

**MASTER OF SCIENCE IN  
FINANCE**

**MASTERS FINAL WORK  
PROJECT**

EQUITY RESEARCH:  
Samsung Electronics Co., Ltd.

AYLTON HUGO GRAÇA DE MEDEIROS

NOVEMBER 2020

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**SUPERVISOR:**  
PROFESSOR PEDRO RINO VIEIRA

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## Abstract

The following work consists of an Equity Research of Samsung Electronics Co., Ltd. for the year ending 2020F, the assumptions adopted for the forecast of the next five years (2020F-2024F) were based on the historical performance of the past four years (2016-2019). This work was written in accordance with the recommendations of the CFA Institute. I choose to evaluate Samsung Electronics Co., Ltd. on the back of the magnitude and global presences of the brand through its products and services across several industries and sectors where it operates. In addition, my personal empathy with the brand that I have always use since my youth have also motivated and helped me taking this decision. This work was written contemplating public information available until November 3<sup>rd</sup>, 2020, hence, any information or event after this date has not been considered. The main method used for the valuation was the Discounted Cash Flow method, which the result set the price target of ₩ 68 624. Relative methods were also used, which reinforced the BUY recommendation. Despite the current situation of global pandemic where some degree of uncertainty regarding the end of the pandemic and its effects, the starting of the 5G utilization in several countries will boost the stock value. Nonetheless, considering the current global pandemic and the target pricing, we issue a BUY recommendation with medium risk.

JEL classification: G10; G32; G34; G38

Keywords: Equity Research; Valuation; Samsung Electronics Co., Ltd.; Semiconductor; Smartphones; 5G

## Resumo

O seguinte trabalho consiste em uma avaliação do valor das ações da Samsung Electronics Co., Ltd. para o ano 2020, os pressupostos adotados para a previsão dos próximos cinco anos (2020F-2024F) foram baseados no desempenho histórico dos últimos quatro anos (2016-2019). Este trabalho foi elaborado em conformidade com as recomendações do CFA Institute. Eu escolhi fazer este trabalho sobre a Samsung Electronics Co., Ltd. devido a magnitude e presença global da marca através dos seus produtos e serviços nas diversas indústrias e setores onde atua. Além disso, a minha empatia pessoal com a marca que sempre utilizei desde a minha juventude motivou e ajudou-me a tomar esta decisão. O principal método utilizado para a avaliação foi o método do Fluxo de Caixa Descontado, cujo resultado definiu o preço-alvo de ₩ 68 624. Também foram utilizados métodos relativos, do qual os resultados encontrados também reforço a recomendação da COMPRA. Apesar da presente situação de pandemia global onde existe algum grau de incerteza quanto ao final do vírus e das suas consequências, o início do uso de tecnologia 5G em diversos países irão valorizar a ação. No entanto, levando em consideração o grau de incerteza causado pelo COVID-19 e o preço alvo alcançado, emitimos uma recomendação de COMPRA com risco médio.

Classificação JEL: G10; G32; G34; G38

Palavras-Chave: Equity Research; Avaliação de Empresas; Samsung Electronics Co., Ltd.; Semicondutor; Smartphones; 5G

## Acknowledgements

The delivery of this work represents a major accomplishment, the end of a stage that started 2 years ago but planned 8 years ago. The commitment, dedication, and the time management of bad and good times, the losses and gains implicit in wanting to end the Master in Finance, concluding this Master would not be possible without the following people that I would like to thank.

To my pillars, those that gave me strength and support especially in the bad times, my mother Irene Graça, my sister Valmikija Medeiros and my brother Leonardo Medeiros, without you I would not be able to be who I am and get where I got, from the bottom of my heart, my deepest thank you for all.

To my supervisor, Professor Pedro Rino Viera, for his guidance, advice, and availability so that I could present the best work possible, the Lourenço family for their support and trust, to my classmates who directly or indirectly supported and help me through these years, and my co-workers who were a supportive through these 2 years

To my best friend, my “brother” Joel Rocha, for the guidance, advice and encouragement given throughout my university years.

Last but not least, my girlfriend Márcia Formiga for her patience with me in difficult times, for the strength she gave me when writing this work.

Thank you for all,

I just wanted to highlight my motto through my university years and the music that accompanied me for long hours during the preparation of this work.

“The investment in Education pay the best interest” Benjamin Franklin in 1758.

Vivaldi Four Season (Spring1) - Vivaldi (Recomposed by Max Richter).

Arrival of the Birds - The Cinematic Orchestra, London Metropolitan Orchestra

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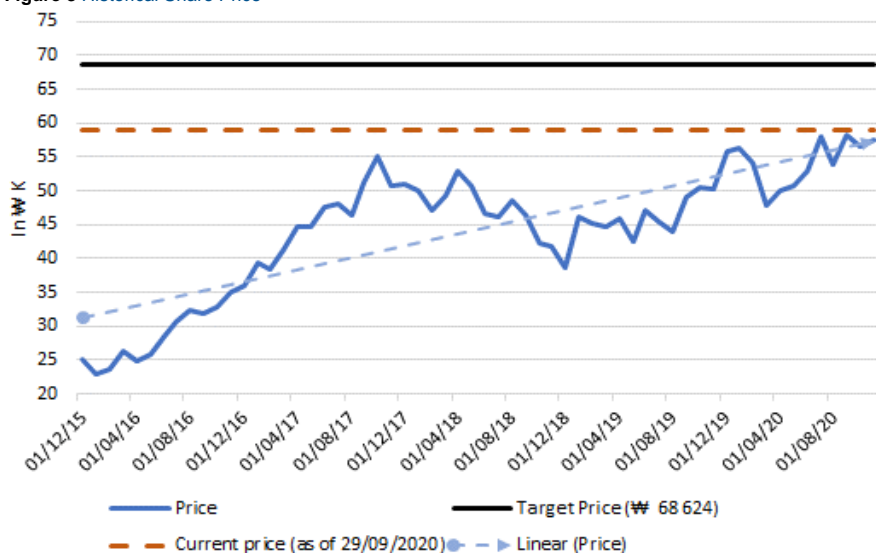
## Pushing the boundaries of 5G innovation.

