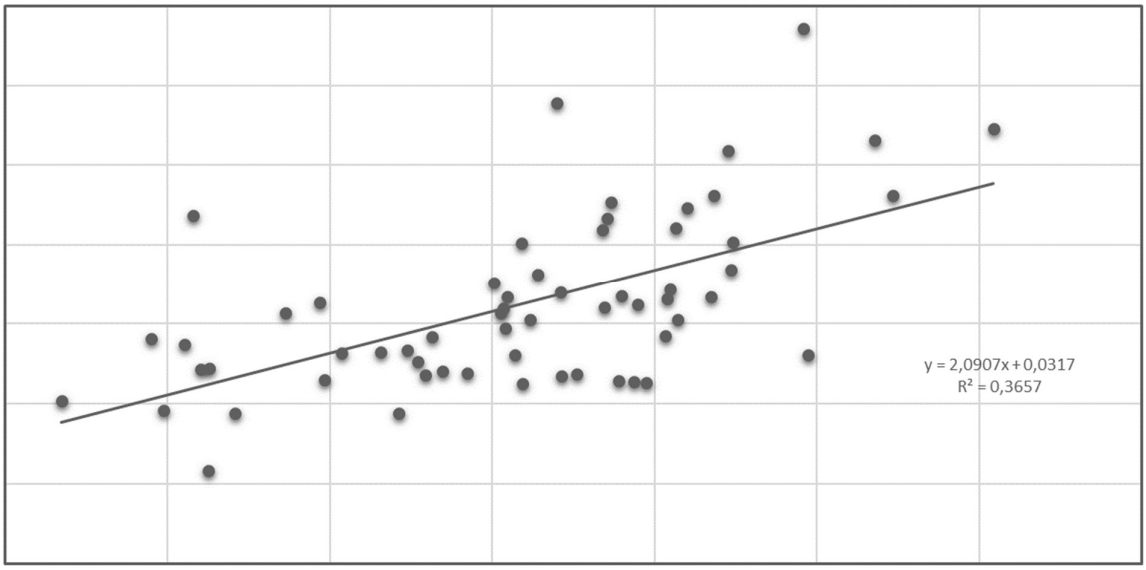
The Equity Risk Premium (ERP) has been based on Tesla's revenues in each region, as follows.

Region	Revenues	Weight	ERP
United States	40.553 mln	49.6%	5.0%
China	18.145 mln	22.2%	6.1%
Belgium	22.764 mln	4.7%	0.9%
France		4.7%	0.8%
Germany		4.7%	0.0%
Italy		4.7%	3.3%
Netherlands		4.7%	0.0%
United Kingdom		4.7%	0.9%

Since Tesla does not report the specific of "others", I assumed that it refers to Europe and I used the major countries in that region as a proxy: Belgium, France, Germany, Italy, Netherlands, and United Kingdom. All data used comes from Damodaran (2023). The weighted ERP resulted from the table above is 5.51%, which is assumed to be constant.

The beta is the result of a statistical regression run on the Nasdaq 100. After a correlation analysis on the historical returns of Tesla over five different indexes, I identified the Nasdaq as the best proxy for beta calculation. Indeed, the p-value resulted is approximately equal to 0.00000030979373, suggesting that the corresponding predictor variable is statistically significant in relation to the dependent variable. The analysis has been on five years considering the monthly data, and the result is the following (Figure 4.1).

Figure 4.5 – Regression Chart



The coefficient (β_i) of the equation obtained from the regression of the return of the index (x) and Tesla (y) is 2.0907. The unlevered beta, being higher than 1, suggests that Tesla's stock reacts more intensely to market changes, amplifying its risk profile.

Considering again the effect of the life cycle, Tesla is expected to reach an unlevered beta close to the one of its industries. Using a sample of 19 automakers, without considering its competitors in the EV industry with a short history, I obtained a beta of 1.33 that is expected to be reached in 2028.

Adding the effect of financial leverage, the coefficient follows the formula presented in chapter 2:

$$\beta_L = \beta_U + \frac{D}{E}(\beta_U - \beta_D)$$

The beta debt uses as a proxy the rating assigned by Moody's and S&P to Tesla's debt, respectively of Baa2 and BBB. Damodaran offers an estimation of beta debt for each level of rating. Tesla, given its rating, has a beta debt of 0.10. Consequently, using the market estimation of equity and debt explained previously, Tesla has an unlevered beta of 2.0948.

Finally, the cost of debt, which is estimated by adding to the risk-free rate the credit spread, is 5.37%. Regarding the deductibility of interest payment, the tax rate used is the one of the industries, equal to 25%.

The final cost of capital is the following:

$$99.7\% * 15.02\% + 0.3\% * 5.02\%(1 - 25\%) = 14.99\%$$

Considering the changes expected along Tesla's life cycle, the WACC at the end of the valuation period, in 2032, is expected to be 9.47%.

4.1.5 - Valuation

The output of the valuation is the result of the present value of FCF and TV. FCF have been computed starting from NOPAT. After the discount of the reinvestment rate, as follows, FCF have been estimated.

$$Reinvestment\ Rate = \frac{Capital\ Expenditure - Depreciation + \Delta\ in\ Working\ Capital}{After - Tax\ Operating\ Income}$$

The present value of FCF has been computed using the WACC. Instead, the terminal value is the result of the following formula.

$$TV = \frac{FCF_{n+1}}{(WACC - g)}$$

The perpetual growth rate (g) used is equal to the risk-free rate in 2032 of 2.15%. In the best case it has been assumed to be 25% higher, while in the worst one 25% lower. The results obtained are highlighted in the following table:

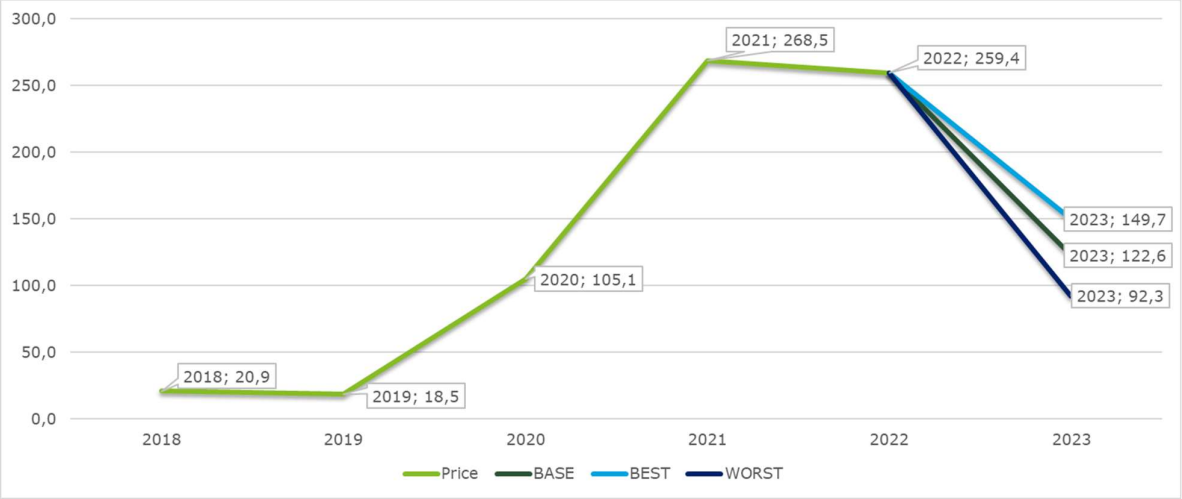
Voice	Base Case	Best Case	Worst Case
PV of FCF	250.353	304.167	164.088
PV of TV	59.685	79.544	42.331

The current probability of failure assigned to Tesla is 0.00%, while the proceeds in case of failure have been estimated to be the 10% of the sum of present values. Additionally, the growth option value related to RoboTaxi, previously explained, goes to increase the firm's value.

Voice	Base Case	Best Case	Worst Case
Value of Operating Assets	310.039	383.711	226.073
Growth Option Value	64.117	76.174	52.060
Enterprise Value	374.156	459.885	292.035

The value of equity has been obtained after the reduction of debt and minorities interests, and the addition of cash and non-operating assets. Instead, the total amount of outstanding shares is 3.164 mln. The estimated value per share, in the three scenarios, is evidenced in the figure 4.2.

Figure 4.6 – Valuation Chart



Considering the actual price of $211, Tesla is overpriced of 172%, 141%, and 229% in the base, best, and worst case, respectively. These concerning about the overvaluation of Tesla have been moved also by important investment banks and economists. For example, JP Morgan published a report (2023) where it was highlighted a price target for Tesla of $120 per share.

As evidenced in the whole analysis, valuing a disruptor innovator involves plenty of considerations and adjustments. It is important to stay flexible and adapt the valuation methods as new information becomes available and the disruptor's business evolves.

4.2 – RELATIVE VALUATION

Tesla's multiple valuation relies on asset side multiples. These includes EV/Sales, EV/EBITDA, EV/EBIT, and Equity/Net Income. In addition, rather than focusing just on current financial performances, the central point of my analysis has been forward multiples. Starting from the projections made by analysts and published in Refinitiv, I calculated the companies' forward multiples for the next two years. This strategy allowed me to capture not just the current situation of the industry, but also its potential and direction.

Tesla's market valuation highlighted an enterprise value of $762.811 mln, and, after considering its past and expected financial results, the current multiples obtained are the followings:

TESLA Inc.		EV/SALES			EV/EBITDA			EV/EBIT			EQUITY/NET INCOME		
Company	Ticker	2022	2023	2024	2022	2023	2024	2022	2023	2024	2022	2023	2024
Tesla Inc.	TSLA.O	9,6x	6,4x	4,1x	44,4x	48,0x	31,5x	57,5x	63,5x	38,8x	63,3x	76,5x	46,6x

The selection of an appropriate sample of competitors started with an initial group of 18 well-established automotive companies previously described in chapter 3, without considering some new

firms emerged in the last few years with poor financial results. Specifically, those companies are BMW AG, BYD Auto Co., Ltd., Daimler AG, Ford Motor Company, General Motors Company, Honda Motor Co., Ltd., Hyundai Motor Company, Kia Corporation, Mazda Motor Corporation, Nissan Motor Co., Ltd., Renault S.A., SAIC Motor Corporation Limited, Stellantis N.V., Subaru Corporation, Suzuki Motor Corporation, Tata Motors Limited, Toyota Motor Corporation, and Volkswagen AG.

The results obtained, resumed by the following statistics, report a substantial difference in terms of multiples compared to Tesla.

AUTOMAKERS	EV/SALES			EV/EBITDA			EV/EBIT			EQUITY/NET INCOME		
Statistic	2022	2023	2024	2022	2023	2024	2022	2023	2024	2022	2023	2024
Mean	0,9x	0,8x	0,7x	7,6x	7,2x	6,2x	16,6x	22,5x	18,6x	8,5x	11,3x	9,1x
Median	0,9x	0,8x	0,7x	6,4x	5,6x	5,1x	15,1x	14,3x	13,0x	6,7x	9,1x	7,0x
Std Dev	0,5x	0,4x	0,3x	4,9x	4,0x	3,8x	11,0x	21,3x	17,2x	20,2x	9,5x	7,0x
High Value	2,1x	1,4x	1,4x	21,9x	17,0x	17,2x	41,6x	77,4x	65,0x	65,3x	42,8x	28,2x
Low Value	0,2x	0,2x	0,1x	1,4x	1,3x	0,9x	2,2x	2,4x	1,4x	-28,4x	3,3x	1,8x

Considering the valuation results derived from this group of peers, the disparities become even more clear.

LARGE SAMPLE	EV/Sales	EV/EBITDA	EV/EBIT	Equity/Net Income	Average	Median
2022	$29	$42	$71	$33	**$44**	**$37**
2023	$38	$35	$62	$36	**$43**	**$37**
2024	$50	$46	$89	$44	**$57**	**$48**

The results of this analysis reveal a notable disparity in share price estimations when considering the financial results, both past and projected, for the years 2022, 2023, and 2024. On average, the share price obtained is, respectively, of $44, $43, and $57. Considering an actual share price of $211, it represents significant differences of approximately 380%, 391%, and 270%.

This divergence can be attributed to several critical factors. Firstly, it is essential to acknowledge that the automotive industry is primarily composed by companies which can be considered mature. Consequently, these established players typically do not have the same exponential growth prospects that define Tesla's unique trajectory. Additionally, Tesla's disruptive innovations and pioneering business model is only now starting to be adopted by other carmakers. This fundamental dissimilarity in growth trajectories and characteristics render direct peer comparisons unreliable. Indeed, the output obtained do not capture the essence of Tesla’s potential, underestimating its distinctive position and growth trajectory.

In response to these challenges, I selected a group of peers that can be considered disruptor innovator: Airbnb Inc., Apple Inc., Meta Platforms, Inc., Netflix, Inc., Spotify Technology S.A., Uber Technologies, Inc., Amazon.com, Inc., and NVIDIA Corporation. The results obtained, from the same group of multiples, are reported in the following table.

