

A Work Project, presented as part of the requirements for the Award of a Master Degree in Economics / Finance / Management from the NOVA – School of Business and Economics.

Equity Research Apple Inc.

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In this part, I did a company overview, where I detailed the shareholders structure and Business Structure. Regarding the Business Structure Apple divides itself by region and by product.

For the revenue analysis, I used our value drivers to estimate our future revenues, and I also took into consideration components like population, GDP and Market size.

In the detail of the regions, I briefly described every region. Following that, I talked about the main trends not only regarding the products and Apple itself, but also about some macroeconomics trends. In the end of every region, I came up with a value, that based on my research, I believe is the appropriate to compute in or valuation model.

Regarding the products, I did the same as in the regions but I also took a deep dive into the products history, components, competitors, trends, and established to added value input to compute in our valuation model.

Services
Healthcare
Virtual Reality
Innovation

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Company Overview¹

Apple Inc. is a global company that designs and sells technology hardware products and services. Founded in 1976 in Cupertino, CA, United States of America is the most valuable company in the world. Steve Jobs is well-known as its founder, having led the company from 1996 to 2011. The company employs 154,000 full-time workers, and has more than 500 physical stores worldwide. Apple's main purpose is to create products that enrich people's daily lives. It is considered a revolutionary company, shaping all the segments it operates in.

Apple sells a variety of products that include the iPhone, iMac, iPad, Wearables Home and Accessories. Moreover, Apple sells or earns revenue from numerous services such as Advertising, Apple Care, Apple Store, Subscription Based Services (Apple Music, Apple Arcade, Apple News+, Apple TV+ and Apple Fitness+), Apple Card and Apple Pay fitness service built for the Apple Watch.

Shareholder Structure²

Apple's Shareholder structure is mostly comprised of institutional investors who own 53% of the outstanding shares. Institutional investors such as The Vanguard group, Berkshire Hathaway and BlackRock own 30.88% of the outstanding shares. Public Companies own 5.3% of Apple shares as do individual stakeholders. Tim Cook, Apple's CEO is one of these individual insiders with more than 1 million shares. The remaining 42% is held by the general public.

Over the years, Apple has been repurchasing its own stock through various buyback programs, with the objective of reaching a net cash neutrality position in the upcoming future. In 2020 and 2021 Apple bought back a combined value of US\$77 billion worth of shares³. This was partly prompted by introduced by the Joe Biden Presidency tax reform that obliges Apple to pursue a more optimal capital structure. Such repurchasing leads to increases in shareholder value. Companies typically employ this kind of strategy when they perceive that their stock is undervalued or in a bid to improve financial ratios.

Business Structure

In this section, we are going to analyse each of Apple's product and region. We believe each one has distinguished characteristics and this analysis will be essential for an accurate estimation of Apple's revenues.

Apple is much more than a technology hardware product seller; it is engaged in a wide range of services that are forecast to become the company's main products in the future. The company divides its business primarily on a geographical basis, segmenting it by the Americas, Europe, Greater China, Japan and the Rest of Asia Pacific. The Americas region includes North and South America. Europe includes all European countries, Middle East and Africa. Greater China includes Hong Kong and Taiwan. The Rest of Asia Pacific includes Australia and other Asian countries beyond Greater China and Japan. The Japan region is further segmented due to this country's importance to Apple. Each and every one of the segments is managed separately due to the

¹ Apple Annual Report

² Money CNN

³ Luca Maestri, Apple CFO on investors conference call, April 2021

diversity of every market and in order to achieve a better alignment with the company's clients and distribution partners in these locations. Furthermore, this structure also facilitates rapid and effective management implementation and improves coherence throughout the organisation. Nevertheless, Apple also divides its revenues by product for a better understanding of overall performance. Apple has experienced stable revenue growth since 2010, mainly promoted by the introduction of new products and sales to other regions. Apple has constantly outperformed the majority of analysts' predictions, establishing record revenues year after year. In 2020, sales dropped as a consequence of the Covid19 pandemic, but in 2021 Apple enjoyed an unprecedented rate of growth, greater than those seen in the preceding years. Apple managed to grow 33% in a year⁴, in spite of a global supply chain crisis and silicon chip shortage. This growth was largely driven by iPhone, iPad and Services sales.