### 1. Research Snapshot

(YE2020 Price Target of ₩ 68 624 (+17.91%); recommendation is to **Buy**)

We Issue a **Buy** recommendation with medium risk for Samsung Electronics Co., Ltd. (005930.KS) with a 2020YE price target of ₩ 68 624, using the discounted cash flow method (DCF). Relative valuation through DCF and multiples supports our view that the stock is currently undervalued in the Korean Stock Exchange (KSE). This offers a potential 17.91% upside gain from its latest closing price of ₩ 58 200 (as of 29/09/2020), although with a medium risk.

Figure 3 Historical Share Price



Source: Author

- Consolidation of the global presence through most profitable segments.

Samsung Electronics Co. Ltd. has started the mass production of the industry's first 16-gigabit (Gb) LPDDR5 mobile DRAM, using extreme ultraviolet (EUV) technology, the new 16Gb LPDDR5 will boasts the highest mobile memory performance and largest capacity to enable more consumers to enjoy the full benefits of 5G and AI (Artificial Intelligence) features in next-generation smartphones. The semiconductor Company Nvidia announced that its next-generation gaming chip will be manufactured by Samsung.

The new Samsung Galaxy Z Fold2 5G (released in September 2020) will boost the Company's mobile sell worldwide and especially in the American market as Huawei Technologies Co is struggling in its international markets outside of China due to U.S. sanctions.

- Striving to be ahead of the pack on the 5G race.

Samsung has lately won a ₩ 7.9 Tn (~€ 5.7 Bn) contract to provide 5G wireless solution to Verizon Communication Inc until December 2025. That contract may spark a series of long and profitable contracts to provide 5G technology worldwide, taking advantage of the sanctions towards the wireless leader Huawei Technologies Co.

**Buy**  
**Medium Risk**  
**South Korea**

November 2020

Figure 1 Analyst's Risk Assessment

Low **Medium** High

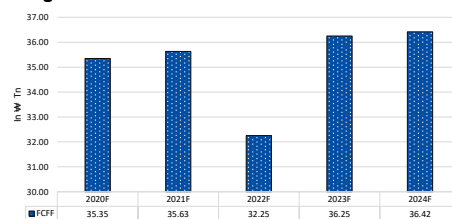
Source: Author

Table 1 Market Profile

Previous Close price	₩ 60 100
Open Price	₩ 60 700
Day High	₩ 60 900
Day Low	₩ 60 100
52 week High	₩ 62 800
52 week Low	₩ 42 300
Volume	15 657 122
Shares outstanding	6.79B

Source: Reuters

Figure 2 Free Cash Flow to Firm



Source: Author

Table 2 Discounted Cash Flow

	In ₩ Tn
Firm Value	425.15
Debt Value	15.46
Equity Value	409.69
Share Outstanding (in Tn)	0.00597
Intrinsic Value	68624
Upside potencial	17.91%
Closing Price (as of 29/09/2020)	58 200
Market value of equity	291.33
EV	261.27

Source: Author

Table 3 Target Prices

Valuation	Target Price
Closing Price (as of 29/09/2020)	₩ 58 200
<b>Discounted Cash Flow</b>	<b>₩ 68 624</b>
EV/Sales	₩ 71 702
P/E	₩ 67 119

Source: Author and Yahoo Finance

## 2. Business Description

### Brief History

Samsung Electronics Co., Ltd. (hereinafter mentioned as SEC, the Company or Samsung) is a Multi-national South-Korean Company founded in 1938. It was originally meant to be a trading Company. Currently, it has several holding companies and subsidiaries united under the brand name of Samsung. It is the largest South Korean conglomerate.

Samsung started in 1938 as a small trading Company located in Su-dong near Daegu city and it was founded by Lee Byung-Chul. He started with only 40 employees and the Company's major business was the production and distribution of groceries within the city. Samsung entered the electronics industry in the 1960's with the formation of several electronics focused divisions. The initial electronics divisions included Samsung Electronics Devices, Samsung Electro-Mechanics, Samsung Corning, and Samsung Semiconductor & Telecommunications. Samsung built its initial facilities in Suwon, South Korea, in 1970, where they started producing black and white television sets.

By 1980, Samsung entered the telecommunications hardware industry with the purchase of Hanguk Jenja Tongsin. Initially building telephone switchboards, Samsung expanded into telephone and fax systems which eventually shifted to mobile phone manufacturing.

### SEC operational segments and revenues by regions

Samsung specializes in 4 core operational segments, which are IM (IT and Mobile communications), CE (Consumable Electronics), DP (Device Panel, which aggregates the sub-segments of Semi-Conductor and Display Panel), and (Ha) Harman. Other operational segments are very small compared with the previous ones; therefore, these segments are agglomerated as "others".

#### IT and Mobile communications (IM)

This segment is mainly engaged in handheld phones, manufacture of computers, network systems, digital cameras, and others. This business segment is the one that generates more volume in sales, representing 47% of consolidated revenues in FY19.

#### Consumable Electronics (CE)

This business segment is mainly engaged in the manufacture of color televisions, monitors, printers, air conditioners, refrigerators, laundry machines among others consumable electronics. In FY19, this segment represented 19% of consolidated revenues.

#### Device Panel (DP)

This segment aggregates the sub-segments of the Semi-Conductor and Display Panel. These sub-segments are mainly engaged in semi-conductor and display parts, including dynamic random-access memories, flashes, thin-film transistor liquid crystal displays (TFT-LCDs), and others. Combined they represent 41% of consolidated sales.

#### Harman (HA)

The smallest segment in revenues, this business unit was acquired in 2017 and is mainly engaged in offers navigation, integrated audio, lighting, car systems, audio and visual products, enterprise automation solutions, and connected services. Consolidated revenues in FY19 accounted for 4%.

#### Revenues by Regions

The Company operates in five continents through several subsidiaries, with most of these subsidiaries been 100% or >95% owned directly or indirectly by SEC. Regarding Geographic sales, most sales are recorded in America (32%) and Europe (19%) followed very closely by other regions.