DISRUPTORS	EV/SALES			EV/EBITDA			EV/EBIT			EQUITY/NET INCOME		
Statistic	2022	2023	2024	2022	2023	2024	2022	2023	2024	2022	2023	2024
Mean	7,3x	5,5x	4,3x	-128,8x	30,7x	24,0x	23,1x	55,7x	30,5x	-56,2x	182,2x	52,9x
Median	5,8x	5,0x	4,3x	17,2x	17,9x	14,6x	28,0x	26,0x	19,4x	25,8x	31,4x	21,5x
Std Dev	5,9x	3,6x	2,6x	378,5x	33,6x	28,0x	61,0x	70,0x	27,2x	199,3x	387,5x	75,2x
High Value	21,8x	13,5x	10,0x	55,5x	117,7x	97,0x	130,1x	235,5x	97,0x	69,4x	1205,7x	248,3x
Low Value	2,5x	1,8x	1,1x	-1126,3x	8,3x	7,4x	-79,6x	12,9x	11,2x	-571,4x	15,7x	12,1x

Upon closer examination of the valuation multiples, it becomes apparent that Tesla's position aligns more closely with disruptor innovators than with automakers, especially when considering the median values. In the initial year of evaluation, 2022, there are some outliers, as Uber and Spotify, which obtained particularly low results. Notably, Tesla's EV/Sales multiples consistently fall within the range of disruptor innovators, suggesting that investors are willing to pay a similar premium for Tesla's revenue as they are for these innovative companies. In contrast, its other multiples are significantly above the group's mean and median, reflecting the premium investors place on Tesla's earnings, operating profit, and net income.

In consideration to the results obtained, Tesla’s share price resulting from those multiples is the following.

LARGE SAMPLE	EV/Sales	EV/EBITDA	EV/EBIT	Equity/Net Income	Average	Median
2022	$156	$102	$127	$109	**$123**	**$118**
2023	$197	$98	$107	$109	**$128**	**$108**
2024	$266	$121	$130	$122	**$160**	**$126**

The disruptor innovator group's multiples, encompassing EV/Sales, EV/EBITDA, EV/EBIT, and Equity/Net Income, exhibit a closer alignment with Tesla's intrinsic value, as determined by a discounted cash flow (DCF) analysis, which yielded a share price of $123, $150, and $92 in the base, best, and worst case, respectively.

The key reason behind the enhanced reliability of the disruptor innovator group's multiples lies in their shared characteristics with Tesla. These innovators reflect comparable characteristics such as disruptive business models, and unique growth perspectives. Additionally, investor sentiment for disruptors may share similarities between those group of peers, driven by a more similar future potential and expectations. Consequently, the valuation multiples using disruptor innovators of the last decade, better represent Tesla's value.

Appendix

Appendix 4.1- Reorganized Balance Sheet

REORGANIZED BALANCE SHEET					
Operating Method					
$ million	**2018**	**2019**	**2020**	**2021**	**2022**
Total funds invested: uses					
Operating cash*	429	492	631	1.076	1.629
Account receivables	949	1.324	1.886	1.913	2.952
Inventory	3.113	3.552	4.101	5.757	12.839
Account payables and similar liabilities	- 3.404	- 3.771	- 6.051	- 10.025	- 15.255
Trade working capital	**1.087**	**1.597**	**567**	**- 1.279**	**2.165**
Other current assets/(liabilities)	- 3.461	- 4.152	- 4.719	- 6.368	- 7.011
Operating working capital	**- 2.374**	**- 2.555**	**- 4.152**	**- 7.647**	**- 4.846**
Operating fixed assets	19.973	20.538	23.688	31.433	36.850
Other operating non-current assets/(liabilities)	1.392	1.470	1.536	2.138	4.193
Operating fixed capital	**21.365**	**22.008**	**25.224**	**33.571**	**41.043**
Invested capital (excluding goodwill and similar assets)	**18.991**	**19.453**	**21.072**	**25.924**	**36.197**
Goodwill and similar assets net of deferred taxes	68	198	207	200	194
Invested capital	**19.059**	**19.651**	**21.279**	**26.124**	**36.391**
Investments	-	-	-	1.260	184
Surplus assets/(liabilities)	**-**	**-**	**-**	**1.260**	**184**
Total funds invested	19.059	19.651	21.279	27.384	36.575
*Working cash on revenues	2%				

Financing Method					
€ million	**2018**	**2019**	**2020**	**2021**	**2022**
Total funds invested: sources					
Cash and cash equivalents	- 3.257	- 5.776	- 18.753	- 16.631	- 20.556
Short-term debt	2.568	1.785	2.132	1.589	1.502
Long-term debt	9.404	11.634	9.607	5.245	1.597
Net financial position (NFP)	**8.715**	**7.643**	**- 7.014**	**- 9.797**	**- 17.457**
Debt equivalents	4.030	3.898	4.614	5.598	8.134
NFP and debt equivalents	**12.745**	**11.541**	**- 2.400**	**- 4.199**	**- 9.323**
Noncontrolling interests	1.390	1.492	1.454	1.394	1.194
Shareholders' equity	**4.924**	**6.618**	**22.225**	**30.189**	**44.704**
Total funds invested	19.059	19.651	21.279	27.384	36.575

Appendix 4.2 - Reorganized Income Statement

REORGANIZED INCOME STATEMENT					
$ million	**2018**	**2019**	**2020**	**2021**	**2022**
Net revenues	21.461	24.578	31.536	53.823	81.462
Cost of goods sold	- 17.419	- 20.509	- 24.906	- 40.217	- 60.465
Gross Margin	**4.042**	**4.069**	**6.630**	**13.606**	**20.997**
Selling and marketing costs	- 933	- 240	- 475	- 1.191	90
Research & Development	- 1.460	- 1.343	- 1.491	- 2.593	- 3.075
Other non-recurring (costs)/revenues	- 135	- 149	-	27	- 344
EBITDA	**1.514**	**2.337**	**4.664**	**9.849**	**17.668**
Depreciation and amortization	- 1.901	- 2.362	- 2.619	- 3.275	- 4.036
EBITA	**- 387**	**- 25**	**2.045**	**6.574**	**13.632**
Amortization and write-down of goodwill and similar assets	-	- 44	- 51	- 51	-
EBIT	**- 387**	**- 69**	**1.994**	**6.523**	**13.632**
Financial income	46	89	- 92	191	254
Financial charges	- 663	- 685	- 748	- 371	- 167
Net income / (loss) from equity investments					
Income before taxes	**- 1.004**	**- 665**	**1.154**	**6.343**	**13.719**
Taxes	- 58	- 110	- 292	- 699	- 1.132
Net income after taxes	**- 1.062**	**- 775**	**862**	**5.644**	**12.587**
Net income (loss) from discontinued operations	-	-	-	-	-
Net income	**- 1.062**	**- 775**	**862**	**5.644**	**12.587**
Net income to noncontrolling interests	- 86	87	172	120	4
Net group income	**- 976**	**- 862**	**690**	**5.524**	**12.583**

Appendix 4.3 – NOPAT Calculation

NOPAT					
$ million	**2018**	**2019**	**2020**	**2021**	**2022**
Adjusted tax rate	25,00%	25,00%	25,00%	25,00%	25,00%
EBITA	**- 387**	**- 25**	**2.045**	**6.574**	**13.632**
Operating taxes	97	6	- 511	- 1.644	- 3.408
NOPAT	**- 290**	**- 19**	**1.534**	**4.931**	**10.224**

Appendix 4.4 – Cash Flow Statement Calculation

CASH FLOW STATEMENT					
$ million	**2018**	**2019**	**2020**	**2021**	**2022**
NOPAT	-290	-19	1534	4931	10224
Depreciation and amortization	1901	2406	2670	3326	4036
Gross cash flow	**1611**	**2387**	**4204**	**8257**	**14260**
Operating working capital change		-509	1030	1845	-3444
Other operating current assets and liabilities change		691	567	1649	643
Net capital expenditures		-2971	-5820	-11071	-9453
Other noncurrent assets change		-78	-66	-602	-2055
Goodwill and similar assets change		-174	-60	-44	6
Gross investment		**-3041**	**-4349**	**-8223**	**-14303**
Free cash flow		**-654**	**-145**	**34**	**-43**
Financial income		89	-92	191	254
Other financial income/(loss)		0	0	0	0
Surplus asset/(liabilities) change		0	0	-1260	1076
Non-operating taxes		-116	219	945	2276
Non-operating cash flow		**-27**	**127**	**-125**	**3606**
Cash flow available to investors		**-681**	**-18**	**-91**	**3563**
Financial charges		-685	-748	-371	-167
Short-term debt change		-783	347	-543	-87
Long-term debt change		2230	-2027	-4362	-3648
Debt equivalents change		-132	716	984	2536
Cash flow to debtholders		**630**	**-1712**	**-4292**	**-1366**
Noncontrolling interest change		15	-210	-180	-204
Equity change		2556	14917	2440	1932
Cash flow to equityholders		**2571**	**14707**	**2260**	**1728**
Excess cash change		2520	12977	-2123	3925

Appendix 4.5 – Automotive Revenues Estimation

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Model S/X												
Units Sold	24.980	66.705										
Growth	*-56%*	*167%*										
Base Case			*59.840*	*61.823*	*63.782*	*65.711*	*67.602*	*69.449*	*71.245*	*72.984*	*74.660*	*76.265*
% Growth			*-10,3%*	*3,3%*	*3,2%*	*3,0%*	*2,9%*	*2,7%*	*2,6%*	*2,4%*	*2,3%*	*2,2%*
Best Case			*61.556*	*62.319*	*64.272*	*66.193*	*68.075*	*69.911*	*71.694*	*73.419*	*75.079*	*76.666*
% Growth			*-7,7%*	*4,1%*	*4,0%*	*3,8%*	*3,6%*	*3,4%*	*3,2%*	*3,1%*	*2,9%*	*2,7%*
Worst Case			*58.124*	*60.138*	*62.117*	*64.072*	*65.994*	*67.879*	*69.718*	*71.506*	*73.236*	*74.901*
% Growth			*-12,9%*	*0,5%*	*0,5%*	*0,5%*	*0,4%*	*0,4%*	*0,4%*	*0,4%*	*0,3%*	*0,3%*
Price Model S	86.796	99.740	94.990	82.242	82.242	82.242	82.242	82.242	82.242	82.242	82.242	82.242
Price Model X	95.796	104.990	99.990	91.242	91.242	91.242	91.242	91.242	91.242	91.242	91.242	91.242
Average	91.296	102.365	97.490	86.742	86.742	86.742	86.742	86.742	86.742	86.742	86.742	86.742
Model 3/Y												
Units Sold	911.242	1.247.146										
Growth	*106%*	*37%*										
Base Case			*1.718.190*	*2.229.691*	*2.715.089*	*3.088.950*	*3.267.175*	*3.356.442*	*3.443.262*	*3.527.316*	*3.608.287*	*3.685.865*
% Growth			*37,8%*	*29,8%*	*21,8%*	*13,8%*	*5,8%*	*2,7%*	*2,6%*	*2,4%*	*2,3%*	*2,2%*
Best Case			*1.835.951*	*2.357.566*	*2.836.439*	*3.182.416*	*3.311.732*	*3.378.758*	*3.464.967*	*3.548.329*	*3.628.530*	*3.705.260*
% Growth			*47,2%*	*37,2%*	*27,2%*	*17,2%*	*7,2%*	*3,4%*	*3,2%*	*3,1%*	*2,9%*	*2,7%*
Worst Case			*1.086.707*	*1.726.732*	*2.240.289*	*2.727.402*	*3.102.284*	*3.280.565*	*3.369.465*	*3.455.870*	*3.539.461*	*3.619.924*
% Growth			*28,3%*	*22,3%*	*16,3%*	*10,3%*	*4,3%*	*2,0%*	*1,9%*	*1,8%*	*1,7%*	*1,6%*
Price Model 3	41.796	48.440	47.490	47.490	47.490	47.490	47.490	47.490	47.490	47.490	47.490	47.490
Price Model Y	37.296	50.898	49.900	49.900	49.900	49.900	49.900	49.900	49.900	49.900	49.900	49.900
Average	39.546	49.669	48.695	48.695	48.695	48.695	48.695	48.695	48.695	48.695	48.695	48.695
Cybertruck												
Units Sold												
Base Case			*0*	*50.000*	*325.000*	*425.000*	*525.000*	*525.000*	*525.000*	*525.000*	*525.000*	*525.000*
Best Case			*50.000*	*375.000*	*525.000*	*675.000*	*675.000*	*675.000*	*675.000*	*675.000*	*675.000*	*675.000*
Worst Case			*0*	*0*	*50.000*	*275.000*	*375.000*	*475.000*	*475.000*	*475.000*	*475.000*	*475.000*
Price			49.900	49.900	49.900	49.900	49.900	49.900	49.900	49.900	49.900	49.900
Tesla Semi												
Units Sold												
Base Case				*0*	*50.000*	*50.000*	*50.000*	*50.000*	*50.000*	*100.000*	*100.000*	*100.000*
Best Case				*50.000*	*50.000*	*50.000*	*50.000*	*50.000*	*100.000*	*100.000*	*100.000*	*100.000*
Worst Case				*0*	*0*	*50.000*	*50.000*	*50.000*	*50.000*	*50.000*	*100.000*	*100.000*
Price				250.000	250.000	250.000	250.000	250.000	250.000	250.000	250.000	250.000
Roadster												
Units Sold												
Base Case					*0*	*15.795*	*20.455*	*25.330*	*30.431*	*35.771*	*41.360*	*47.213*
Best Case					*15.795*	*20.455*	*25.330*	*30.431*	*35.771*	*41.360*	*47.213*	*53.342*
Worst Case					*0*	*0*	*15.795*	*20.455*	*25.330*	*30.431*	*35.771*	*41.360*
Price					200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000
Total Revenues Base Case			***89.501***	***116.432***	***166.461***	***192.983***	***207.747***	***213.230***	***218.633***	***236.445***	***241.651***	***246.739***
Total Revenues Best Case			***97.898***	***151.420***	***185.552***	***210.983***	***218.418***	***222.862***	***240.782***	***246.109***	***251.329***	***256.429***
Total Revenues Worst Case			***58.584***	***89.300***	***116.974***	***164.591***	***191.162***	***205.929***	***211.392***	***216.775***	***234.563***	***239.744***