In terms of EBITDA, the company has benefitted from astonishing growth, with more than six-fold growth in EBITDA since 2010. We believe that in the future its EBITDA will be even higher due both to the expected continuation of total revenues' increase and the increasing weight of services in Apple revenues (due to the high gross margin of services, being about 70% compared to 35% in the case of products).

Revenue Analysis

In this section, we are going to analyse each of Apple's products and regions. We believe each one has distinguished characteristics and this analysis will be essential for an accurate estimation of Apple's revenues. Our estimation is the result of four steps. First, we identified the value drivers of Apple revenues for the last years. Second, we forecasted the value drivers from 2021 to 2030 and the implicit evolution of Apple's revenues. Third, we thought about external and internal factors that were not being contemplated in the value drivers. At last, we computed how the revenues will vary depending on those factors. One can find the true value of this equity research within the sections below where it can be found a unique approach and analysis resulted from an extensive research.

Value Drivers

For the purpose of estimating future revenues of all the products, the value drivers used were the evolution of the gross domestic product, population, inflation and Industry value.

As a result of the significant contrasts between the different locations in which Apple is present, product sales estimates have been divided according to regions using the respective value drivers for each zone. This way we believed greater accuracy could be achieved when estimating the revenues.

It is important to note that due to insufficient information concerning the division of specific product revenues by the various regions, an equal division has been assumed for all the products depending on the weights of the total revenues by the various regions (for which data is available). Despite the significance of this assumption, we believe that for the purpose of equity research, the loss of accuracy in last years' sales as a result of this assumption is broadly compensated for by an increase in the accuracy of our estimations.

⁴ Apple annual report

It is also important to note that we did not make any division for Wearables. Due to insufficient information for some regions, we thought that the assumptions that we would have been required to make would have been too significant. Thus, the revenues for wearables were calculated globally.

With regard to the value drivers themselves, we started by ascertaining the market share for each of the products⁵. After this, the value of the industry was deducted and its weight relative to the gross domestic product calculated. Following this – and assuming a given and constant weight for the following years – the expected GDP growth was calculated, thus defining the future industry value. Next, making use of our estimations of the evolution of market share for each of the products, we arrived at the nominal value of the revenues. Finally, the value of the revenues with the proper inflation rate was adjusted.

Concerning Services, an entirely different approach was adopted. Specific value drivers were used for each of them. For example, to calculate the revenues for the App Store, we considered the number of iPhones used, the average paid app downloads per Device, the average price per App and the Apple commissions rates. With services being so different from products, it seemed justifiable to use such different value drivers. This allowed for more accurate estimates than if the method previously described in the previous paragraph had been used.

Regions

Americas

This region represents the greatest revenue for Apple. Revenues have been growing since 2016, showing a 77% increase since then. Nonetheless, despite a 23% increase in revenues, this is the region that grew the least in 2021. While Apple agglomerates the different American continents, we believe they must be analysed separately due to the significant differences between them. The Northern continent represents a more mature market, where Apple is the clear market leader; on the Southern continent Apple is weaker, but here there is higher growth potential. Apple feels more comfortable in North America. In this region we can observe steady revenue combined with products and services that are entirely integrated into society. Moreover, this is where the Apple Headquarters are based. Apple is the market leader in every product line, except in the Mac segment. It is interesting to note that not only is the region very important to Apple but, conversely, Apple is also very important to the region. The company has just presented a 5-year plan to invest US\$ 430 billion in the building of a new campus, making investments in green energy, silicon engineering and 5G technology⁶. This will create more than 20,000 new jobs, directly and indirectly benefitting almost 3 million workers in this region. We believe this is of the utmost importance for the American consumer because of their patriotic outlook; they always prefer to buy products from companies who invest locally. During the Trump administration, efforts were made to start assembling some products in the United States, not only to fight unemployment but, also, to boost economic growth. In 2019, iMac Pro assembly moved to the US. This was a failure since almost all the components used came from China and the import costs proved to be extremely high. This resulted in the most expensive product ever introduced by Apple. After suffering a loss of US\$100 million, iMac Pro production was relocated back to China⁷. As a result, it is difficult to foresee Apple

⁵ Stat counter Global Stats

⁶ Apple Investment Plan

⁷ Wall Street Journal

being able to transfer its production to the United States in the short term. This would require several years' investment in new manufacturing facilities while offsetting lower wages and costs from overseas. Displaying the "Made in USA" label on their products is an old dream that would certainly benefit Apple if the company managed to maintain the same sales prices. Nonetheless, for now this is impossible and it is highly unlikely that consumers would appreciate the trade-off between the price increase and the local production stamp. For instance, analysts predict that shifting all iPhone production to the US would represent an increase of 20% in the final price⁸.