Figure 4 SEC's logo's evolution since 1938



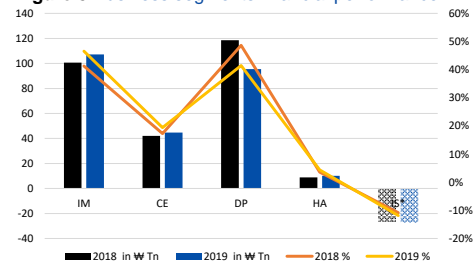
Source: Samsung.com

Table 4 SEC's revenues per segment

Revenues Per Segments	2018		2019		Delta
	in ₩ Tn	%	in ₩ Tn	%	
IT and Mobile communications	100.68	41%	107.27	47%	6.55%
Consumable Electronics	42.11	17%	44.76	19%	6.29%
Device Panel	118.56	49%	95.52	41%	-19.43%
Harman	8.84	4%	10.08	4%	14.03%
(Intersegment sales)	-26.42	-11%	-27.23	-12%	3.07%
Total	243.77	100%	230.40	100%	-5.48%

Source: SEC's Financial Report

Figure 5 Business segments financial performance



Source: SEC's Financial Report

Table 5 Revenues by Regions

Revenues Per Region	2018		2019		Delta
	in ₩ Tn	%	in ₩ Tn	%	
South Korea	33.92	14%	34.18	15%	0.77%
America	81.69	34%	73.85	32%	-9.60%
Europe	42.96	18%	42.10	18%	-2.00%
Asia and Africa	41.99	17%	41.61	18%	-0.90%
China	43.21	18%	38.05	17%	-11.94%
Total	243.77	100%	230.40	100%	-5.48%

Source: SEC's Financial Report

# 3. Management and Corporate Governance

## Corporate Governance

The members of the Board of Directors (the “Board”) are elected by resolution at a general meeting of shareholders and comprise five Executive Directors and six Independent Directors. Executive Directors are elected from candidates recommended by the Board. For Independent Directors, the Independent Director Recommendation Committee recommends candidates through a separate procedure to ensure more deliberate and objective consideration. Based on the annual reports, SEC aims to continuously assess good practices within the governance model. However, scandal can erupt and lead to serious reputational risk as well as the loss of confidence and value for stakeholders. Like the one 2017 when Jay Y. Lee (former vice-chairman) was accused of bribing a friend of the former president in return for government support in a deal. This scandal led the former CEO (Kwon Oh-hyun) to publicly apologize on the Company’s annual meeting. The other one erupted in 2019 when an investigation into allegations that Samsung Group may have orchestrated an accounting fraud in one of the biopharmaceutical units (Samsung BioLogics). We believe that such scandals harm the investor confidence, and a form of mitigation pass through to invest heavier in compliance to strengthen procedures and tighten proper supervision.

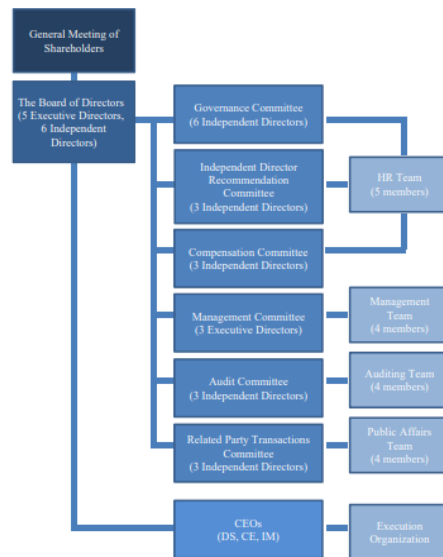
The Company has Directors who have a high-level of expertise and full understanding of the businesses. Accordingly, the Board appoints the heads of the DS, CE, and IM divisions as Executive Directors to participate in the decision-making process. This enables the Board to employ a comprehensive and long-term perspective when making management decisions. Ki-Nam Kim(62) is currently the Vice Chairman & CEO of DS Segment, the 10 years’ experience serving SEC (started in 2010) across several segments has provided him with a deep knowledge, this knowledge combined with a Ph. D. in Electrical Engineering by the University of California provides him strong skills and expertise to lead SEC. Dong-Jin Koh (59) is the President & CEO of the IM segment, he has 13 years’ experience in the mobile communication business within SEC (started in 2007), which couple with an M.S. in Technology Policy from the University of Sussex gives him plenty experience within IM segment. Hyun-Suk Kim(59) is the President & CEO of CE and Digital Appliances Business, his education background (M.S. in Electrical Engineering by Portland State University) and the 11 years’ experience servicing visual display business in SEC (started in 2009) gives him solid knowledge and expertise in CE and digital appliances business. Jong-Hee Han (58) is the President & Head of Visual Display, he has also a long experience in visual display business (9 years) in SEC. He holds and a B.S in Electrical Engineering by Inha University. Yoon-Ho Choi (57) serves as President & CFO, he has deep experience as a CFO across several departments, he has a B.S. in Business Sungkyunkwan University.

The Company’s three mainstay businesses are directed by leading professionals in the relevant field who also participate in the Board as Chief Executive Officers and practice responsible management. The Board needs diverse perspectives in order to make broad decisions. Independent Directors leverage their expertise and skills in myriad fields, including finance, law, engineering, IT, and public administration, to participate in the Board’s informed and objective decision-making process.

## Shareholder structure

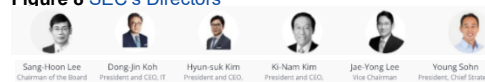
As per Figure 6, we can observe how the Company ownership is structured by the end of 2019. Common stocks account for 99.1% and consequently the preferred accounts for 0.9%. Common stocks are listed in Korean Stock Exchange (KRX) and London Stock Exchange (LSE), whereas the preferred stocks are listed in Luxembourg Stock Exchange (LuxSE) and Korean Stock Exchange (KRX) as well. Roughly 56% of the investor are foreign (such as BlackRock, the Vanguard Group and Harding Loevner LP). Major shareholders accounts for 21% of the shareholder structure, these shareholders are mainly the Company’s directors of holding companies such as Samsung Life Insurance Co. and Samsung Electronics Co. Domestic institution and individual and such as National

Figure 6 Corporate Governance Organization



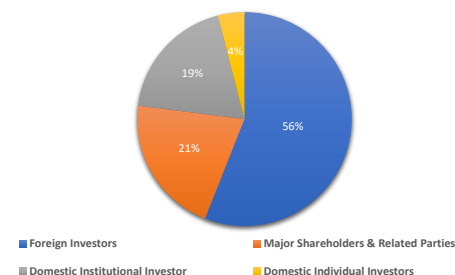
Source: SEC’s Financial Report

Figure 8 SEC’s Directors



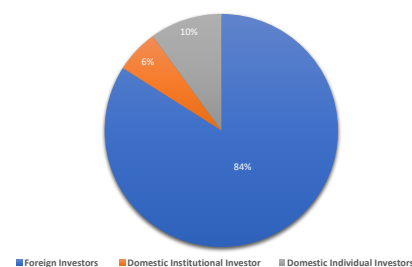
Source: SEC’s Financial Report

Figure 7 Common Stock



Source: SEC’s Financial Report

Figure 9 Preferred Stock



Source: SEC’s Financial Report

Pension Service of Korea, Samsung Life insurance, and Kun-Hee Lee (Chairman) are the remaining investor in shareholder structure.