Appendix 4.6 – Energy Generation and Storage Revenues Estimation

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Energy generation and storage (solar panels, solar roofs, and powerwall)												
Revenues	2.789	3.909										
Growth	*40%*	*40%*										
Base Case			*5.082*	*6.449*	*7.985*	*9.639*	*11.337*	*12.984*	*14.469*	*15.675*	*16.497*	*16.852*
% Growth			*30%*	*26,9%*	*23,8%*	*20,7%*	*17,6%*	*14,5%*	*11,4%*	*8,3%*	*5,2%*	*2,2%*
Best Case			*5.238*	*6.633*	*8.193*	*9.866*	*11.574*	*13.220*	*14.688*	*15.864*	*16.642*	*16.941*
% Growth			*34,0%*	*30,5%*	*27,0%*	*23,6%*	*20,1%*	*16,6%*	*13,1%*	*9,6%*	*6,2%*	*2,7%*
Worst Case			*4.925*	*6.258*	*7.758*	*9.377*	*11.045*	*12.668*	*14.137*	*15.341*	*16.173*	*16.551*
% Growth			*26,0%*	*23,1%*	*20,3%*	*17,4%*	*14,6%*	*11,7%*	*8,9%*	*6,0%*	*3,2%*	*0,3%*

Appendix 4.7 – Automotive Regulatory Credits Revenues Estimation

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Automotive regulatory credits												
Revenues	1.465	1.776										
% on Automotive Sales	*3,3%*	*2,6%*	*3,0%*	*3,0%*	*3,0%*	*3,0%*	*3,0%*	*3,0%*	*3,0%*	*3,0%*	*3,0%*	*3,0%*
Base Case			*2.668*	*3.471*	*4.963*	*5.753*	*6.194*	*6.357*	*6.518*	*7.049*	*7.204*	*7.356*
Best Case			*2.919*	*4.514*	*5.532*	*6.290*	*6.512*	*6.644*	*7.178*	*7.337*	*7.493*	*7.645*
Worst Case			*1.747*	*2.662*	*3.487*	*4.907*	*5.699*	*6.139*	*6.302*	*6.463*	*6.993*	*7.147*

Appendix 4.8 – Automotive Leasing Revenues Estimation

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Automotive leasing												
Revenues	1.642	2.476										
% on Automotive Sales	*3,7%*	*3,7%*	*4,2%*	*4,2%*	*4,2%*	*4,2%*	*4,2%*	*4,2%*	*4,2%*	*4,2%*	*4,2%*	*4,2%*
Base Case			*3.721*	*4.840*	*6.920*	*8.023*	*8.637*	*8.865*	*9.089*	*9.830*	*10.046*	*10.258*
Best Case			*4.070*	*6.295*	*7.714*	*8.771*	*9.080*	*9.265*	*10.010*	*10.231*	*10.448*	*10.660*
Worst Case			*2.435*	*3.712*	*4.863*	*6.842*	*7.947*	*8.561*	*8.788*	*9.012*	*9.751*	*9.967*

Appendix 4.9 – Services and Other Revenues Estimation

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Services and other												
Revenues	3.802	6.091										
% on Automotive Sales	*8,6%*	*9,1%*	*9,1%*	*9,1%*	*9,1%*	*9,1%*	*9,1%*	*9,1%*	*9,1%*	*9,1%*	*9,1%*	*9,1%*
Base Case			*8.150*	*10.603*	*15.159*	*17.574*	*18.918*	*19.417*	*19.910*	*21.532*	*22.006*	*22.469*
Best Case			*8.915*	*13.789*	*16.897*	*19.213*	*19.890*	*20.295*	*21.926*	*22.412*	*22.887*	*23.351*
Worst Case			*5.335*	*8.132*	*10.652*	*14.988*	*17.408*	*18.753*	*19.250*	*19.740*	*21.360*	*21.832*

Appendix 4.10 – Weighted Average Cost of Capital

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Unlevered Beta (βu)	2,09	1,94	1,79	1,63	1,48	1,33	1,33	1,33	1,33	1,33
Debt Beta (βd)	0,10	0,10	0,10	0,10	0,10	0,10	0,10	0,10	0,10	0,10
Capital structure (D/E)	0,3%	0,8%	1,3%	1,9%	2,4%	2,9%	3,4%	4,0%	4,5%	5,0%
Levered Beta	**2,10**	**1,95**	**1,81**	**1,66**	**1,51**	**1,37**	**1,37**	**1,38**	**1,39**	**1,39**
Risk free rate (Rf)	3,46%	3,31%	3,17%	3,02%	2,88%	2,73%	2,59%	2,44%	2,30%	2,15%
Equity risk premium (ERP)	5,51%	5,51%	5,51%	5,51%	5,51%	5,51%	5,51%	5,51%	5,51%	5,51%
Beta levered (β)	2,10	1,95	1,81	1,66	1,51	1,37	1,37	1,38	1,39	1,39
Cost of equity (Ke)	**15,02%**	**14,08%**	**13,14%**	**12,19%**	**11,23%**	**10,26%**	**10,15%**	**10,04%**	**9,93%**	**9,82%**
Credit spread	1,6%	1,6%	1,6%	1,6%	1,6%	1,6%	1,6%	1,6%	1,6%	1,6%
Cost of debt (Kd)	**5,02%**	**4,87%**	**4,73%**	**4,58%**	**4,44%**	**4,29%**	**4,15%**	**4,00%**	**3,86%**	**3,71%**
EQUITY										
Shares outstanding	3.166									
Current Market Price	$211									
Market Value of Equity	$668.026									
DEBT										
Book Value of Straight Debt =	2531									
Interest Expense on Debt =	167									
Average Maturity =	2									
Pre-tax Cost of Debt =	1,6%									
Tax Rate =	25%									
Market Value of Straight Debt	$1.860									
DEBT RATING	Baa2/BBB	Baa2/BBB	Baa2/BBB	Baa2/BBB	Baa2/BBB	Baa2/BBB	Baa2/BBB	Baa2/BBB	Baa2/BBB	Baa2/BBB
WACC										
Tax rate (t)	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%
D/EV	0,3%	0,8%	1,3%	1,9%	2,4%	2,9%	3,4%	4,0%	4,5%	5,0%
E/EV	99,7%	99,2%	98,7%	98,1%	97,6%	97,1%	96,6%	96,0%	95,5%	95,0%
WACC	**14,99%**	**14,00%**	**13,01%**	**12,03%**	**11,04%**	**10,06%**	**9,91%**	**9,76%**	**9,62%**	**9,47%**

Appendix 4.11 – Base Case Projections

REORGANIZED BALANCE SHEET

Operating Method

$ million	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total funds invested: uses												
Operating cash*	1.076	1.629	2.182	2.836	4.030	4.679	5.057	5.217	5.372	5.811	5.948	6.073
Account receivables	1.913	2.952	2.952	3.836	5.451	6.329	6.840	7.057	7.267	7.860	8.045	8.215
Days on sales	13	13	10	10	10	10	10	10	10	10	10	10
Inventory	5.757	12.839	12.839	16.683	23.706	27.528	29.748	30.691	31.605	34.183	34.992	35.729
Days on sales	39	57	42	42	42	42	42	42	42	42	42	42
Account payables and similar liabilities	- 10.025	- 15.255	- 15.255	- 19.823	- 28.167	- 32.709	- 35.345	- 36.467	- 37.552	- 40.615	- 41.576	- 42.453
Days on sales	- 67	- 67	- 50	- 50	- 50	- 50	- 50	- 50	- 50	- 50	- 50	- 50
Trade working capital	**- 1.279**	**2.165**	**2.718**	**3.532**	**5.019**	**5.829**	**6.299**	**6.498**	**6.692**	**7.238**	**7.409**	**7.565**
On sales	*-2,38%*	*2,66%*	*2,49%*	*2,49%*	*2,49%*	*2,49%*	*2,49%*	*2,49%*	*2,49%*	*2,49%*	*2,49%*	*2,49%*
Other current assets/(liabilities)	- 6.368	- 7.011	- 6.000	- 6.000	- 6.000	- 6.000	- 6.000	- 6.000	- 6.000	- 6.000	- 6.000	- 6.000
Operating working capital	**- 7.647**	**- 4.846**	**- 3.282**	**- 2.468**	**- 981**	**- 171**	**299**	**498**	**692**	**1.238**	**1.409**	**1.565**
Operating fixed assets	31.433	36.850	43.823	56.154	74.330	94.462	114.704	133.746	151.684	170.333	187.815	204.179
On sales	*58,40%*	*45,24%*	*40,16%*	*39,60%*	*36,89%*	*40,37%*	*45,37%*	*51,27%*	*56,47%*	*58,63%*	*63,15%*	*67,24%*
Capex	- 11.071	- 9.453	10.912	17.015	24.178	28.077	30.340	31.302	32.234	34.864	35.689	36.441
Capex on sales	*-20,57%*	*-11,60%*	*10,00%*	*12,00%*	*12,00%*	*12,00%*	*12,00%*	*12,00%*	*12,00%*	*12,00%*	*12,00%*	*12,00%*
Other operating non-current assets/(liabilities)	2.138	4.193	5.456	6.948	9.671	10.997	11.630	11.738	11.819	12.493	12.491	12.451
On sales	*3,97%*	*5,15%*	*5,00%*	*4,90%*	*4,80%*	*4,70%*	*4,60%*	*4,50%*	*4,40%*	*4,30%*	*4,20%*	*4,10%*
Operating fixed capital	**33.571**	**41.043**	**49.279**	**63.102**	**84.002**	**105.458**	**126.335**	**145.484**	**163.503**	**182.826**	**200.306**	**216.630**
Invested capital (excluding goodwill and similar assets)	**25.924**	**36.197**	**45.998**	**60.635**	**83.021**	**105.287**	**126.633**	**145.982**	**164.195**	**184.064**	**201.715**	**218.195**
Goodwill and similar assets net of deferred taxes	200	194	144	94	44	- 6	- 56	- 106	- 156	- 206	- 256	- 306
Invested capital	**26.124**	**36.391**	**46.142**	**60.729**	**83.065**	**105.281**	**126.577**	**145.876**	**164.039**	**183.858**	**201.459**	**217.889**
Investments	1.260	184	500	500	500	500	500	500	500	500	500	500
Surplus assets/(liabilities)	**1.260**	**184**	**500**	**500**	**500**	**500**	**500**	**500**	**500**	**500**	**500**	**500**
Total funds invested	27.384	36.575	46.642	61.229	83.565	105.781	127.077	146.376	164.539	184.358	201.959	218.389

*Working cash on revenues 2%

Financing Method

$ million	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total funds invested: sources												
Cash and cash equivalents	- 16.631	- 20.556	- 15.342	- 13.976	- 13.052	- 18.654	- 28.750	- 43.053	- 60.917	- 82.343	- 108.136	- 139.633
Short-term debt	1.589	1.502	1.502	1.502	1.502	1.502	1.502	1.502	1.502	1.502	1.502	1.502
Long-term debt	5.245	1.597	1.000	1.000	1.000	2.286	3.571	4.857	6.143	7.429	8.714	10.000
Net financial position (NFP)	**- 9.797**	**- 17.457**	**- 12.840**	**- 11.474**	**- 10.550**	**- 14.866**	**- 23.677**	**- 36.694**	**- 53.272**	**- 73.413**	**- 97.920**	**- 128.131**
Debt equivalents	5.598	8.134	5.255	5.255	5.255	5.255	5.255	5.255	5.255	5.255	5.255	5.255
NFP and debt equivalents	**- 4.199**	**- 9.323**	**- 7.586**	**- 6.219**	**- 5.295**	**- 9.612**	**- 18.422**	**- 31.439**	**- 48.017**	**- 68.158**	**- 92.665**	**- 122.876**
Noncontrolling interests	1.394	1.194	1.394	1.594	1.794	1.994	2.194	2.394	2.594	2.794	2.994	3.194
Yearly variation (exluding net income)			*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*
Shareholders' equity	**30.189**	**44.704**	**52.833**	**65.854**	**87.066**	**113.399**	**143.305**	**175.421**	**209.962**	**249.722**	**291.629**	**338.071**
Total funds invested	27.384	36.575	46.642	61.229	83.565	105.781	127.077	146.376	164.539	184.358	201.959	218.389