In South America, Apple is seen as a social status brand. In poorer countries, owning an Apple product is an outward sign of being successful and wealthy⁹. Since the average income per capita of the South American continent is very low compared to the North American continent, most of the consumers in the former can only afford cheaper options, usually supplied by Chinese and Korean brands. That is why this market is largely dominated by these brands, where they account for more than 50% of the market share. However, considering how Apple has been evolving over the last few years, during which they have launched several affordable product lines (e.g. iPhone SE, Apple Watch SE), continuous increases in sales can be expected in this region. Moreover, several collaborations can be anticipated with companies from this region. Over the last few years, Apple has established several partnerships with big third-party online retailers such as "Mercado Livre" to start selling its products in Mexico and Brazil. With the success of such partnerships, Apple will surely adopt this strategy for the remaining South American countries, especially in Colombia and Argentina through companies such as "Amazon"¹⁰.

Concluding, Apple investors can probably look forward to steady two-digit growth rates over the next decade, mainly powered by the South American region which is set to attain a share of the Americas revenues. Thus we took into account in our valuation a 2% annual increase in addition to the expected revenues driven by the value drivers. In the stable North America region, the expected growth in revenues will derive from population and GDP growth. While the company is heavily investing in new manufacturing facilities, we believe they will not be feasible to move production in less than a decade, due to high costs of changing production sites. Thus we don't expect any decrease or increase in the value drivers' driven in revenues.

Europe

In terms of revenue, this is one of Apple's most stable and secure regions. Overall revenues had been increasing since 2010, with a major growth of 30% from last year. This is accounted for by the increase in iPhone sales, services and iPad. For the past few years, there has been increasing competition in this region from Korean and Chinese manufacturers. Xiaomi and Huawei have gained a significant market share¹¹. But they all lack Apple's quality and brand prestige. This region is composed of highly developed countries, which enjoy higher disposable incomes. This type of consumer in this region is exactly what Apple seeks because such consumers can afford premium products. This has been boosting Apple sales over the years and is expected to continue for the foreseeable future. Nevertheless, the European Union commission has recently approved several

⁸ Bank of America Report

⁹ Stat counter Global Stats

¹⁰ Apple Newsroom

¹¹ Stat counter Global Stats

laws that can impact Apple. All electronics devices should use a single charger, USB type C¹². Apple argues that this bill represents an obstacle to innovation that might harm consumers. Even though, Apple is already using USB type C in devices such as the iPad and the iMac, suggesting future changes towards all the other product lines. Moreover, the right to repair is also being debated in the European Union parliament. Members of the European Union can soon look forward to new laws that will ensure the ability to repair electronic devices¹³. These two measures are important since the EU is committed to reducing its carbon footprint, representing savings of 2,000 tonnes of electronic waste every year. Such measures will present Apple with new challenges and have an impact on its revenue. Furthermore, it is estimated that in 2025, 56% of sales will take place online¹⁴. This is a positive development for Apple since it already has a very well established online store, shipping to all countries in this region.

Apple may also face a further significant challenge in the Europe region: fluctuations in the value of the Euro against the dollar¹⁵. To conclude, we believe Apple revenues will continue to grow in this region. New EU laws will present Apple with fresh challenges that we account to have a negative 5% impact in the revenues until 2024. Other competitors, such as Chinese brands, will gain significant representation in this consumer electronics market, which is already being accounted in each product market share forecast.

Greater China

This is one of the most important regions for Apple. Not only because of the weight it represents in terms of revenue, but also because this is where the majority of Apple's suppliers and production are based.

This region is characterised by a highly competitive market. Local giants such as Huawei and Xiaomi offer cheaper products with features similar to those found on Apple devices. The average Chinese consumer does not value brands and design in the same way as in other regions. Instead, what they most value is price and functionality. That poses a challenge to Apple since there is always a premium to be paid for brand value.