The Company's internal policy for equitable treatment of shareholders demands that preferred shares do not carry voting rights, so it pays a 1% higher dividend rate annually than do common shares based on face value. So, when dividends are not paid on the common stock, no dividends may be paid on preferred stock.

## 4. Industry Overview and Competitive Positioning

### Global Economy Outlook

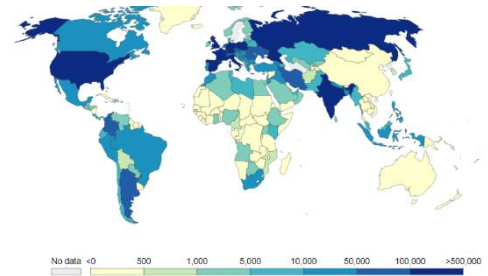
The global economic outlook will be highly affected by the global spread of the new Coronavirus (Covid-19), this pandemic will slow down the economic growth significantly, which will in turn amplify its effects on several sectors including the ones where SEC operates. The growth for 2020 has been steadily revised down as a consequence of the new Covid-19 global pandemic. Services activity has so far been more resilient than investment and trade, this is explained by the fact that services are more virtual, meaning that they can operate without human interaction or physical contact with other humans, while some investments and trades still requires a physical interaction, which is what the Governments of several countries are trying to avoid, by imposing lockdowns and quarantines. Despite that, some industries and sectors are likely to gain momentum as a consequence of the virus' proliferation. Home working tools and confinement restrictions have affected positively some sector, Consumer Electronics, Telecommunication, IT, Digital entertainment, and Healthcare are some of them. Nonetheless, activity is expected to edge down in the second semester of 2020, regardless of when is the end of this global pandemic, the world economy will have a softened recuperation of economic activities such as investment and trade. According to IMF, the annual global GDP growth is projected to drop to -4.4% in 2020, from the weak 2.8% in 2019, the same source foreseen a growth to 5.2% in 2021. Depending on how long the virus lasts, the events unfold very rapidly on the daily bases, thus, there is a higher degree of uncertainty around forecasts. Nonetheless, the economic impact of the coronavirus outbreak is already affecting SEC positively and negatively in some cases all over the world, especially in key markets such as America and Europe.

In **Americas**, the USA that is the largest market in this region will shrink by 6.5pp to -4.3% by year end 2020 after nil GDP growth in the 1Q of 2020. According to Goldman Sachs, the USA will cut their full year forecast to 0.4% growth from 1.2% on expectations for growth of 3% and 4% in the third and fourth quarters and strong gains in early 2021.

In **Europe**, the Covid-19 pandemic has triggered a recession, this region was showing some resilience and begin to show signal of stabilization. Alike other regions, Europe's GDP has been revised down. On the word of European commission estimates that real GDP growth in 2020 will be reduced by 8.8 pp to -7.2%.

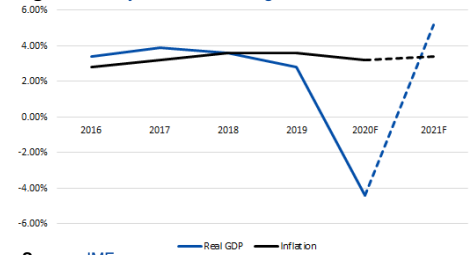
In **China**, according to the worst-case scenario projected by the IMF, China's GDP growth could fall as low as 1.9% in the year end of 2020, a 4.3pp fall compared to 2019. In the early 2020, several plants were temporarily closed in an attempted to slow down the spread of corona virus. However, by the end of 1Q, the official work resumption rate was 98% for large industrial enterprises. Yet, production capacity utilization rates are still far below pre-crisis levels. The production facilities are expected to return to normal by the end of April for industries and by the end of Q2 for services.

Figure 10 Weekly confirmed cases of Covid-19



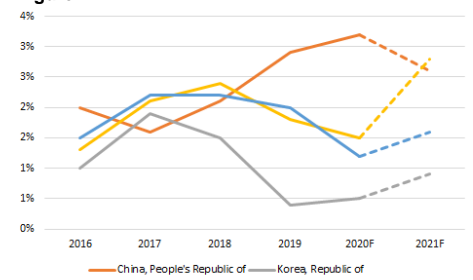
Source: European CDC as of 9/11/2020

Figure 11 Key markets' GDP growth and Inflation



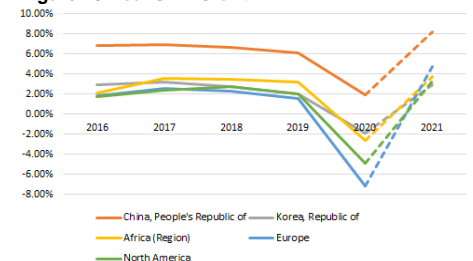
Source: IMF

Figure 12 World's inflation



Source: IMF

Figure 13 Real GDP Growth



Source: IMF

**Segment overview**

IM overview

The IM segment is highly driven by the sales of smartphones. Thus, this overview will be focused on the smartphone industry. The industry had been gradually developing and growing since the introduction of the iPhone 1 in 2007 and the first android phone in late 2008. It had been growing both in market size, as well as in models and suppliers. The negative impacts of the Coronavirus on the smartphone market will be felt throughout 2020 as per the latest IDC projections, smartphones shipments are expected to plummet 11.9% in 2020. On a more long-term basis, the epidemic is expected to result in a 2.3% decline in global shipments for the entire calendar year. Yet, the smartphone A series will continue to perform well, meanwhile, the launch of Galaxy S20 (its premium 5G flagship), supported growth profits in 1S20. Looking forward, as the consumers are limiting the spending and opting for a less expensive replacement option because of the general decrease of GDP, SEC will face an uphill battle, mainly with two new premium devices (Note 20 and Fold 2) coming in the second half of the year. The market was supposed to see growth this year based on early estimates before the outbreak but the situation in the last months forced a re-evaluation of the previous estimates. Again, the uncertainty regards the impacts of Covid-19 in the emerging markets can change projection.