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REORGANIZED INCOME STATEMENT												
$ million	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**
Net revenues	53.823	81.462	109.122	141.796	201.487	233.971	252.833	260.853	268.619	290.531	297.405	303.673
Cost of goods sold	- 40.217	- 60.465	89.597	114.991	161.363	185.013	197.372	200.996	204.265	217.991	220.143	218.645
% of revenues	*74,7%*	*74,2%*	*82,1%*	*81,1%*	*80,1%*	*79,1%*	*78,1%*	*77,1%*	*76,0%*	*75,0%*	*74,0%*	*72,0%*
Gross Margin	**13.606**	**20.997**	**19.525**	**26.805**	**40.125**	**48.959**	**55.461**	**59.856**	**64.354**	**72.539**	**77.262**	**85.029**
in %	*25,3%*	*25,8%*	*17,9%*	*18,9%*	*19,9%*	*20,9%*	*21,9%*	*22,9%*	*24,0%*	*25,0%*	*26,0%*	*28,0%*
Selling and marketing costs	- 1.191	90	- 873	- 1.040	- 1.343	- 1.404	- 1.348	- 1.217	- 1.074	- 968	- 793	- 607
% of revenues	*2,2%*	*-0,1%*	*0,8%*	*0,7%*	*0,7%*	*0,6%*	*0,5%*	*0,5%*	*0,4%*	*0,3%*	*0,3%*	*0,2%*
Research & Development	- 2.593	- 3.075	- 3.274	- 3.120	- 3.895	- 3.900	- 3.540	- 2.956	- 2.328	- 1.743	- 1.784	- 1.822
% of revenues	*4,8%*	*3,8%*	*3,0%*	*2,2%*	*1,9%*	*1,7%*	*1,4%*	*1,1%*	*0,9%*	*0,6%*	*0,6%*	*0,6%*
Other non-recurring (costs)/revenues	27	- 344	- 300	- 300	- 300	- 300	- 300	- 300	- 300	- 300	- 300	- 300
% of revenues	*-0,1%*	*0,4%*	*0,3%*	*0,2%*	*0,1%*	*0,1%*	*0,1%*	*0,1%*	*0,1%*	*0,1%*	*0,1%*	*0,1%*
EBITDA	**9.849**	**17.668**	**15.079**	**22.345**	**34.586**	**43.355**	**50.273**	**55.383**	**60.651**	**69.528**	**74.384**	**82.299**
Depreciation and amortization	- 3.275	- 4.036	- 3.939	- 4.684	- 6.002	- 7.945	- 10.097	- 12.261	- 14.296	- 16.214	- 18.207	- 20.076
% on operating fixed assets	*10,4%*	*11,0%*	*10,7%*	*10,7%*	*10,7%*	*10,7%*	*10,7%*	*10,7%*	*10,7%*	*10,7%*	*10,7%*	*10,7%*
EBITA	**6.574**	**13.632**	**11.140**	**17.661**	**28.584**	**35.410**	**40.176**	**43.122**	**46.355**	**53.314**	**56.177**	**62.223**
Amortization and similar assets	- 51	-	- 50	- 50	- 50	- 50	- 50	- 50	- 50	- 50	- 50	- 50
EBIT	**6.523**	**13.632**	**11.090**	**17.611**	**28.534**	**35.360**	**40.126**	**43.072**	**46.305**	**53.264**	**56.127**	**62.173**
Financial income	191	254	*254*	*254*	*254*	*254*	*254*	*254*	*254*	*254*	*254*	*254*
Financial charges	- 371	- 167	- *371*	- *371*	- *371*	- *371*	- *371*	- *371*	- *371*	- *371*	- *371*	- *371*
Net income / (loss) from equity investments	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*
Income before taxes	**6.343**	**13.719**	**10.973**	**17.494**	**28.417**	**35.243**	**40.009**	**42.955**	**46.188**	**53.147**	**56.010**	**62.056**
Taxes	- 699	- 1.132	- 2.743	- 4.373	- 7.104	- 8.811	- 10.002	- 10.739	- 11.547	- 13.287	- 14.002	- 15.514
Tax rate	*-11,0%*	*-8,3%*	*-25,0%*	*-25,0%*	*-25,0%*	*-25,0%*	*-25,0%*	*-25,0%*	*-25,0%*	*-25,0%*	*-25,0%*	*-25,0%*
Net income after taxes	**5.644**	**12.587**	**8.229**	**13.120**	**21.313**	**26.432**	**30.006**	**32.216**	**34.641**	**39.860**	**42.007**	**46.542**
Net income (loss) from discontinued operations	-	-	-	-	-	-	-	-	-	-	-	-
Net income	**5.644**	**12.587**	**8.229**	**13.120**	**21.313**	**26.432**	**30.006**	**32.216**	**34.641**	**39.860**	**42.007**	**46.542**
Net income to noncontrolling interests	120	4	100	100	100	100	100	100	100	100	100	100
Net group income	**5.524**	**12.583**	**8.129**	**13.020**	**21.213**	**26.332**	**29.906**	**32.116**	**34.541**	**39.760**	**41.907**	**46.442**

Appendix 4.12 – Best Case Projections

REORGANIZED BALANCE SHEET

Operating Method

$ million	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total funds invested: uses												
Operating cash*	1.076	1.629	2.381	3.653	4.478	5.102	5.309	5.446	5.892	6.039	6.176	6.301
Account receivables	1.913	2.952	2.952	4.529	5.552	6.327	6.583	6.752	7.305	7.488	7.658	7.812
Days on sales	13	13	9	9	9	9	9	9	9	9	9	9
Inventory	5.757	12.839	12.839	19.700	24.147	27.516	28.633	29.367	31.773	32.567	33.306	33.977
Days on sales	39	57	39	39	39	39	39	39	39	39	39	39
Account payables and similar liabilities	- 10.025	- 15.255	- 15.255	- 23.407	- 28.691	- 32.694	- 34.021	- 34.894	- 37.751	- 38.696	- 39.573	- 40.371
Days on sales	- 67	- 67	- 46	- 46	- 46	- 46	- 46	- 46	- 46	- 46	- 46	- 46
Trade working capital	**- 1.279**	**2.165**	**2.917**	**4.475**	**5.486**	**6.251**	**6.505**	**6.672**	**7.218**	**7.399**	**7.566**	**7.719**
On sales	*-2,38%*	*2,66%*	*2,45%*	*2,45%*	*2,45%*	*2,45%*	*2,45%*	*2,45%*	*2,45%*	*2,45%*	*2,45%*	*2,45%*
Other current assets/(liabilities)	- 6.368	- 7.011	- 6.000	- 6.000	- 6.000	- 6.000	- 6.000	- 6.000	- 6.000	- 6.000	- 6.000	- 6.000
Operating working capital	**- 7.647**	**- 4.846**	**- 3.083**	**- 1.525**	**- 514**	**251**	**505**	**672**	**1.218**	**1.399**	**1.566**	**1.719**
Operating fixed assets	31.433	36.850	44.815	61.943	82.188	104.017	124.756	144.094	164.042	182.742	200.264	216.660
On sales	*58,40%*	*45,24%*	*37,65%*	*33,91%*	*36,71%*	*40,77%*	*46,99%*	*52,92%*	*55,69%*	*60,52%*	*64,85%*	*68,78%*
Capex	- 11.071	- 9.453	11.904	21.918	26.867	30.615	31.857	32.674	35.350	36.234	37.056	37.803
Capex on sales	*-20,57%*	*-11,60%*	*10,00%*	*12,00%*	*12,00%*	*12,00%*	*12,00%*	*12,00%*	*12,00%*	*12,00%*	*12,00%*	*12,00%*
Other operating non-current assets/(liabilities)	2.138	4.193	5.952	8.950	10.747	11.991	12.212	12.253	12.962	12.984	12.970	12.916
On sales	*3,97%*	*5,15%*	*5,00%*	*4,90%*	*4,80%*	*4,70%*	*4,60%*	*4,50%*	*4,40%*	*4,30%*	*4,20%*	*4,10%*
Operating fixed capital	**33.571**	**41.043**	**50.767**	**70.893**	**92.935**	**116.008**	**136.967**	**156.347**	**177.004**	**195.726**	**213.233**	**229.576**
Invested capital (excluding goodwill and similar asse	**25.924**	**36.197**	**47.684**	**69.368**	**92.420**	**116.259**	**137.472**	**157.019**	**178.222**	**197.124**	**214.800**	**231.295**
Goodwill and similar assets net of deferred taxes	200	194	144	94	44	- 6	- 56	- 106	- 156	- 206	- 256	- 306
Invested capital	**26.124**	**36.391**	**47.828**	**69.462**	**92.464**	**116.253**	**137.416**	**156.913**	**178.066**	**196.918**	**214.544**	**230.989**
Investments	1.260	184	500	500	500	500	500	500	500	500	500	500
Surplus assets/(liabilities)	**1.260**	**184**	**500**	**500**	**500**	**500**	**500**	**500**	**500**	**500**	**500**	**500**
Total funds invested	27.384	36.575	48.328	69.962	92.964	116.753	137.916	157.413	178.566	197.418	215.044	231.489

*Working cash on revenues 2%

Financing Method

$ million	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total funds invested: sources												
Cash and cash equivalents	- 16.631	- 20.556	- 15.693	- 13.732	- 16.746	- 25.736	- 40.010	- 58.313	- 80.405	- 107.789	- 138.927	- 176.452
Short-term debt	1.589	1.502	1.502	1.502	1.502	1.502	1.502	1.502	1.502	1.502	1.502	1.502
Long-term debt	5.245	1.597	1.000	1.000	1.000	2.286	3.571	4.857	6.143	7.429	8.714	10.000
Net financial position (NFP)	**- 9.797**	**- 17.457**	**- 13.191**	**- 11.230**	**- 14.244**	**- 21.948**	**- 34.937**	**- 51.953**	**- 72.760**	**- 98.859**	**- 128.710**	**- 164.950**
Debt equivalents	5.598	8.134	5.255	5.255	5.255	5.255	5.255	5.255	5.255	5.255	5.255	5.255
NFP and debt equivalents	**- 4.199**	**- 9.323**	**- 7.936**	**- 5.975**	**- 8.989**	**- 16.693**	**- 29.682**	**- 46.699**	**- 67.505**	**- 93.604**	**- 123.455**	**- 159.695**
Noncontrolling interests	1.394	1.194	1.394	1.594	1.794	1.994	2.194	2.394	2.594	2.794	2.994	3.194
Yearly variation (exluding net income)			*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*
Shareholders' equity	**30.189**	**44.704**	**54.870**	**74.343**	**100.159**	**131.452**	**165.405**	**201.718**	**243.477**	**288.228**	**335.505**	**387.991**
Total funds invested	27.384	36.575	48.328	69.962	92.964	116.753	137.916	157.413	178.566	197.418	215.044	231.489

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REORGANIZED INCOME STATEMENT												
$ million	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**
Net revenues	53.823	81.462	119.039	182.651	223.888	255.123	265.474	272.285	294.585	301.954	308.799	315.026
Cost of goods sold	- 40.217	- 60.465	96.422	145.938	176.423	198.230	203.353	205.575	219.172	221.332	222.953	220.518
% of revenues	*74,7%*	*74,2%*	*81,0%*	*79,9%*	*78,8%*	*77,7%*	*76,6%*	*75,5%*	*74,4%*	*73,3%*	*72,2%*	*70,0%*
Gross Margin	**13.606**	**20.997**	**22.617**	**36.713**	**47.464**	**56.892**	**62.121**	**66.710**	**75.414**	**80.622**	**85.846**	**94.508**
in %	*25,3%*	*25,8%*	*19,0%*	*20,1%*	*21,2%*	*22,3%*	*23,4%*	*24,5%*	*25,6%*	*26,7%*	*27,8%*	*30,0%*
Selling and marketing costs	- 1.191	- 90	- 952	- 1.339	- 1.493	- 1.531	- 1.416	- 1.271	- 1.178	- 1.007	- 823	- 630
% of revenues	*2,2%*	*-0,1%*	*0,8%*	*0,7%*	*0,7%*	*0,6%*	*0,5%*	*0,5%*	*0,4%*	*0,3%*	*0,3%*	*0,2%*
Research & Development	- 2.593	- 3.075	- 3.571	- 4.018	- 4.328	- 4.252	- 3.717	- 3.086	- 2.553	- 1.812	- 1.853	- 1.890
% of revenues	*4,8%*	*3,8%*	*3,0%*	*2,2%*	*1,9%*	*1,7%*	*1,4%*	*1,1%*	*0,9%*	*0,6%*	*0,6%*	*0,6%*
Other non-recurring (costs)/revenues	27	- 344	- 300	- 300	- 300	- 300	- 300	- 300	- 300	- 300	- 300	- 300
% of revenues	*-0,1%*	*0,4%*	*0,3%*	*0,2%*	*0,1%*	*0,1%*	*0,1%*	*0,1%*	*0,1%*	*0,1%*	*0,1%*	*0,1%*
EBITDA	**9.849**	**17.668**	**17.794**	**31.055**	**41.343**	**50.810**	**56.689**	**62.053**	**71.382**	**77.503**	**82.870**	**91.688**
Depreciation and amortization	- 3.275	- 4.036	- 3.939	- 4.790	- 6.621	- 8.785	- 11.119	- 13.335	- 15.403	- 17.535	- 19.534	- 21.407
% on operating fixed assets	*10,4%*	*11,0%*	*10,7%*	*10,7%*	*10,7%*	*10,7%*	*10,7%*	*10,7%*	*10,7%*	*10,7%*	*10,7%*	*10,7%*
EBITA	**6.574**	**13.632**	**13.855**	**26.265**	**34.722**	**42.024**	**45.570**	**48.718**	**55.980**	**59.969**	**63.336**	**70.281**
Amortization and similar assets	- 51	- -	- 50	- 50	- 50	- 50	- 50	- 50	- 50	- 50	- 50	- 50
EBIT	**6.523**	**13.632**	**13.805**	**26.215**	**34.672**	**41.974**	**45.520**	**48.668**	**55.930**	**59.919**	**63.286**	**70.231**
Financial income	191	254	*254*	*254*	*254*	*254*	*254*	*254*	*254*	*254*	*254*	*254*
Financial charges	- 371	- 167	- *371*	- *371*	- *371*	- *371*	- *371*	- *371*	- *371*	- *371*	- *371*	- *371*
Net income / (loss) from equity investments	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*
Income before taxes	**6.343**	**13.719**	**13.688**	**26.098**	**34.555**	**41.857**	**45.403**	**48.551**	**55.813**	**59.802**	**63.169**	**70.114**
Taxes	- 699	- 1.132	- 3.422	- 6.524	- 8.639	- 10.464	- 11.351	- 12.138	- 13.953	- 14.950	- 15.792	- 17.528
Tax rate	*-11,0%*	*-8,3%*	*-25,0%*	*-25,0%*	*-25,0%*	*-25,0%*	*-25,0%*	*-25,0%*	*-25,0%*	*-25,0%*	*-25,0%*	*-25,0%*
Net income after taxes	**5.644**	**12.587**	**10.266**	**19.573**	**25.916**	**31.393**	**34.052**	**36.413**	**41.860**	**44.851**	**47.377**	**52.585**
Net income (loss) from discontinued operations	-	-	-	-	-	-	-	-	-	-	-	-
Net income	**5.644**	**12.587**	**10.266**	**19.573**	**25.916**	**31.393**	**34.052**	**36.413**	**41.860**	**44.851**	**47.377**	**52.585**
Net income to noncontrolling interests	120	4	100	100	100	100	100	100	100	100	100	100
Net group income	**5.524**	**12.583**	**10.166**	**19.473**	**25.816**	**31.293**	**33.952**	**36.313**	**41.760**	**44.751**	**47.277**	**52.485**