Over recent years in China, not only Apple, but also Huawei and Xiaomi have been obliged to comply with very strict data laws. The Chinese government demands access to confidential data for surveillance and safety reasons. Moreover, more than 55,000 IOS apps have been banned from this region. With any app that is perceived as a threat to the Chinese regime being blocked, the Chinese government created a Chinese version of the App Store¹⁶. Apple's new data storage facility is controlled by Chinese State employees, and the company's encryption technology used in other regions has already been abandoned. This is a clear red flag for the company's internal policy. The option to leave this region would represent a loss of almost 30% of enterprise value¹⁷. However, for China this would represent a loss of over US\$30 billion for their economy and unemployment for more than four million Chinese workers. This would certainly be a lose-lose situation for both parties. Apple finds itself in a Catch-22 situation; either it complies with local laws or it will find itself obliged to leave this region.

¹² European Commission

¹³ European Commission

¹⁴ 2021 European e-commerce Report

¹⁵ Trading Economics

¹⁶ NY Times – Censorship, Surveillance and Profits: A hard bargain for Apple in China

¹⁷ Goldman Sachs Report

It is hard to believe that Apple will leave China in the next decade. There is no other country with the same logistics platform, skilled work and infrastructure to ensure it would remain competitive at this level. Nowadays, Apple's global supply chain is essentially dependent on China¹⁸. This region is the number one supplier of the rare metals critical to manufacturing Apple components. Nevertheless, Apple is steadily developing its production capacity in countries such as India and Vietnam¹⁹. Key suppliers are investing US\$ 900 million in India over the next five years²⁰. Also, part of the AirPods production has moved to Vietnam²¹. This move is a cornerstone in Apple's strategy since it will no longer be fully dependent on a single region for its entire production, mitigating the risks inherent to the company's supply chain and trade tariffs imposed by China and the US.

We believe that the Chinese consumer will start boycotting Apple products the company continuously moves production away from their country. The Chinese government can also make new requests that Apple simply cannot comply with, ultimately resulting in withdrawal from its market. Last year's 70% growth can be attributed to improved iPhone and service sales. This services sector is expected to be worth US\$714 billion by 2025, thus representing an enormous opportunity for Apple²². However, Apple is fundamentally struggling in the services business in this region, due to the censorship of the majority of their services. Apple TV +, Apple Arcade, Apple News, Apple iTunes Music and Movies, Apple Card and Apple books are unavailable in China. Those that are available are heavily monitored by the Chinese government. This region accounts for only 10% of Apple Service revenue. This is a major setback for Apple, since it relies on services as the main driver of future revenues. If the company cannot sell most of their services in the largest internet market in the world, then this will inevitably have a dramatic impact on the company's future.

Overall, we believe that uncertainty in this region will be ongoing, not only due to trade wars with the United States, but also because of the risk of having to comply with sudden legal demands from the Chinese State. For this reason we computed a negative 8% impact on our revenues forecasted for this region. Apple's effort to limit this risk is moving forward through the expansion of their production capacity in other countries. However, revenues still can be expected to continue increasing in this region, but always with the proviso that this scenario is vulnerable to change within a matter of months.

Japan

This region is of very special significance to Apple; there is no other place in the world where its overall market share is so high, not even in the United States²³. Revenues have been constantly increasing, growing 33% from last year.

This market dominance can be attributed to the poorly defined strategy pursued by Samsung. Since WW2, Korea has had a tense relationship with Japan. Symptomatic of this, Samsung even removed all Japanese-related emojis from their systems. No company had ever done anything like this before, and Japanese consumers took this decision so seriously that they began boycotting

¹⁸ Bloomberg Report

¹⁹ Official Apple supply chain manager

²⁰ Reuters Report

²¹ Apple Newsroom

²² Eudfair China

²³ Stat counter Global Stats

Samsung as a result. Samsung attempted to rebrand itself in Japan by changing to Galaxy (their flagship phone) but the success of this sleight of hand has been negligible. Nowadays, one cannot see a Samsung logo in Japan even when buying their electronic devices²⁴. Analysts originally predicted that the iPhone would have only limited appeal to the average Japanese consumer, since all smartphones had a lot of buttons and that was associated with the number of functionalities. However, Apple ended up prevailing in Japan since what its consumers most value is convenience, being something that Apple excels in. Aesthetics have also played a major role in Apple's success story in Japan. Simplicity, ease of use and attention to detail are features that Japanese culture values very highly. And they are prepared to pay a premium price for a product that can deliver these qualities.