DP overview

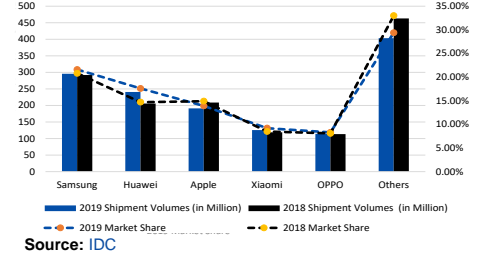
As previously mentioned, DP aggregates 2 semi-segment (Semi-Conductor and Display Panel). The Semiconductor industry is a highly competitive market previously lead by SEC, which was overtaken by intel in 2019 according to the Semiconductor Industry Association (SIA). After an 11.9% contraction to USD 412.1 Bn in 2019, the industry can look forward to growth, SIA projects the industry’s worldwide sales to be USD 426 Bn in the end of 2020 after what was expected to be a relatively weak 2020. Despite suffering from disruption on the supply chain, especially on the supply side given the shutdown of several manufacturing plants across China and South East Asia, the market will post a moderate growth by 6.2% (to USD 452 Bn) in 2021. Demand for chips related to the rapidly growing use of AI will contribute significantly to the industry’s overall growth. In addition, emerging technologies such as 5G, IoT, HPC, and intelligent edge will be fundamental to an overall recovery by the technology sector.

Regarding Display panel industry is dominated by 4 major competitors such as SEC, Sony Corp, Panasonic Corp, and LG Display Co. Ltd. SEC demonstrates leadership in the display panel market via its 85% ownership subsidiary Samsung Display with a Global market share of 24% in 2019 (IHS Technology). Samsung Display is particularly strong in the OLED (organic light-emitting diode) segment for mobile display where the Company held a global revenue share of 92% and a capacity share of 78% in 2019 (IHS Technology). The global display panel market was valued at USD 134.14 Bn in 2019 and is expected to reach USD 171.93 Bn by 2024, registering a Compound Annual Growth Rate (CAGR) of 4.2% during the forecast period between 2020 and 2024. Due to the emergence of highly defined pixel quality display monitors, there is an increasing demand for all sorts of electronic monitor (mainly to computer and high-resolution TV displays). In addition, the increasing number of companies aiming to adopt the home working option in the middle and after the Covid-19 outbreak, will lead to a spike in demand for laptops, PC monitors, and tablets.

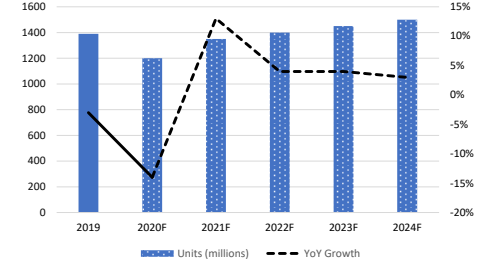
CE overview

The consumer electronics industry was one of the SEC’s segments that was continually growing and evolving until 2019. Despite the consumers main drivers for the demand of consumer electronics will not be affected by confinement and lockdown status on key markets (America and Europe) the disruption on the supply side will be the catalyst for the projected reduction in global sales. Thus, once the manufacturing plants and distribution back to full operational capacity, the industry will rebound, growth will be experienced on the 4Q20 or 1Q21.

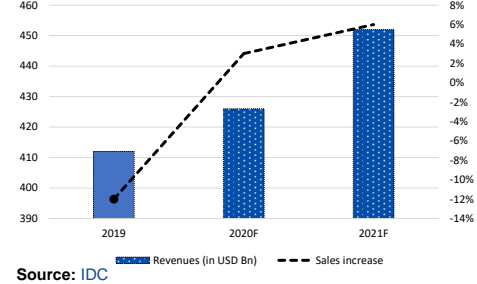
**Figure 14 Smartphone Shipment**



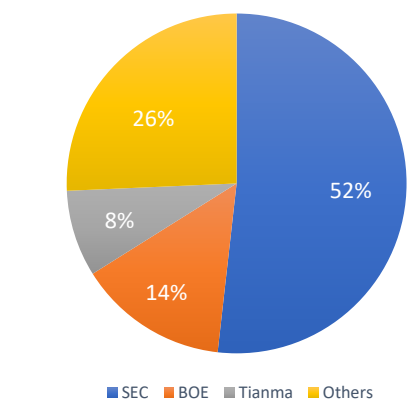
**Figure 15 Forecast for Worldwide Smartphone shipment**



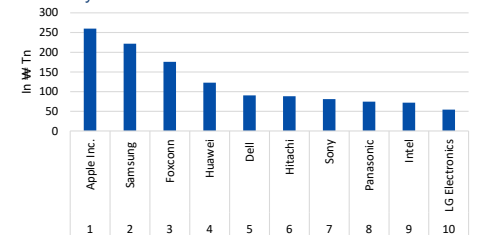
**Figure 16 Semi-Conductor worldwide revenues forecast.**



**Figure 17 World Market Share of Display Panel**



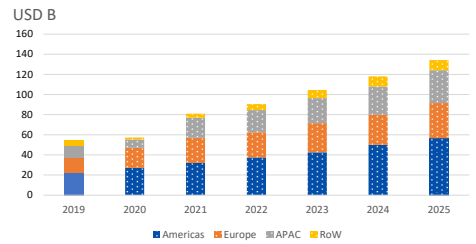
**Figure 18 World top 10 largest electronics companies in the by Revenue in 2019**