Appendix 4.13 – Worst Case Projections

REORGANIZED BALANCE SHEET

Operating Method

$ million	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total funds invested: uses												
Operating cash*	1.076	1.629	1.461	2.201	2.875	4.014	4.665	5.041	5.197	5.347	5.777	5.905
Account receivables	1.913	2.952	2.952	4.449	5.810	8.113	9.429	10.189	10.505	10.807	11.676	11.935
Days on sales	13	13	15	15	15	15	15	15	15	15	15	15
Inventory	5.757	12.839	12.839	19.351	25.271	35.287	41.011	44.314	45.689	47.001	50.782	51.908
Days on sales	39	57	63	63	63	63	63	63	63	63	63	63
Account payables and similar liabilities	- 10.025	- 15.255	- 15.255	- 22.992	- 30.026	- 41.927	- 48.728	- 52.653	- 54.286	- 55.845	- 60.338	- 61.675
Days on sales	- 67	- 67	- 75	- 75	- 75	- 75	- 75	- 75	- 75	- 75	- 75	- 75
Trade working capital	**- 1.279**	**2.165**	**1.997**	**3.009**	**3.930**	**5.487**	**6.377**	**6.891**	**7.105**	**7.309**	**7.897**	**8.072**
On sales	*-2,38%*	*2,66%*	*2,73%*	*2,73%*	*2,73%*	*2,73%*	*2,73%*	*2,73%*	*2,73%*	*2,73%*	*2,73%*	*2,73%*
Other current assets/(liabilities)	- 6.368	- 7.011	- 6.000	- 6.000	- 6.000	- 6.000	- 6.000	- 6.000	- 6.000	- 6.000	- 6.000	- 6.000
Operating working capital	**- 7.647**	**- 4.846**	**- 4.003**	**- 2.991**	**- 2.070**	**- 513**	**377**	**891**	**1.105**	**1.309**	**1.897**	**2.072**
Operating fixed assets	31.433	36.850	40.214	49.123	61.120	78.671	98.253	117.997	136.568	154.050	172.244	189.261
On sales	*58,40%*	*45,24%*	*55,07%*	*44,63%*	*42,52%*	*39,20%*	*42,12%*	*46,81%*	*52,55%*	*57,63%*	*59,63%*	*64,10%*
Capex	- 11.071	- 9.453	7.303	13.208	17.248	24.085	27.991	30.246	31.184	32.080	34.661	35.429
Capex on sales	*-20,57%*	*-11,60%*	*10,00%*	*12,00%*	*12,00%*	*12,00%*	*12,00%*	*12,00%*	*12,00%*	*12,00%*	*12,00%*	*12,00%*
Other operating non-current assets/(liabilities)	2.138	4.193	3.651	5.393	6.899	9.433	10.730	11.342	11.434	11.495	12.131	12.105
On sales	*3,97%*	*5,15%*	*5,00%*	*4,90%*	*4,80%*	*4,70%*	*4,60%*	*4,50%*	*4,40%*	*4,30%*	*4,20%*	*4,10%*
Operating fixed capital	**33.571**	**41.043**	**43.865**	**54.516**	**68.019**	**88.105**	**108.983**	**129.399**	**148.002**	**165.545**	**184.375**	**201.366**
Invested capital (excluding goodwill and similar asse	**25.924**	**36.197**	**39.861**	**51.525**	**65.949**	**87.592**	**109.361**	**130.230**	**149.107**	**166.854**	**186.272**	**203.438**
Goodwill and similar assets net of deferred taxes	200	194	144	94	44	- 6	- 56	- 106	- 156	- 206	- 256	- 306
Invested capital	**26.124**	**36.391**	**40.005**	**51.619**	**65.993**	**87.586**	**109.305**	**130.124**	**148.951**	**166.648**	**186.016**	**203.132**
Investments	1.260	184	500	500	500	500	500	500	500	500	500	500
Surplus assets/(liabilities)	**1.260**	**184**	**500**	**500**	**500**	**500**	**500**	**500**	**500**	**500**	**500**	**500**
Total funds invested	27.384	36.575	40.505	52.119	66.493	88.086	109.805	130.624	149.451	167.148	186.516	203.632

*Working cash on revenues 2%

Financing Method

$ million	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total funds invested: sources												
Cash and cash equivalents	- 16.631	- 20.556	- 17.174	- 14.441	- 13.343	- 14.128	- 19.794	- 29.751	- 43.689	- 60.924	- 80.789	- 106.700
Short-term debt	1.589	1.502	1.502	1.502	1.502	1.502	1.502	1.502	1.502	1.502	1.502	1.502
Long-term debt	5.245	1.597	1.000	1.000	1.000	2.286	3.571	4.857	6.143	7.429	8.714	10.000
Net financial position (NFP)	**- 9.797**	**- 17.457**	**- 14.672**	**- 11.939**	**- 10.841**	**- 10.340**	**- 14.720**	**- 23.392**	**- 36.044**	**- 51.994**	**- 70.572**	**- 95.198**
Debt equivalents	5.598	8.134	5.255	5.255	5.255	5.255	5.255	5.255	5.255	5.255	5.255	5.255
NFP and debt equivalents	**- 4.199**	**- 9.323**	**- 9.418**	**- 6.685**	**- 5.586**	**- 5.085**	**- 9.466**	**- 18.138**	**- 30.790**	**- 46.739**	**- 65.318**	**- 89.943**
Noncontrolling interests	1.394	1.194	1.394	1.594	1.794	1.994	2.194	2.394	2.594	2.794	2.994	3.194
Yearly variation (exluding net income)			*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*
Shareholders' equity	**30.189**	**44.704**	**48.529**	**57.210**	**70.285**	**91.177**	**117.076**	**146.367**	**177.647**	**211.093**	**248.840**	**290.381**
Total funds invested	27.384	36.575	40.505	52.119	66.493	88.086	109.805	130.624	149.451	167.148	186.516	203.632

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REORGANIZED INCOME STATEMENT												
$ million	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**
Net revenues	53.823	81.462	73.026	110.064	143.734	200.706	233.261	252.049	259.870	267.331	288.841	295.241
Cost of goods sold	- 40.217	- 60.465	60.611	90.363	116.712	161.167	185.209	197.858	201.659	205.043	218.942	218.478
% of revenues	*74,7%*	*74,2%*	*83,0%*	*82,1%*	*81,2%*	*80,3%*	*79,4%*	*78,5%*	*77,6%*	*76,7%*	*75,8%*	*74,0%*
Gross Margin	**13.606**	**20.997**	**12.414**	**19.702**	**27.022**	**39.539**	**48.052**	**54.191**	**58.211**	**62.288**	**69.900**	**76.763**
in %	*25,3%*	*25,8%*	*17,0%*	*17,9%*	*18,8%*	*19,7%*	*20,6%*	*21,5%*	*22,4%*	*23,3%*	*24,2%*	*26,0%*
Selling and marketing costs	- 1.191	- 90	- 584	- 807	- 958	- 1.204	- 1.244	- 1.176	- 1.039	- 891	- 770	- 590
% of revenues	*2,2%*	*-0,1%*	*0,8%*	*0,7%*	*0,7%*	*0,6%*	*0,5%*	*0,5%*	*0,4%*	*0,3%*	*0,3%*	*0,2%*
Research & Development	- 2.593	- 3.075	- 2.191	- 2.421	- 2.779	- 3.345	- 3.266	- 2.857	- 2.252	- 1.604	- 1.733	- 1.771
% of revenues	*4,8%*	*3,8%*	*3,0%*	*2,2%*	*1,9%*	*1,7%*	*1,4%*	*1,1%*	*0,9%*	*0,6%*	*0,6%*	*0,6%*
Other non-recurring (costs)/revenues	27	- 344	- 300	- 300	- 300	- 300	- 300	- 300	- 300	- 300	- 300	- 300
% of revenues	*-0,1%*	*0,4%*	*0,4%*	*0,3%*	*0,2%*	*0,1%*	*0,1%*	*0,1%*	*0,1%*	*0,1%*	*0,1%*	*0,1%*
EBITDA	**9.849**	**17.668**	**9.339**	**16.173**	**22.985**	**34.690**	**43.242**	**49.858**	**54.619**	**59.493**	**67.096**	**74.101**
Depreciation and amortization	- 3.275	- 4.036	- 3.939	- 4.299	- 5.251	- 6.533	- 8.409	- 10.503	- 12.613	- 14.598	- 16.467	- 18.412
% on operating fixed assets	*10,4%*	*11,0%*	*10,7%*	*10,7%*	*10,7%*	*10,7%*	*10,7%*	*10,7%*	*10,7%*	*10,7%*	*10,7%*	*10,7%*
EBITA	**6.574**	**13.632**	**5.400**	**11.874**	**17.734**	**28.156**	**34.833**	**39.355**	**42.006**	**44.895**	**50.629**	**55.689**
Amortization and similar assets	- 51	- -	- 50	- 50	- 50	- 50	- 50	- 50	- 50	- 50	- 50	- 50
EBIT	**6.523**	**13.632**	**5.350**	**11.824**	**17.684**	**28.106**	**34.783**	**39.305**	**41.956**	**44.845**	**50.579**	**55.639**
Financial income	191	254	*254*	*254*	*254*	*254*	*254*	*254*	*254*	*254*	*254*	*254*
Financial charges	- 371	- 167	- *371*	- *371*	- *371*	- *371*	- *371*	- *371*	- *371*	- *371*	- *371*	- *371*
Net income / (loss) from equity investments	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*
Income before taxes	**6.343**	**13.719**	**5.233**	**11.707**	**17.567**	**27.989**	**34.666**	**39.188**	**41.839**	**44.728**	**50.462**	**55.522**
Taxes	- 699	- 1.132	- 1.308	- 2.927	- 4.392	- 6.997	- 8.666	- 9.797	- 10.460	- 11.182	- 12.616	- 13.881
Tax rate	*-11,0%*	*-8,3%*	*-25,0%*	*-25,0%*	*-25,0%*	*-25,0%*	*-25,0%*	*-25,0%*	*-25,0%*	*-25,0%*	*-25,0%*	*-25,0%*
Net income after taxes	**5.644**	**12.587**	**3.925**	**8.781**	**13.175**	**20.992**	**25.999**	**29.391**	**31.379**	**33.546**	**37.847**	**41.642**
Net income (loss) from discontinued operations	-	-	-	-	-	-	-	-	-	-	-	-
Net income	**5.644**	**12.587**	**3.925**	**8.781**	**13.175**	**20.992**	**25.999**	**29.391**	**31.379**	**33.546**	**37.847**	**41.642**
Net income to noncontrolling interests	120	4	100	100	100	100	100	100	100	100	100	100
Net group income	**5.524**	**12.583**	**3.825**	**8.681**	**13.075**	**20.892**	**25.899**	**29.291**	**31.279**	**33.446**	**37.747**	**41.542**