Japanese companies like Sony and Sharp were comparatively slow to adapt and their smartphones were clearly less appealing than the iPhone. To compound this, Sony and Sharp were only designing products focusing on the Japanese consumer (Galapagos Syndrome)²⁵, and which were less appealing to consumers around the world. Furthermore, in the other product categories, Apple is well positioned particularly with the iPad, Wearables and Services. Apple iPad dominates 73% of the market²⁶, and we expect 55 Million users in 2026, an increase of 10% since 2020²⁷. In the Wearables category, Apple AirPods and Apple Watch dominate this market. The combined revenues of these products have already overtaken the revenues generated by iMac and iPad. This is also due to their biggest competitor being Samsung which, as mentioned previously, is struggling in this market It's worth mentioning that with regard to the Apple Home Pod, more than 4 million households have smart speakers, and it is expected that in 2024 this will reach 22 million households, an increase of 450%²⁸. The market is driven by smartphones, that are swiftly developing their ability to conveniently connect IoT devices. Japan is well-known for its appetite for incorporating robots and other automated machines into everyday life to maximise convenience. So this is a promising major indicator in the smart speaker market.

We also expect revenue from services to increase in this region. Since the iPhone is comprehensively spread among the population, it is highly likely that Apple Services will be easily adopted.

Overall, we expect that Apple will maintain its dominance in this region. Japanese consumers trust Apple and appreciate, above all, the convenience of their products. Growth in wearables and services will certainly be a major factor in this growth according to our projections. Thus, we added a 5% increase to our forecasted revenues.

Rest of Asia

This region is the one where Apple's market share is the lowest, yet it also represents the biggest opportunity for Apple. The company's business relies heavily on wealthier economies²⁹, where higher prices can be easily afforded. Unfortunately, this is not the case for most Asian countries, where most consumers prefer cheaper products such as the ones supplied by Chinese and South Korean brands. For example in a wealthy country like Singapore, Apple is the clear market leader

²⁴ Apple Explained

²⁵ Medium

²⁶ Statista – Japan Tablet Market Share

²⁷ Statista – Japan Tablet Users Forecast

²⁸ Fuji Research Laboratory

²⁹ IDC

with a 39% market share. But in poorer countries, such as India and Indonesia, Apple has only about 1% of market share.

Apple's strategy should focus on introducing a lower priced model to penetrate this market. Samsung and Xiaomi have taken this path and shown it to be successful. In India, the average price of an iPhone is about US\$750, equivalent to twice the average monthly wage. Samsung and Xiaomi prices range between 200\$ - 300\$ and these brands thus enjoy most of the market share³⁰. Furthermore, the expansion of Apple facilities to other Asian countries such as India and Vietnam can boost Apple sales. Prices should drop due to lower shipping costs and incentives provided for local production³¹. Products manufactured outside India have to pay tariffs. So, for example, Chinese brands have already built production facilities in this country in order to avoid such tariffs³². India is the second largest smartphone market in the world. With Apple already manufacturing in this market and avoiding local tariffs, this may lead not only to a significant increase in market share but, also, to higher revenues. The majority of countries in this region are increasingly investing in the development of their domestic telecom markets, which is also expected to drive the market in this region³³. This can, in turn, lead to an increase in demand for 5G phones that Apple is well-positioned to exploit. As the only brand from outside Asia operating in this market, Apple has been enjoying growth in this region. With a current market share of 16.42%³⁴, it has gained almost 5% in just two years. Nevertheless, we believe this growth trend will not spread out to other Apple products such as the iPad and iMac. A Cisco report predicts that PCs will account for 4% of all internet connected devices, a loss of 2% since 2017³⁵. While, tablets will maintain their current 3% share. This can be seen as a victory, considering that there will be significant increase in products like wearables and smart speakers.

To conclude, more developed countries prefer Apple products over Chinese brands. This pattern is clear across all product lines. We believe that Apple should lower their product sale costs, while consistently avoiding positioning themselves among the most competitive prices. Thus, we computed a 10% increase in our forecasted revenues, since we believe this low price product will be launched. Consumers can still perceive some value in owning Apple products, even in a region where, culturally, brands do not significantly influence consumers' buying decisions. Furthermore, by 2030 this region will represent more than half of world GDP and 60% of its overall economic growth. The rise in population and salaries should benefit Apple over the more affordable competition³⁶. So we increased our estimated revenues by 3%, since we believe it would have a positive impact in Apple's sales.