**Harman**

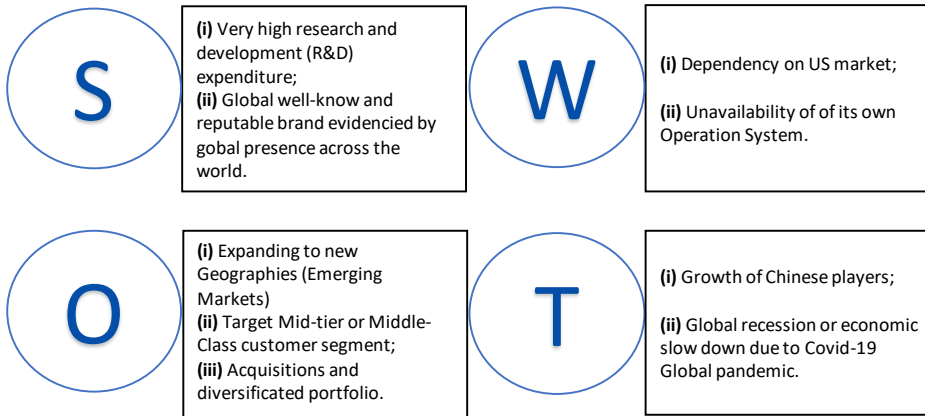
The sector where Harman operates is driven by the consumer end demand for portable audio systems and intergraded sound systems. According to Market Research Firm, the wireless audio device market size was projected to grow from USD 57.3 Bn in 2020 to USD 134.2 billion by 2025; it was expected to grow at a CAGR of 18.6% from 2020 to 2025. Such projection was revised down, and the moment it is uncertain how the industry may behave. On the demand side, factors such as the surge in the global demand for infotainment devices, rise in use of wireless audio devices in the commercial sector, the market growth have been fueled by the increased R&D expenditure to the development of new and advanced wireless audio devices. The market is highly fragmented and low entry cost in terms of capital is increasing the number of new entrants in the market. Thus, assessing the precise market position for Harman within this sector is highly imprecise.

**Figure 19** Wireless Audio Device Market by Region

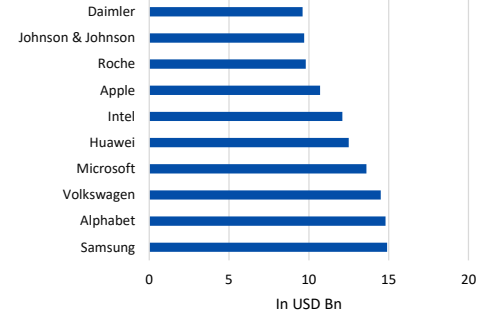


Source: Marketsandmarkets.com

**Competitive Positioning**



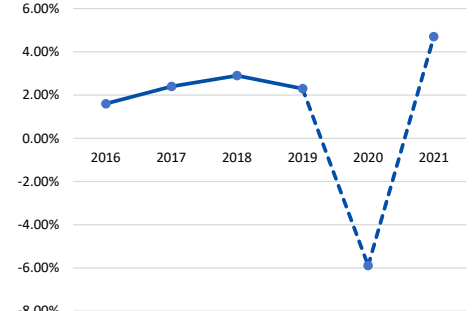
**Figure 20** Top 10 highest spending on R&D



Source: EU Industrial R&D Investment Scoreboard

**Strengths:** (i) Samsung operates 34 R&D centers across the world, and it has spent ₩ 19.21 Tr on R&D in 2019, which was the largest amount spent in the world. R&D spending strongly correlates with a Company’s revenue growth and expansion into the new product markets through innovative and efficient products. (ii) The Samsung brand is one of the most recognizable and reputable brand on the global market, especially for smartphones and consumer electronics goods. This strength is an internal factor that supports the SEC’s ability to grow and expand against competitors.

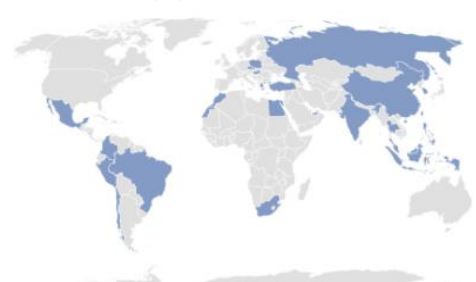
**Figure 21** US Real GDP Growth



Source: IMF

**Weaknesses:** (i) The US market is a key market for SEC’s products. Apart from smartphones, it is a key market for other SEC’s products as well. However, that also leaves Samsung dependent on the US economy to a very large extent and any kind of economic instability (US trade war against China) or uncertainty in the US politics instability will have a severe impact on the overall market position of Samsung and its revenue, which in 2019 accounted for 32% of revenues. (ii) Not having their own Operational System makes SEC dependable on Android Operational System. Thus, all the development and future path are not decided by SEC. Moreover, the switching cost for SEC’s products are practically nil except for Apple’s products. This can lead the consumer’s perception that Android products are inferior to IOS (Apple’s Operating System).

**Figure 22** Emerging Markets



Source: IMF

**Opportunities:** (i) Samsung faces major competition from Apple in the US market and tough competition from Huawei and Xiaomi in the Chinese and Indian markets. As so, the biggest opportunity that SEC currently has is to expand aggressively to new markets and uncharted geographies, whether by price segmentation or product differentiation. (ii) It is the growing middle-class customers in the developing world who are increasing the demand for consumer electronics. The Company should produce products for this customer segment as they are the ones who are bringing the next big wave for product demand on emerging markets. (iii) SEC has a diversified product portfolio, one of the reasons for its strong market competitive position. SEC can strengthen their position through acquisitions and by diversifying into related areas.

**Threats:** (i) The competition in the smartphone and consumer electronics, as well as the semiconductor industry is currently high. Apart from Huawei and other Chinese brands, Apple is a leading competitor of Samsung in the global smartphone market. After having retained a top position in the semiconductor industry, Samsung lost its leadership position to Intel in 2019. The growing competition also causes pressure in the operating costs since the Company may have to adjust the pricing and spend more on R&D and marketing to retain its market position. (ii) The coronavirus has impacted negatively the global economy, with an unexpected and massive negative proportion from the production to sales. Apart from the disrupted supply chain in various regions of the world, the virus may also affect the supply of products worldwide.

### Michael E. Porter's five forces model

Porter's model is used to identify and analyze five competitive forces. These forces determine the intensity of competition and consequently the profitability and attractiveness of an industry. Thus, the model helps companies identify their competitive strategy and understand the industry changes.