Appendix 4.14 – Base Case DCF

Year	0	1	2	3	4	5	6	7	8	9	10	TV
Revenues	81.462	109.122	141.796	201.487	233.971	252.833	260.853	268.619	290.531	297.405	303.673	310.202
% growth		*34,0%*	*29,9%*	*42,1%*	*16,1%*	*8,1%*	*3,2%*	*3,0%*	*8,2%*	*2,4%*	*2,1%*	*2,2%*
EBIT	13.632	11.090	17.611	28.534	35.360	40.126	43.072	46.305	53.264	56.127	62.173	63.510
EBIT margin		*10,2%*	*12,4%*	*14,2%*	*15,1%*	*15,9%*	*16,5%*	*17,2%*	*18,3%*	*18,9%*	*20,5%*	*20,5%*
Tax rate (t)		*25,0%*	*25,0%*	*25,0%*	*25,0%*	*25,0%*	*25,0%*	*25,0%*	*25,0%*	*25,0%*	*25,0%*	*25,0%*
EBIT (1-t)		8.317	13.208	21.400	26.520	30.094	32.304	34.728	39.948	42.095	46.630	47.632
Reinvestment		0,90	1,00	0,92	0,79	0,69	0,60	0,52	0,48	0,42	0,35	0,05
FCFF		**791**	**63**	**1.737**	**5.579**	**9.382**	**13.063**	**16.597**	**20.752**	**24.443**	**30.109**	**45.287**
WACC		14,99%	14,00%	13,01%	12,03%	11,04%	10,06%	9,91%	9,76%	9,62%	9,47%	9,47%
Cumulated		0,87	0,77	0,69	0,63	0,59	0,56	0,52	0,47	0,44	0,40	0,40
PV (FCF)		**688**	**49**	**1.204**	**3.542**	**5.557**	**7.351**	**8.566**	**9.849**	**10.697**	**12.183**	**18.325**
Economic Profit (EP)		1.121	3.580	7.739	10.926	13.395	15.287	16.409	19.605	20.711	24.006	26.464
Invested Capital (IC)	36.197	45.998	60.635	83.021	105.287	126.633	145.982	164.195	184.064	201.715	218.195	220.541
ROIC		18,1%	21,8%	25,8%	25,2%	23,8%	22,1%	21,2%	21,7%	20,9%	21,4%	21,6%

Terminal cash flow	45.287	
Terminal cost of capital	9,47%	
Terminal value	**618.710**	
PV(Terminal value)	250.353	
PV (CF over next 10 years)	59.685	
Sum of PV	**310.039**	
Probability of failure	0,00%	
Proceeds if firm fails	31.004	
Value of operating assets	**310.039**	
Growth option value	64.117	
EV	**374.156**	
- Debt	-2.531	
- Minority interests	-4	
+ Cash	16.253	
+ Non-operating assets	184	
Value of equity	**388.058**	
Number of shares	3.164	
Estimated value /share	**123**	
Price	211	20/10/2023
Price as % of value	172%	

TV	N	N+1	N+2
NOPAT	**46.630**	**47.632**	**48.657**
g NOPAT		2,2%	2,2%
Invested capital (IC)	**218.195**	**220.541**	**222.912**
g IC on g Sales		50%	50%
g IC		1,1%	1,1%
IC change		2.346	2.371
FCF	30.109	45.287	46.286
g FCF		50,4%	2,2%
WACC	9,5%	9,5%	9,5%
TV	**618.710**		
ROIC	**21,4%**	**21,8%**	**22,1%**
RONIC		**-43%**	**43,7%**
IR		-5,0%	4,9%
WACC	9,5%		
TV	**618.710**		
EP	26.464	26.970	
CV of EP in N+1	284.811		
CV of Delta EP da N+2	115.704		
CV of EP	400.515		
TV	**618.710**		
Check all TV	*TRUE*		

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Appendix 4.15 – Best Case DCF

Year	0	1	2	3	4	5	6	7	8	9	10	TV
Revenues	81.462	119.039	182.651	223.888	255.123	265.474	272.285	294.585	301.954	308.799	315.026	323.493
% growth		*46,1%*	*53,4%*	*22,6%*	*14,0%*	*4,1%*	*2,6%*	*8,2%*	*2,5%*	*2,3%*	*2,0%*	*2,7%*
EBIT	13.632	13.805	26.215	34.672	41.974	45.520	48.668	55.930	59.919	63.286	70.231	72.118
EBIT margin		*11,6%*	*14,4%*	*15,5%*	*16,5%*	*17,1%*	*17,9%*	*19,0%*	*19,8%*	*20,5%*	*22,3%*	*22,3%*
Tax rate (t)		*25,0%*	*25,0%*	*25,0%*	*25,0%*	*25,0%*	*25,0%*	*25,0%*	*25,0%*	*25,0%*	*25,0%*	*25,0%*
EBIT (1-t)		10.354	19.661	26.004	31.481	34.140	36.501	41.947	44.939	47.465	52.673	54.089
Reinvestment		0,84	0,95	0,82	0,72	0,61	0,53	0,49	0,42	0,37	0,31	0,06
FCFF		**1.637**	**975**	**4.748**	**8.886**	**13.148**	**16.995**	**21.453**	**26.059**	**29.775**	**36.124**	**50.981**
WACC		14,99%	14,00%	13,01%	12,03%	11,04%	10,06%	9,91%	9,76%	9,62%	9,47%	9,47%
Cumulated		0,87	0,77	0,69	0,63	0,59	0,56	0,52	0,47	0,44	0,40	0,40
PV (FCF)		**1.424**	**750**	**3.290**	**5.642**	**7.788**	**9.564**	**11.072**	**12.368**	**13.031**	**14.617**	**20.629**
Economic Profit (EP)		2.435	6.839	10.490	13.909	16.034	18.131	21.396	23.229	24.603	28.576	31.469
Invested Capital (IC)	36.197	47.684	69.368	92.420	116.259	137.472	157.019	178.222	197.124	214.800	231.295	234.403
ROIC		21,7%	28,3%	28,1%	27,1%	24,8%	23,2%	23,5%	22,8%	22,1%	22,8%	23,1%

Terminal cash flow	50.981	
Terminal cost of capital	9,47%	
Terminal value	**751.701**	
PV(Terminal value)	304.167	
PV (CF over next 10 years)	79.544	
Sum of PV	**383.711**	
Probability of failure	0,00%	
Proceeds if firm fails	38.371	
Value of operating assets	**383.711**	
Growth option value	76.174	
EV	**459.885**	
- Debt	-2.531	
- Minority interests	-4	
+ Cash	16.253	
+ Non-operating assets	184	
Value of equity	**473.787**	
Number of shares	3.164	
Estimated value /share	**150**	
Price	211	20/10/2023
Price as % of value	141%	

TV	N	N+1	N+2
NOPAT	**52.673**	**54.089**	**55.542**
g NOPAT		2,7%	2,7%
Invested capital (I	**231.295**	**234.403**	**237.553**
g IC on g Sales		50%	50%
g IC		1,3%	1,3%
IC change		3.108	3.150
FCF	36.124	50.981	52.393
g FCF		41,1%	2,8%
WACC	9,5%	9,5%	9,5%
TV	**751.701**		
ROIC	**22,8%**	**23,4%**	**23,7%**
RONIC		**-46%**	**46,8%**
IR		-5,9%	5,7%
WACC	9,5%		
TV	**751.701**		
EP	31.469	32.186	
CV of EP in N+1	339.891		
CV of Delta EP da N+	180.515		
CV of EP	520.406		
TV	**751.701**		

Check all TV *TRUE*

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Appendix 4.16 – Worst Case DCF

Year	0	1	2	3	4	5	6	7	8	9	10	TV
Revenues	81.462	73.026	110.064	143.734	200.706	233.261	252.049	259.870	267.331	288.841	295.241	296.193
% growth		*-10,4%*	*50,7%*	*30,6%*	*39,6%*	*16,2%*	*8,1%*	*3,1%*	*2,9%*	*8,0%*	*2,2%*	*0,3%*
EBIT	13.632	5.350	11.824	17.684	28.106	34.783	39.305	41.956	44.845	50.579	55.639	55.818
EBIT margin		*7,3%*	*10,7%*	*12,3%*	*14,0%*	*14,9%*	*15,6%*	*16,1%*	*16,8%*	*17,5%*	*18,8%*	*18,8%*
Tax rate (t)		*25,0%*	*25,0%*	*25,0%*	*25,0%*	*25,0%*	*25,0%*	*25,0%*	*25,0%*	*25,0%*	*25,0%*	*25,0%*
EBIT (1-t)		4.013	8.868	13.263	21.080	26.087	29.479	31.467	33.634	37.935	41.729	41.864
Reinvestment		0,80	1,12	0,97	0,91	0,78	0,69	0,60	0,53	0,50	0,41	0,01
FCFF		**818**	**-1.053**	**345**	**1.971**	**5.615**	**9.222**	**12.682**	**15.948**	**19.152**	**24.537**	**41.536**
WACC		14,99%	14,00%	13,01%	12,03%	11,04%	10,06%	9,91%	9,76%	9,62%	9,47%	9,47%
Cumulated		0,87	0,77	0,69	0,63	0,59	0,56	0,52	0,47	0,44	0,40	0,40
PV (FCF)		**711**	**-811**	**239**	**1.251**	**3.326**	**5.189**	**6.545**	**7.569**	**8.382**	**9.929**	**16.807**
Economic Profit (EP)		-1.780	1.280	3.657	7.939	11.222	13.756	14.577	15.499	17.935	20.569	22.532
Invested Capital (IC)	36.197	39.861	51.525	65.949	87.592	109.361	130.230	149.107	166.854	186.272	203.438	203.766
ROIC		10,1%	17,2%	20,1%	24,1%	23,9%	22,6%	21,1%	20,2%	20,4%	20,5%	20,5%

Terminal cash flow	41.536	
Terminal cost of capital	9,47%	
Terminal value	**454.090**	
PV(Terminal value)	183.742	
PV (CF over next 10 years)	42.331	
Sum of PV	**226.073**	
Probability of failure	0,00%	
Proceeds if firm fails	22.607	
Value of operating assets	**226.073**	
Growth option value	52.060	
EV	**278.133**	
- Debt	-2.531	
- Minority interests	-4	
+ Cash	16.253	
+ Non-operating assets	184	
Value of equity	**292.035**	
Number of shares	3.164	
Estimated value /share	**92**	
Price	211	20/10/2023
Price as % of value	229%	

TV	N	N+1	N+2
NOPAT	**41.729**	**41.864**	**41.999**
g NOPAT		0,3%	0,3%
Invested capital (I	**203.438**	**203.766**	**204.095**
g IC on g Sales		50%	50%
g IC		0,2%	0,2%
IC change		328	329
FCF	24.537	41.536	41.670
g FCF		69,3%	0,3%
WACC	9,5%	9,5%	9,5%
TV	**454.090**		
ROIC	**20,5%**	**20,6%**	**20,6%**
RONIC		**-41%**	**41,2%**
IR		-0,8%	0,8%
WACC	9,5%		
TV	**454.090**		

EP	22.532	22.599
CV of EP in N+1	238.651	
CV of Delta EP da N+	12.001	
CV of EP	250.652	
TV	**454.090**	

Check all TV *TRUE*

Appendix 4.17 – Multiples Automotive Companies Sample

		EV/SALES			EV/EBITDA			EV/EBIT			EQUITY/NET INCOME		
Company	**Ticker**	**2022**	**2023**	**2024**	**2022**	**2023**	**2024**	**2022**	**2023**	**2024**	**2022**	**2023**	**2024**
Bayerische Motoren Werke AG	BMWG.DE	0,9x	0,8x	0,7x	5,8x	5,5x	4,3x	6,1x	7,7x	5,6x	3,1x	3,8x	2,7x
BYD Auto	002594.SZ	2,1x	1,4x	0,9x	21,9x	12,2x	9,0x	41,6x	35,5x	24,6x	44,5x	42,8x	28,2x
Daimler AG	MBGn.DE	1,1x	1,0x	0,9x	5,2x	5,3x	5,0x	9,0x	10,8x	8,4x	4,7x	4,2x	3,1x
Ford Motor Company	F	1,1x	1,0x	1,0x	9,4x	11,5x	10,3x	28,6x	43,4x	42,2x	-28,4x	9,2x	8,4x
General Motors Company	GM	1,1x	1,0x	0,9x	6,9x	5,4x	4,8x	17,5x	16,2x	13,9x	6,4x	5,9x	5,0x
Honda Motor Co., Ltd.	7267.T	0,6x	0,6x	0,5x	4,2x	3,7x	3,4x	14,6x	11,6x	10,7x	8,7x	7,0x	6,5x
Hyundai Motor Company	005380.KS	1,1x	1,0x	0,8x	10,1x	10,8x	8,6x	15,6x	19,4x	14,4x	7,0x	9,1x	6,5x
Kia Corporation	000270.KS	0,3x	0,3x	0,2x	2,9x	3,0x	2,3x	4,0x	4,5x	3,3x	5,9x	6,2x	4,4x
Mazda Motor Corporation	7261.T	0,3x	0,2x	0,2x	4,0x	4,5x	3,6x	7,5x	7,8x	7,6x	4,5x	9,1x	5,3x
Nissan Motor Co., Ltd.	7201.T	0,9x	0,8x	0,7x	8,8x	9,2x	7,5x	31,6x	39,2x	37,6x	9,5x	19,0x	9,0x
Renault S.A.	RENA.PA	1,4x	1,4x	1,4x	8,0x	10,9x	10,0x	33,2x	77,4x	65,0x	-27,5x	10,5x	18,4x
SAIC Motor Corporation Limited	600104.SS	0,6x	0,6x	0,6x	16,9x	17,0x	17,2x	16,9x	13,6x	14,0x	12,4x	10,4x	10,6x
Stellantis N.V.	STLAM.MI	0,2x	0,2x	0,1x	1,4x	1,3x	0,9x	2,2x	2,4x	1,4x	2,8x	3,3x	1,8x
Subaru Corporation	7270.T	0,3x	0,3x	0,3x	2,6x	2,7x	2,3x	5,0x	7,0x	5,7x	8,3x	11,8x	9,6x
Suzuki Motor Corporation	7269.T	0,6x	0,5x	0,4x	4,9x	4,8x	4,0x	7,5x	8,4x	6,9x	10,2x	9,4x	8,0x
Tata Motors Limited	TAMO.NS	0,8x	0,7x	0,6x	7,8x	6,9x	6,3x	24,9x	69,4x	47,2x	65,3x	27,5x	23,8x
Toyota Motor Corporation	7203.T	1,3x	1,2x	1,1x	10,0x	8,3x	7,3x	18,3x	14,9x	13,0x	10,9x	8,3x	7,4x
Volkswagen AG	VOWG_p.DE	1,1x	1,0x	0,9x	5,9x	5,7x	5,2x	14,6x	15,8x	13,1x	5,2x	5,3x	4,5x
Mean		0,9x	0,8x	0,7x	7,6x	7,2x	6,2x	16,6x	22,5x	18,6x	8,5x	11,3x	9,1x
Median		0,9x	0,8x	0,7x	6,4x	5,6x	5,1x	15,1x	14,3x	13,0x	6,7x	9,1x	7,0x
Std Dev		0,5x	0,4x	0,3x	4,9x	4,0x	3,8x	11,0x	21,3x	17,2x	20,2x	9,5x	7,0x
High Value		2,1x	1,4x	1,4x	21,9x	17,0x	17,2x	41,6x	77,4x	65,0x	65,3x	42,8x	28,2x
Low Value		0,2x	0,2x	0,1x	1,4x	1,3x	0,9x	2,2x	2,4x	1,4x	-28,4x	3,3x	1,8x
Tesla Inc.	**TSLA.O**	9,4x	6,2x	4,0x	43,2x	46,7x	30,7x	56,0x	61,8x	37,8x	61,6x	74,5x	45,3x