Products

iPhone

The Apple smartphone, known as iPhone, has played a central role in Apple's recent history. From 2010 onwards, it has repeatedly represented around 50% of Apple total revenues. It attained its most significant weight in Apple revenue in 2015 when it accounted for 66% of total revenues and

³⁰ Counterpoint Research

³¹ Nikkei Analyst

³² Bloomberg Report

³³ GSMA Report

³⁴ Statista – Smartphone Market in APAC

³⁵ Cisco APAC Devices Growth Forecast

³⁶ Understanding Asia in 2030 – Asia Pacific Foundation of Canada

since then, it has experienced a decrease, mostly as a result of the growing weight of services revenue. In 2021, iPhone revenues accounted for 52% of Apple total revenue. In absolute terms, it represented a steady income of about US\$ 150 000 million from 2015 onwards, with a surprising increase to US\$ 190,000 million in 2021.

In order to understand how iPhone revenues can be expected to evolve in coming years, we first need to understand the reason for the boom in revenues over the past year. The main driver of this increase was the 5th Generation of cell phone coverage. 5G is in fact much powerful than 4G. This new technology promises to have much less latency (1 millisecond compared to 200 milliseconds), much more security and to be 100 times faster than 4G. In a completely saturated market, with the subsequent challenge to innovation and standing out from competitors, the adoption of this new technology by iPhone 12 was certainly part of the reason why iPhone sales increased. The remaining part was surely due to Covid-19.

Over 2020, people experienced a unique and unprecedented situation. Because of Covid-19-related lockdowns, people were obliged to stay at home and transfer as much as possible to the digital medium: work, meetings or even family and friend reunions. This digital conversion has led people to place much more value on the equipment they use to access it and to a greater openness to investing in higher quality equipment.

Looking ahead, we think that the following factors should be taken into consideration: the saturation and lack of innovation in the smartphone industry, the impact of Covid-19 and 5G integration.

Regarding the above-mentioned issues affecting the smartphones industry in general, we think that this will decrease the frequency of smartphone replacement. According to a Counterpoint study in October 2017, smartphone users habitually replace their devices every twenty-one months³⁷. Nowadays, and bearing in mind that people can keep the same smartphone for three or more years without feeling they have become obsolete³⁸, we believe that this frequency will approach 36 months in the coming years.

In relation to the impact of Covid-19 on revenue, we are of the opinion that the most significant effects have already been expressed in 2021 sales. With mass vaccination programmes and the consequent return to a 'normal' life, we will probably observe a phenomenon contrary to the recent acceleration in digitalization. However, it is unlikely the world will ever be the same as before and some people/companies will continue to work online. These people will surely use smartphones more frequently and will consequently need better quality equipment and thus be prepared to replace it more often.

On the other hand, Covid-19 has also brought negative impacts such as a shortage of microchips in the market. For instance, JP Morgan has cut its iPhone sales forecasts by 4% for the first quarter 2022³⁹. The expected shortage of microchips over the next two years will probably have a negative impact on sales.

With regard to 5G technology, there is still a lot of potential for development. Not concerning iPhones but for 5G enabling infrastructures. Contrary to the previous technologies (3G and 4G) this new one relies on much higher operating frequencies, reaching millimetre wave bands. The

³⁷ Counterpoint Research

³⁸ Wedbush Analysts Report

³⁹ JP Morgan Report

problem is that these high frequencies have a much shorter range than the lower frequencies⁴⁰. As a result, we currently see carriers using an ideal scenario combination of frequencies (high, medium, and low) which do not enable making the most of 5G⁴¹. As such, the 5G capabilities described at the beginning are not yet visible. For instance, the 5G offered by T-Mobile carrier is just 20% faster than the 4G, instead of the 1000% this technology promised it would deliver. As a result, many customers are still waiting for these improvements and when they do become a reality, Apple will definitely feel the impact on 5G iPhone sales.

In the case of 5G iPhones, Apple is expected to launch a new 5G enabled low-cost iPhone (iPhone SE) in 2022⁴². Due to the limited supply of affordable devices with this technology, this could represent a great boost in the number of iPhone unit sales over the coming year.

In addition to these three factors, it is also important to consider another one: as of 2022, Apple will start to sell self-repair kits for iPhones⁴³. It is highly predictable that this will also have an impact on the frequency with which consumers buy new iPhones and consequently impact on Apple's total revenues. On the other hand, the cost of the repair kits is still unknown and thus it is difficult to forecast how much of the presumed decrease in iPhone sales might be offset by the sales of self-repair kits.