#### Threat of New Entrants (Very Low-1)

The hardware industry, more specifically the electronic sector entry is extremely difficult, since it is required a large initial investment, and competition is fierce. In the current economic climate entry in this sector will be extremely difficult. Currently, the easiest entry into the electronics sector would be in a lower legal environment (3<sup>rd</sup> world countries) markets with a smaller scale and local brand, nevertheless the scale would not be enough to compete with SEC's products. In other sophisticated markets, entering this industry could be through excellent design reliability, durability, and cost-effectiveness which could be tremendously costly.

#### Bargaining Power of Suppliers (Very Low-1)

The Company's suppliers are mainly those companies that supply raw material for production. Some of them are important and a key player in their industry, supplying valuable raw material or semi-finished products, so their bargaining power is an important force affecting the Company's position. For those suppliers who supply for instance lithium and plastic in mass quantities, the average credit condition may be more favorable than the most of the suppliers that provide a homogeneous products or services in small quantities, which gives SEC the option to choose other suppliers without major influence on their finished products/services or the costs of them. However, these suppliers' bargaining power is very low due to several important factors: (i) their small size (SME's) compared to Samsung do not allow their bargaining to be strong, so we consider them as low. (ii) These suppliers are distributed all over the world and SEC can easily switch to a new one. (iii) SEC is a major source of income for these suppliers, most often they cannot afford to lose a client such SEC. Therefore, the Company establish the trade conditions that the suppliers are required to follow.

#### Bargaining Power of Buyers (Moderate-3)

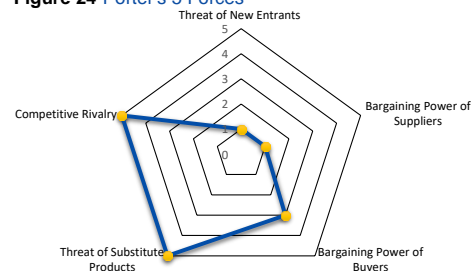
The overall bargaining power of customers is moderate. The reason behind this is that the switching costs are very low for the customers (except for Apple products in IM and CE segments), and they can easily switch to any of the competing brands given the operationally of the products are often the same between brands, especially in IM and CE segments. So, the customers can easily compare brands' products by searching about the brand's feedback. To avoid that, SEC invests heavily in R&D and Marketing & Advertising (₩11.29 Tn) to attract and retain customers.

Figure 23 Top 10 Countries with more COVID-19 cases



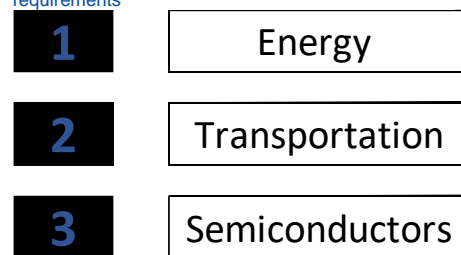
Source: Worldometers as of 08/09/2020

Figure 24 Porter's 5 Forces



Source: The Author

Figure 25 Top 3 industries with largest Capex requirements



Source: Investopedia

Figure 26 SEC's Supply Chain



Source: Samsung.com

Figure 27 Avg. Yearly Trade in Depreciation by operating system



Source: Bankmycell.com



## Threat of Substitute Products (Very high-5)

The assessment cannot be much reliable since there are many products and services across segments. Nonetheless, by focusing on the main segments (IM and CE) the products are easily replaced in a stand of point of the capability, efficiency and cost; the difference can rely on the ability to combine these 3 characteristics and make a product-focused (or not) on one of them. In general, substitute products can do what the Company's products does.

## Competitive Rivalry (Very High-5)

The electronics industry is experiencing fierce competition on the back of the large number of big players with similar size and financial strength. Across all Company's segments, there are huge competitors fighting for market share, some of these competitors are: Apple, Sony, Huawei, Intel, and Asus. These large players are well-known brands with an established brand image, so the technological innovation becomes the primary differentiating factor. Overall, the level of competitive rivalry in the electronics industry is very high.

# 5. Investment Summary

## Recommendation

Considering a stock price of ₩ 58 200 (as of 29/09/2020), and the target price reached of ₩ 68 624 (upside potential of 17.91%) by using the Discounted Cash Flow Method for the end of 2020 (30/12/2020). We issue a **BUY** recommendation considering the medium Risk assessment. Dividends Discount Model was used, but despite fulfilling the criteria for the use of the model, we have disregarded it given the inconclusive value achieved (for more details please refer to "Valuation"). The relative valuation through Multiples (EV/Sales and P/E) demonstrated the recommendation, the average price target of both were ₩ 68 937 with an upside potential of 23.54%, which supported our buy recommendation. Hence, the DCF and the average of multiples shows that SEC is currently undervalued on the market.

## Valuation Methods

In order to evaluate Samsung Electronics Co., Ltd. we used two different absolute valuation methods and Market Multiples. Kindly note that we did not use the Adjusted Present Value (APV) since it works best for companies that maintain the amount of debt, which is not the case for the Company. Free Cash Flow to Equity (FCFE) is also not used since it best suitable for valuing financial institutions.

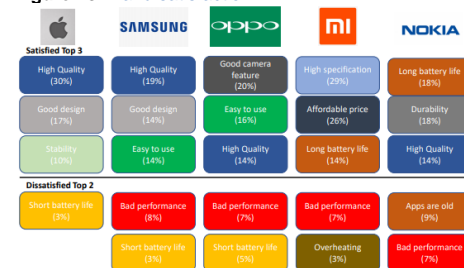
## Discounted Cash Flow

The main method use was the Discounted Cash Flow (hereinafter DCF), which will be the primary method to assess the Company's value. We have chosen this method as a primary method on the back of the following: (i) DCF truly captures the underlying fundamental drivers of the business such as: cost of equity, WACC, growth rate and reinvestment rate. (ii) it relies on FCF that eliminates the subjectivity of the accounting policies, so it is a true and reliable measure of the expected cash left over for the investors. (iii) it takes into consideration several business drivers that we have presented, allowing us to incorporate key changes in the business strategy in the valuation model, which otherwise could be not reflected in other valuation models.