Appendix 4.18 – Multiples Disruptor Innovators Sample

		EV/SALES			EV/EBITDA			EV/EBIT			EQUITY/NET INCOME		
Company	**Ticker**	**2022**	**2023**	**2024**	**2022**	**2023**	**2024**	**2022**	**2023**	**2024**	**2022**	**2023**	**2024**
AirB&B	ABNB.O	10,0x	7,8x	5,2x	42,8x	31,0x	20,8x	44,8x	31,0x	20,8x	47,3x	33,0x	22,2x
Apple	AAPL.O	6,4x	5,6x	4,7x	19,4x	17,7x	14,4x	21,2x	19,8x	15,9x	24,2x	22,1x	17,8x
Meta	META.O	5,5x	4,6x	3,9x	15,1x	10,7x	9,3x	19,0x	12,9x	11,2x	27,4x	15,7x	14,1x
Netflix	NFLX.O	6,2x	5,3x	4,7x	9,8x	8,3x	7,4x	34,8x	26,0x	23,7x	40,6x	35,0x	28,6x
Spotify	SPOT.K	2,8x	2,4x	1,9x	-68,3x	117,7x	97,0x	-50,5x	235,5x	97,0x	-79,0x	1205,7x	248,3x
Uber	UBER.K	2,5x	1,8x	1,1x	-1126,3x	18,0x	9,3x	-79,6x	22,4x	11,2x	-8,2x	23,6x	12,1x
Amazon	AMZN.O	3,1x	2,8x	2,5x	21,2x	17,9x	14,7x	130,1x	72,0x	46,1x	-571,4x	92,9x	58,9x
NVIDIA	NVDA.O	21,8x	13,5x	10,0x	55,5x	24,5x	18,7x	65,0x	26,1x	18,0x	69,4x	29,8x	20,9x
Mean		7,3x	5,5x	4,3x	-128,8x	30,7x	24,0x	23,1x	55,7x	30,5x	-56,2x	182,2x	52,9x
Median		5,8x	5,0x	4,3x	17,2x	17,9x	14,6x	28,0x	26,0x	19,4x	25,8x	31,4x	21,5x
Std Dev		5,9x	3,6x	2,6x	378,5x	33,6x	28,0x	61,0x	70,0x	27,2x	199,3x	387,5x	75,2x
High Value		21,8x	13,5x	10,0x	55,5x	117,7x	97,0x	130,1x	235,5x	97,0x	69,4x	1205,7x	248,3x
Low Value		2,5x	1,8x	1,1x	-1126,3x	8,3x	7,4x	-79,6x	12,9x	11,2x	-571,4x	15,7x	12,1x
Tesla Inc.	**TSLA.O**	9,4x	6,2x	4,0x	43,2x	46,7x	30,7x	56,0x	61,8x	37,8x	61,6x	74,5x	45,3x

Appendix 4.19 – Multiples Valuation

	Enterprise Value			Equity
LARGE SAMPLE (2022)	**Sales**	**EBITDA**	**EBIT**	**Net Income**
Large sample median	0,9x	6,4x	15,1x	6,7x
Tesla Performance	81.462	17.668	13.632	12.583
Tesla EV	**72.648**	**113.607**	**206.419**	**83.941**
- Debt	- 2.531	- 2.531	- 2.531	- 2.531
- Minority interests	- 4	- 4	- 4	- 4
+ Cash	16.253	16.253	16.253	16.253
+ Non-operating assets	184	184	184	184
Equity Value	**91.620**	**132.579**	**225.391**	**102.913**
Shares outstanding	3.164	3.164	3.164	3.164
Value x share	**29**	**42**	**71**	**33**

	Enterprise Value			Equity
LARGE SAMPLE (2023)	**Sales**	**EBITDA**	**EBIT**	**Net Income**
Large sample median	0,8x	5,6x	14,3x	9,1x
Tesla Performance	122.283	16.327	12.338	10.405
Tesla EV	**100.952**	**91.880**	**175.852**	**94.850**
- Debt	- 2.531	- 2.531	- 2.531	- 2.531
- Minority interests	- 4	- 4	- 4	- 4
+ Cash	16.253	16.253	16.253	16.253
+ Non-operating assets	184	184	184	184
Equity Value	**119.924**	**110.852**	**194.824**	**113.822**
Shares outstanding	3.164	3.164	3.164	3.164
Value x share	**38**	**35**	**62**	**36**

	Enterprise Value			Equity
LARGE SAMPLE (2024)	**Sales**	**EBITDA**	**EBIT**	**Net Income**
Large sample median	0,7x	5,1x	13,0x	7,0x
Tesla Performance	192.447	24.861	20.196	17.096
Tesla EV	**138.305**	**125.808**	**262.964**	**118.939**
- Debt	- 2.531	- 2.531	- 2.531	- 2.531
- Minority interests	- 4	- 4	- 4	- 4
+ Cash	16.253	16.253	16.253	16.253
+ Non-operating assets	184	184	184	184
Equity Value	**157.277**	**144.780**	**281.936**	**137.911**
Shares outstanding	3.164	3.164	3.164	3.164
Value x share	**50**	**46**	**89**	**44**

	Enterprise Value			Equity
DI SAMPLE (2022)	**Sales**	**EBITDA**	**EBIT**	**Net Income**
Large sample median	5,8x	17,2x	28,0x	25,8x
Tesla Performance	81.462	17.668	13.632	12.583
Tesla EV	**474.806**	**304.585**	**381.306**	**324.530**
- Debt	- 2.531	- 2.531	- 2.531	- 2.531
- Minority interests	- 4	- 4	- 4	- 4
+ Cash	16.253	16.253	16.253	16.253
+ Non-operating assets	184	184	184	184
Equity Value	**493.778**	**323.557**	**400.278**	**343.502**
Shares outstanding	3.164	3.164	3.164	3.164
Value x share	**156**	**102**	**127**	**109**

	Enterprise Value			Equity
DI SAMPLE (2023)	**Sales**	**EBITDA**	**EBIT**	**Net Income**
Large sample median	5,0x	17,9x	26,0x	31,4x
Tesla Performance	122.283	16.327	12.338	10.405
Tesla EV	**605.453**	**292.489**	**320.970**	**326.607**
- Debt	- 2.531	- 2.531	- 2.531	- 2.531
- Minority interests	- 4	- 4	- 4	- 4
+ Cash	16.253	16.253	16.253	16.253
+ Non-operating assets	184	184	184	184
Equity Value	**624.425**	**311.461**	**339.942**	**345.579**
Shares outstanding	3.164	3.164	3.164	3.164
Value x share	**197**	**98**	**107**	**109**

	Enterprise Value			Equity
DI SAMPLE (202)	**Sales**	**EBITDA**	**EBIT**	**Net Income**
Large sample median	4,3x	14,6x	19,4x	21,5x
Tesla Performance	192.447	24.861	20.196	17.096
Tesla EV	**821.769**	**362.358**	**392.074**	**368.317**
- Debt	- 2.531	- 2.531	- 2.531	- 2.531
- Minority interests	- 4	- 4	- 4	- 4
+ Cash	16.253	16.253	16.253	16.253
+ Non-operating assets	184	184	184	184
Equity Value	**840.741**	**381.330**	**411.046**	**387.289**
Shares outstanding	3.164	3.164	3.164	3.164
Value x share	**266**	**121**	**130**	**122**

BIBLIOGRAPHY

Andersen, M., Dauner, T., Lang, N., and Palme, T. (2016). What Automakers Can Learn from the Tesla Phenomenon [online]. Boston Consulting Group, BCG. Available on: https://www.bcg.com/publications/2016/automotive-what-automakers-can-learn-from-tesla-phenomenon.

Anindita, V. (2021). Disruptive Strategy in Disruption Era: Does Netflix Disrupt the Existing Market? International Journal of Business and Technology Management.

Bartman, T. (2015). Confronting a new-market disruption: when disrupting the disruptor is the only way to succeed. The Forum at Harvard Business School.

Beepi Inc. (2016). Study: Americans Feel Taken Advantage of at the Car Dealership [online]. Beepi Inc. Available on: https://www.prnewswire.com/news-releases/study-americans-feel-taken-advantage-of-at-the-car-dealership-300301866.html.

Berger, T., Chen, C., Benedikt Frey, C. (2018). Drivers of disruption? Estimating the Uber effect. European Economic Review.

Bhojraj, S., Lee, M. C. (2002). Who is my peer? A valuation-based approach to the selection of comparable companies. Journal of Accounting Research.

Buffett, W. E. (2000). Chairman’s Letter to the Shareholders. Berkshire Hathaway.

C. Barnes & Co. (2023). Global Forecast for Electric Vehicle Market (2024-2029 Outlook). Barnes Reports - Global Industry Research.

Christensen, C. M. (1992). Exploring the limits of the technology s-curve. Part I and II. Production and Operations Management.

Christensen, C. M. (1997). The innovator's dilemma. Harvard Business Review Press.

Christensen, C. M., Raynor, M. E. (2003). The Innovator's Solution: Creating and Sustaining Successful Growth. Harvard Business Press.

Christensen, C. M., Raynor, M. E., & McDonald, R. (2015). What is disruptive innovation? Twenty years after the introduction of the theory. Harvard Business Review Press.

Ciriaco, R. (2022). Davvero i cinesi di BYD hanno superato Tesla? Non esattamente [online]. Inside EV. Available on: https://insideevs.it/news/596460/byd-tesla-sorpasso-auto-elettriche/.

Corporate Finance Institute (2018). Types of Valuation Multiples [online]. Corporate Finance Institute. Available on: https://corporatefinanceinstitute.com/resources/valuation/types-of-valuation-multiples/.

Corporate Finance Institute (2018). LTM vs. NTM [online]. Corporate Finance Institute. Available on: https://corporatefinanceinstitute.com/resources/valuation/ltm-vs-ntm-valuation-multiples/.

Corporate Finance Institute (2020). Business Life Cycle [online]. Corporate Finance Institute. Available on: https://corporatefinanceinstitute.com/resources/valuation/business-life-cycle/

Cox, N. (2021). BYD's Vertical Integration Makes It the Best EV Pick [online]. Seeking Alpha. Available on: https://seekingalpha.com/article/4450826-byd-vertical-integration-makes-it-the-best-ev-pick.

Damodaran, A. (2008). Damodaran On Valuation: Security Analysis for Investment and Corporate Finance. Wiley.

Damodaran, A. (2008). The Origins of Growth. SSRN.

Damodaran, A. (2009). The Dark Side of Valuation: Valuing Young, Distresses, and Complex Business. Stern School of Business, New York.

Damodaran, A. (2011). The Little Book of Valuation: How to Value a Company, Pick a Stock and Profit. John Wiley & Sons.

Damodaran, A. (2012). Investment Valuation: Tools and Techniques for Determining the Value of Any Asset, 3rd Edition. Wiley.

Damodaran, A. (2013). A tangled web of values: Enterprise value, Firm Value and Market Cap [online]. Aswath Damodaran BlogSpot. Available on: aswathdamodaran.blogspot.com/2013/06/a-tangled-web-of-values-enterprise.html.

Damodaran, A. (2013). Valuation of the week 1: A Tesla Test [online]. Aswath Damodaran BlogSpot. Available on: https://aswathdamodaran.blogspot.com/2013/09/valuation-of-week-1-tesla-test.html.

Damodaran, A. (2014). A Disruptive Cab Ride to Riches: The Uber Payoff [online]. Aswath Damodaran BlogSpot. Available on: https://aswathdamodaran.blogspot.com/2014/06/a-disruptive-cab-ride-to-riches-uber.html.

Damodaran, A. (2014). Applied Corporate Finance, 4th Edition. Stern School of Business, New York.

Damodaran, A. (2018). The Dark Side of Valuation: Valuing Young, Distresses, and Complex Business, 3rd Edition. Stern School of Business, New York.

Damodaran, A. (2018). Netflix: The Future of Entertainment or House of Cards? [online]. Aswath Damodaran BlogSpot. Available on: https://aswathdamodaran.blogspot.com/2018/04/netflix-future-of-entertainment-or.html.