Summing up, in addition to the revenues driven by our value drivers we expect an increase of 2% due to the Covid-19 for the next 3 years (6% increase because of digitalization offset by 4% consequence of chips' shortage) and a flat increase of 3% in the following years; an increase of 2% in the next year followed by a flat increase of 5% in the next years due to 5G developments. Moreover, due to the high market saturation we believe this will have a negative impact of 1% per year and reducing by the same 1% per year, reaching a negative 9% until 2030.

Mac

Apple computers – known as Macs – play an important role in Apple's total revenue. In 2021, they represented 10% of its revenue. Although 10% may seem relatively low, we should not forget that this represents a value of US\$ 35.19 billion. For instance, if the Mac division alone were considered as an independent company, this would still ensure its ranking as a Top100 Fortune500 company. However, it is also known that Macs have been losing relevance in relation to Apple's total revenues. From 2010 to 2021 they went from representing 27% of total revenues to only 10%. As a result, it is important to evaluate what this might mean in terms of the future sales of Apple computers.

A good starting point for attempting such a forecast, is to consider sales figures from the last two years and analyse what might have happened. Mac revenues have been quite stable over the last decade. From 2011 to 2019 they ranged between US\$ 22 to 25 billion with no great variations from year to year. However, they surpassed the US\$ 26 billion barrier in 2020 and reached US\$35 billion dollars in 2021. In our opinion, the explanation that accounts for most of this variation is quite simple, and it is called Apple Silicon. The explanation for the remaining part is also not very complex and it is called Covid-19.

As previously discussed in this report (iPhone Analysis) Covid-19 has transformed the world and

⁴⁰ Business Insider Tech

⁴¹ Tom's Guide

⁴² JP Morgan Report

⁴³ Jeff Williams – Apple COO

the way we live. The increasing need for digitalization has obliged many more people to work from home – particularly online – and one of the consequences of this has been that people in this situation have come to place much greater value on the equipment they use to access their work. With the Mac being considered a high-quality and trustworthy computer, people have increasingly come to regard it as the ideal solution for an “online life”. This surely had a positive impact on Mac sales and will continue to do so from now on (since digitalization is likely to continue, albeit at a slower rate). On the other hand, as in the case of iPhones, we expect to see a negative impact in Mac sales due to the lack of components for microchip production.

Regarding Apple Silicon – Apple’s new processor – this is an absolute ‘game changer’. In response to the limited capacity of Intel’s processors, Apple launched its own computer processor in 2020. As Johny Srouji (senior vice president of Hardware Technologies at Apple) said “Our plan is to give the Mac a much higher level of performance while at the same time consuming less power”. This is, in fact, what happened. But the benefits went beyond this. The scalable architecture of Apple Silicon (ARM technology, as opposed to the x86 architecture that Intel’s chips use) offers not only an “advanced power management and a higher-performance GPU” but also features such as a “secure enclave (for privacy and security), a neural engine for machine learning and an image processing engine”⁴⁴.

Furthermore, the introduction of Apple Silicon represents one more step towards its long-term objective of owning and controlling the primary technologies behind the products that Apple makes. And in the case of computers, their processors are probably their most important technological component. Even so, Apple now owns all the important technologies regarding the computer segment. As the CCS Insight research director Wayne Lam said “Now in computing, they own everything from silicon to the software to how the user moves the mouse around, so it’s tremendously integrated.”⁴⁵. It is important to note that this integration is not only applicable to Apple computers, but also to all Apple products. As mentioned before, this new microchip uses an ARM-based architecture, which is much like the A-series chips that Apple has already been designing for iPhones and iPads for years⁴⁶. This characteristic allows computer users to run iPhone/iPad applications and vice versa.

We believe that this tremendous performance and integration will prove to be a watershed in the computer industry, which will undoubtedly have a profound impact on sales in the upcoming years. However, the introduction of this new technology represents much more than incredible performance and integration. Now, Apple is no longer dependent on Intel, which means more stability and cost savings.

Until now, Apple’s capacity for innovating in the computer segment has been largely dependent on improvements in Intel’s microchips. If Intel did not make any improvement in one year, Apple would be unable to launch a new computer. Now, Apple is entirely autonomous and has already shown to be well ahead of the market.