Damodaran, A. (2018). Stream On: An IPO Valuation of Spotify! [online]. Aswath Damodaran BlogSpot. Available on: https://aswathdamodaran.blogspot.com/2018/03/stream-on-ipo-valuation-of-spotify.html.

Damodaran, A. (2018). Twists and Turns in the Tesla Story: A Boring, Boneheaded Update! [online]. Aswath Damodaran BlogSpot. Available on: https://aswathdamodaran.blogspot.com/2018/06/twists-and-turns-in-tesla-story-boring.html.

Damodaran, A. (2019). The Disruption Dilemma: Valuing the Disruptors & Disrupted [online]. Stern School of Business, New York. Available on: https://pages.stern.nyu.edu/~adamodar/pdfiles/country/Disruption2019.pdf.

Damodaran, A. (2019). Tesla's Travails: Curfew for a Corporate Teenager? [online]. Aswath Damodaran BlogSpot. Available on: https://aswathdamodaran.blogspot.com/2019/06/teslas-travails-curfew-for-corporate.html.

Damodaran, A. (2019). Uber's Coming out Party: Personal Mobility Pioneer or Car Service on Steroids? [online]. Aswath Damodaran BlogSpot. Available on: https://aswathdamodaran.blogspot.com/2019/04/ubers-coming-out-party-personal.html.

Damodaran, A. (2020). The Sharing Economy come home: The IPO of Airbnb! [online]. Aswath Damodaran BlogSpot. Available on: https://aswathdamodaran.blogspot.com/2020/12/the-sharing-economy-come-home-ipo-of.html.

Damodaran, A. (2022). META Lesson 3: Tell me a story! [online]. Aswath Damodaran BlogSpot. Available on: https://aswathdamodaran.blogspot.com/2022/11/meta-lesson-3-tell-me-story.html.

Damodaran, A. (2023). Discount Rates [online]. Stern School of Business, New York. Available on: https://pages.stern.nyu.edu/~adamodar/pdfiles/eqnotes/dcfrates.pdf.

Damodaran, A. (2023). Tesla in 2023: A Return to Reality, The Start of the End or Time to Buy? [online]. Aswath Damodaran BlogSpot. Available on: https://aswathdamodaran.blogspot.com/2023/01/tesla-in-2023-return-to-reality-start.html.

Damodaran, A. (2023). Country Default Spreads and Risk Premiums [online]. Stern School of Business, New York. Available on: https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem.html.

Damodaran, A. (2023). Revenue Multiples by Sector (US) [online]. Stern School of Business, New York. Available on: https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/psdata.html

Damodaran, A. (2023). Cost of Equity and Capital (US) [online]. Stern School of Business, New York. Available on: https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/wacc.html

Eichenberg, P. (2023). How Ford is Changing the Car-Buying Experience [online]. QAD. Available on: https://www.qad.com/blog/2023/05/how-ford-is-changing-the-car-buying-experience.

Elder, B. (2023). Tesla robotaxis are worth $700bn, or $870bn, or zero [online]. Financial Times. Available on: https://www.ft.com/content/1e24011c-9865-491d-8a0a-7e6c434180d1.

Evannex, 2022. Learn About Tesla's Giga Press from IDRA: Five-Part Documentary [online]. InsideEVs. Available on: https://insideevs.com/news/563005/tesla-giga-press-idra-documentary/.

Fama, E. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. Journal of Finance.

Ferrari, B. (2023). Ford Motor Moves Deeper into Supply Network Vertical Integration [online]. The Ferrari Group. Available on: https://theferrarigroup.com/ford-motor-moves-deeper-into-supply-network-vertical-integration/.

Gordon, M.J., Eli Shapiro (1956). Capital Equipment Analysis: The Required Rate of Profit. Management Science.

Gupta, M., Maurya, N. (2017). Tesla's Direct to Consumer Retail Model. Ingenious e-Brain.

Hagstrom, R. G. (2013). The Warren Buffett Way: Investment Strategies of the World's Greatest Investor. John Wiley & Sons.

Hayes, A. 2022. What Is an Inefficient Market? Definition, Effects, and Example [online]. Investopedia. Available on: https://www.investopedia.com/terms/i/inefficientmarket.asp#:~:text=Market%20inefficiencies%20exist%20due%20to,creating%20opportunities%20for%20excess%20profits.

Henderson, B. (1973). The Experience Curve - Reviewed (Part II) History [online]. Boston Consulting Group, BCG. Available on: https://www.bcg.com/publications/1973/corporate-finance-strategy-portfolio-management-experience-curve-reviewed-part-ii-the-history.

Ho, J.C. and Chen, H. (2018), Managing the Disruptive and Sustaining the Disrupted: The Case of Kodak and Fujifilm in the Face of Digital Disruption. Review of Policy Research.

Koller, T., Goedhart, M., Wessels, D. (2010). Valuation: measuring and managing the value of companies. McKinsey & Co.

Koller, T., Goedhart, M., Wessels, D. (2016). Valuing high-tech companies [online]. McKinsey & Co. Available on: https://www.mckinsey.com/capabilities/strategy-and-corporate-finance/our-insights/valuing-high-tech-companies.

Kothari, S. (2023). Tesla Semi: Everything we know in August 2023 [online]. Top Electric SUV. Available on: https://topelectricsuv.com/news/tesla/tesla-semi-all-we-know-feb-2022/#Price_Rivals

Limburg, V. E. (2001). Review of Philo T. Farnsworth: The Father of Television, by D. G. Godfrey. Journal of Mormon History.

Markides, C. (2006). Disruptive innovation: In need of better theory. Journal of Product Innovation Management.

McKinsey (2021). Why the automotive future is electric [online]. McKinsey & Co. Available on: https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/why-the-automotive-future-is-electric.

Metrick, A., & Yasuda, A. (2011). Venture capital & the finance of innovation. Wiley.

Mihalascu, D. (2023). Tesla Semi Volume Production Will Not Start Until Late 2024: Musk [online]. InsideEVs. Available on: https://insideevs.com/news/672016/tesla-semi-volume-production-wil-not-start-until-late-2024/#:~:text=However%2C%20Musk%20previously%20said%20the,to%20ramp%20up%20Semi%20production.

Moore, G. E. (1965). Cramming more components onto integrated circuits. Electronics Magazine.

Muduli, A., and Kaura, V. (2011). Southwest Airlines Success: A Case Study Analysis. BVIMR Management Edge. 4.

Munro, A. (2020). EV vs. ICE Cost Breakdown and its Effects on EV Adoption [online]. Munro & Associates Inc. Available on: https://leandesign.com/2020/02/12/ev-vs-ice-cost-breakdown-and-its-effects-on-ev-adoption/.

Murphy, C. B. (2022). Sustained Growth Rate (SGR): Definition, Meaning, and Limitations [online]. Investopedia. Available on: https://www.investopedia.com/terms/s/sustainablegrowthrate.asp.

Musk, E. (2017). La missione di Tesla [online]. Tesla Inc. Available on: https://www.tesla.com/it_IT/blog/mission-tesla.

O'Connell, B. (2019). What Is Terminal Value and How Does It Work? [online]. TheStreet. Available on: https://www.thestreet.com/dictionary/t/terminal-value.

Ottinger, R. (2021). Create Sustainable Success with the 4 Types of Innovation [online]. Freshconsulting. Available on: https://www.freshconsulting.com/insights/blog/the-4-types-of-innovation/.

Ouerghi, D. (2021). German automaker Volkswagen seeks vertical integration to achieve security of battery raw materials supply [online]. Fastmarkets. Available on: https://www.fastmarkets.com/insights/german-automaker-volkswagen-seeks-vertical-integration-to-achieve-security-of-battery-raw-materials.

Parkhani, P. (2019). Full Circle for Vertical Integration: Ford to Tesla [online]. LinkedIn. Available on: https://www.linkedin.com/pulse/full-circle-vertical-integration-ford-tesla-parth-parkhani/.

Peeyush, K., Werner, R. (2023). The times for multiples: Five situations when multiples need more than a second look [online]. McKinsey & Company. Available on: https://www.mckinsey.com/capabilities/strategy-and-corporate-finance/our-insights/the-times-for-multiples-five-situations-when-multiples-need-more-than-a-second-look.

Pentacoff, M. (2018). Author Experience: How to Select Company Peers [online]. Seeking Alpha. Available on: https://seekingalpha.com/article/4224920-author-experience-how-to-select-company-peers.

Petzold, Landinez, Baaken (2019). Disruptive innovation from a process view: A systematic literature review. Creativity and Innovation Management.

Piovaccari, G. (2023). Gigapresses - the giant dies casts reshaping car manufacturing [online]. Reuters. Available on: https://www.reuters.com/business/autos-transportation/gigapresses-giant-die-casts-reshaping-car-manufacturing-2023-02-10/.

Pritchard, T. (2022). What is a Tesla Supercharger? Everything you need to know [online]. Tom's guide. Available on: https://www.tomsguide.com/reference/what-is-a-tesla-supercharger-everything-you-need-to-know.

Ramey, J. (2017). The first Tesla Roadster: A look back at the early adopter's electric car [online]. Autoweek. Available on: https://www.autoweek.com/news/green-cars/a1835876/first-tesla-roadster-look-back-early-adopters-electric-car/.

Randall, C. (2023). Tesla plans to build 375,000 units of the Cybertruck per year [online]. Electrive. Available on: https://www.electrive.com/2023/06/13/tesla-plans-to-build-375000-units-of-the-cybertruck-per-year/#:~:text=Tesla%20is%20apparently%20aiming%20for,in%20the%20course%20of%202023..

Rauwald, C. (2021). VW CEO Tells German Workers Tesla Factory Will Threaten Jobs [online]. Bloomberg. Available on: https://www.bloomberg.com/news/articles/2021-11-04/vw-ceo-tells-german-workers-tesla-factory-will-threaten-jobs?sref=LspfQlRv.

Rogers, E. M. (1962). Diffusion of innovations. New York, Free Press of Glencoe.

Shin, N., Kraemer, K. L., Dedrick, J. (2017). R&D and firm performance in the semiconductor industry. Industry and Innovation.

Simeonov, S. (2006). Metcalfe's Law: more misunderstood than wrong? [online]. Innovation & venture capital in the post-broadband era. Available on: https://blog.simeonov.com/2006/07/26/metcalfes-law-more-misunderstood-than-wrong/.

Snihur, Y., Wiklund, J. (2019). Searching for innovation: Product, process, and business model innovations and search behavior in established firms. Long Range Planning.

Statista (2023). Sports Cars - Worldwide [online]. Statista. Available on: https://www.statista.com/outlook/mmo/passenger-cars/sports-cars/worldwide.

Statista (2023). Ride-hailing & Taxi – Worldwide [online]. Statista. Available on: https://www.statista.com/outlook/mmo/shared-mobility/shared-rides/ride-hailing-taxi/worldwide.

SumZero (2023). TSLA's robo-taxi business, FSD and more with Tom Narayan, Lead Analyst – Global Autos RBCCM [online]. YouTube.com. Available on: https://www.youtube.com/watch?v=BG94iu0CU0I.

Tesla Inc. (2023). Tesla Vehicle Production & Deliveries and Date for Financial Results & Webcast for First Quarter 2023 [online]. Tesla Inc. Available on: https://ir.tesla.com/press-release/tesla-vehicle-production-deliveries-and-date-financial-results-webcast-first-quarter-2023.

Tesla Inc. (2023). Tesla Vehicle Production & Deliveries and Date for Financial Results & Webcast for Second Quarter 2023 [online]. Tesla Inc. Available on: https://ir.tesla.com/press-release/tesla-vehicle-production-deliveries-and-date-financial-results-webcast-second-quarter-2023.

Tesla Reservation Tracker (2023). Cybertruck Production [online]. Tesla Reservation Tracker. Available on: https://sites.google.com/view/tesla-reservation-tracker/cybertruck-production?authuser=0.

Toyota (2023). Battery Electric Vehicles [online]. Toyota. Available on: https://www.toyota-europe.com/electrification/bev.

Velez-Pareja, I. (2004). Proper Determination of the Growth Rate for Growing Perpetuities: The Growth Rate for the Terminal Value. SSRN.

Volkswagen (2020). All Volkswagen retail partners agree new sales model for ID. Family [online]. Volkswagen. Available on: https://www.volkswagen-newsroom.com/en/press-releases/all-volkswagen-retail-partners-agree-new-sales-model-for-id-family-6042

Wayland, M. (2022). Why Toyota – the world's largest automaker – isn't all-in on electric vehicles [online]. CNBC. Available on: https://www.cnbc.com/2022/09/13/why-toyota-the-worlds-largest-automaker-isnt-all-in-on-evs.html.

Winfred B. H. (1964). Profit from the Learning Curve [online]. Harvard Business Review Press. Available on: https://hbr.org/1964/01/profit-from-the-learning-curve.

Wright, T. P. (1936). Factors Affecting the Cost of Airplanes. Journal of the Aeronautical Sciences.

YCharts.com, (2023). 10 Year Treasury Rate (I:10YTCMR) [online]. YCharts.com. Available on: https://ycharts.com/indicators/10_year_treasury_rate#:~:text=Basic%20Info,a%20maturity%20of%2010%20year.

Zaman, R. (2022). Innovation S-curve – episodic evolution. The Waves Journal.

SITOGRAPHY

tesla.com

aswathdamodaran.blogspot.it

pages.stern.nyu.edu/~adamodar

it.reuters.com

bloomberg.com

insideevs.com