Regarding costs, it is easy to understand how much Apple will save if one considers how dependent it was on Intel. Looking at the processors market, there are only two players offering

⁴⁴ Tim Cook -Apple Annual Conference

⁴⁵ Gartner

⁴⁶ Mac Rumors

comparably high-quality PC processors: Intel Corp. and Advanced Micro Devices Inc. (AMD)⁴⁷. As such, it is easy to understand how weak Apple's negotiating power was over any of these suppliers. However, the actual cost of the processors is not public, neither for Apple Silicon nor Intel processors. According to the IBM AI strategy lead Sumit Gupta, the cost of Apple Silicon ranges between US\$ 40 to 50, while the price of an Intel processor ranges from US\$ 200 to 250 dollars⁴⁸. Assuming Apple sold about 14 million of M1 Macs in 2020, the adoption of this new silicon chip represented a saving of more than US\$ 2,5 billion.

On the other hand, it could be argued that the amount Apple will save by not buying from a supplier, will be eroded through additional spending on research and development. Although this might seem plausible at first glance, it is not true. Since the technology behind the Apple Silicon is very similar to the processor technology of the iPhone and iPad, all research and development for the processors will actually be diluted by these three products and, consequently, product costs will be reduced not only for the computers but also for iPhones and iPads.

At last, it is important to mention that similar to the case of iPhones, Apple will launch self-repair kits for Mac. Nonetheless, it is quite possible that this development will not have the same impact expected on the iPhone segment since the need for computer repairs is typically far lower than in the case of smartphones. Nevertheless, as previously mentioned in our iPhone analysis, predicting the true impact of the implementation of these kits is no easy task, since the kit's price has not yet been made public.

Summing up, an additional increase in sales can be expected in the coming years due, both to the extraordinary performance of Apple processors (we estimate it to be 15%/year from 2022 to 2025 and stabilize at 5%/year from 2026 onwards) and to the increasingly digital world we live in (6%/year from 2022 to 2024 and 3% afterwards). Subsequently, this will be partially offset by the generalized lack of chip's components available in the market (4% decrease from 2022 to 2024). Also we estimate that the introduction of Apple Silicon will represent a decrease in cost of goods sold of 3%.

iPad

A slowdown in iPad Sales is foreseeable following the recent spike in demand provoked by the Covid-19 pandemic. One needs to go back as far as 2012 in order to find a comparable rate of growth; in 2021 iPad sales grew by 34% compared with 2020.

Also, due to the lack of silicon chips Apple will be obliged to prioritise iPhone and exchange iPad components to meet demand for the iPhone. Pre-Pandemic trends such as gesture recognition, longer battery life and miniaturization, but high repair costs, weak video quality and lack of keyboard can hinder market growth⁴⁹. The Covid-19 pandemic and its repercussions has reshaped how consumers spend their time and where they carry out their work, with the tablet industry particularly benefitting from this context.

Over the next few years, it is expected that people will continue to work, learn and play from home even more than they do now. Vendors have transformed tablets beyond casual gaming or browsing devices as there is greater awareness of their potential for meeting greater productivity

⁴⁷ Investopedia

⁴⁸ IBM

⁴⁹ Nikkei Asia

needs at home. We believe WFH (Work from home) will persist after the pandemic; in 2020, 45% of Americans worked from home⁵⁰ and as a newer, more digital generation enters the job market, companies will start to attract more and more talent through this kind of hybrid work, combining working from home and in physical work locations. This will result in an increase in Tablet and PCs sales, since consumers will be obliged to buy new equipment that matches the same performance as they have in their office work environments⁵¹. But we believe there will be more users choosing tablets than PCs. Due to their portability and large screen size, but more importantly, due to their greater affordability, these devices will predictably provide families with easier access to digital content. It can also be foreseen that tablets will be increasingly used in the healthcare industry in the future, not only for the medical staff to access patient information, but also in the context of a simple medical appointment where the doctor can easily show exam results in a more dynamic way.

Concluding, we believe that iPads will maintain their revenue growth over the upcoming years. More and more people will continue to work from their homes and we believe users will switch to tablet options instead of regular PCs. Thus, we accounted for a 3% increase in our estimated revenues. Also, as in iPhones and Macs we believe that Covid-19 will impact positively the revenues in 2% a year from 2022 to 2024 and in 3% a year afterwards.

⁵⁰ Gallup

⁵¹ IDC