## Dividends Discount Model

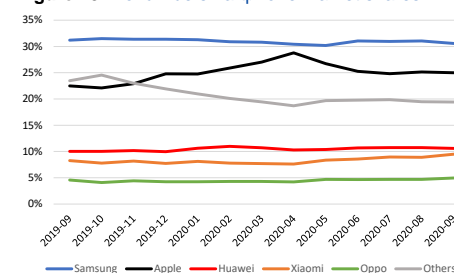
The other absolute method was the Dividends Discount Model (hereinafter DDM), which in our case is suitable since we believe that SEC is on the mature stage of its business cycle, and the Company plan to maintain a high dividend payout policy regardless of the business performance. In addition, minority shareholders have no control over the Company. Hence, investors will receive dividend year on year as they have been receiving consistently in the past years. However, due to the unreliable value achieved, we did not take into consideration for recommendation purposes.

Figure 28 Brand satisfaction



Source: alliedmarketresearch.com

Figure 29 Worldwide smartphone market shares



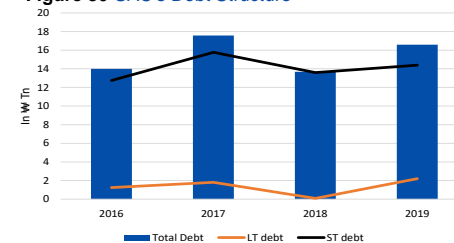
Source: IDC

Table 6 Potential of the valuation Methods

Valuation Methods	Potential
Discounted Cash Flow	17.91%
Dividend Discount	-29.79%
EV/Sales	23.20%
P/E	15.33%

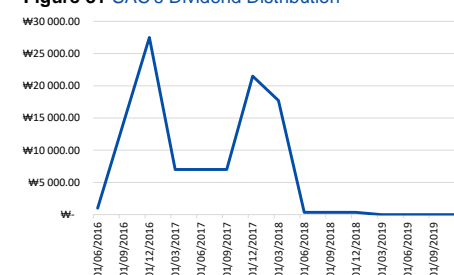
Source: Author

Figure 30 SAC's Debt Structure



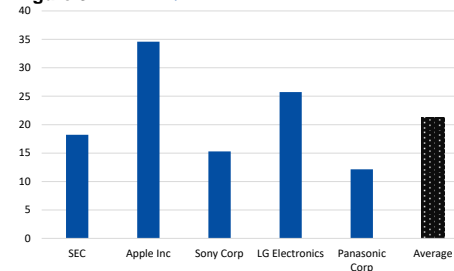
Source: SAC Financial

Figure 31 SAC's Dividend Distribution



Source: Yahoo Finance

Figure 32 Peers' P/E



Source: Yahoo Finance

## Multiple Valuation

The relative valuation we used was the Market Multiples approach, these market multiples are the Enterprise Value to Sales (EV/Sales) and Price to Earnings (P/E). To reach comparable results we composed a peers group selected by several criteria that had to be met to create an accurate group of comparable companies in terms of dimension, structure, global presence, and risk.

### Risks to the methodologies implemented. (For investor's advice)

The investors should be aware of certain risks inherited from the above-mentioned methodologies. For each methodology we advise:

**DCF-** (i) The DCF valuation is extremely sensitive to our assumptions related to the perpetual growth rate and the discount rate assumed. (ii) high degree of confidence about future cash flows. (iii) The terminal value comprises far too much of the total value (~70-80%).

**DDM-** (i) The DDM is based on very broad assumptions about an unknowable future. (ii) The investor must consider the tax effects on the country where its fiscal residence is based as the tax structure is different in several countries.

**Multiples-** For the multiples calculation we have gathered 4 companies that we found most suitable, such companies were Apple Inc, Sony Corp., LG Electronics, and Panasonic Corp. The choice was based on the market capitalization, Industry/sector, and global presence. Please be aware of the following: (i) Some companies may not be fully comparable, nevertheless we group the best suitable companies to reach the most reliable value. (ii) The information on peers companies is public and variable in several sources (for more details on data collections please refer to the "References" section).

# 6. Valuation

## Revenues Forecasting

### America

Revenues in America (North and South America) are expected to increase from ₩ 75.85Tn to ₩ 104.23Tn throughout the forecasted years (2020-2024) on the back of the increasing demand in IM and DP segments despite huge competition in both sectors (mostly by Apple Inc on IT and Intel on DP). The Company shares an oligopoly market with Apple on the IT sector and a perfect competition market but with market leadership in the DP sector. So, a high percentage of the revenues from this region will be through those sectors. In addition, an averaging growing population, and an increasing GDP, combined with demand for handhold electronics and enhanced chips will push revenues until 2024F.

### Korea

The local market is expected to increase on the back of the 5G technology, which will push revenues from IT and mobile communication and CE segments. The revenues will not increase as much in 2020 as it will between 2021-2024F due to the impacts of the coronavirus in the country. Sales forecasts are based on the forecasted GDP growth and the forecasted outlook for the demand of the predominant segments in this country.

### Europe

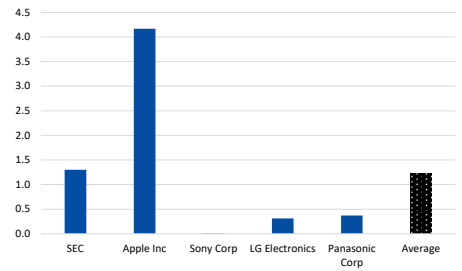
The downward trend in Europe will reverse, mostly due to IT and CE segments.

Figure 33 Peers Selection criteria

	Main segments (IM and CE)	Size	Global Presence	Publicly listed	Peer Company
Apple Inc	✓	✓	✓	✓	Yes
Asus	✓	✓	✓	✓	No
Foxconn	✗	✓	✓	✓	No
HP	✗	✓	✓	✓	No
Huawei	✓	✓	✓	✗	No
Intel	✗	✓	✓	✓	No
LG Electronics	✓	✓	✓	✓	Yes
Microsoft	✗	✓	✓	✓	No
Oppe	✗	✗	✗	✗	No
Panasonic Corp	✓	✓	✓	✓	Yes
SEC	✓	✓	✓	✓	Yes
Sony Corp	✓	✓	✓	✓	Yes
Xiaomi	✗	✓	✗	✓	No

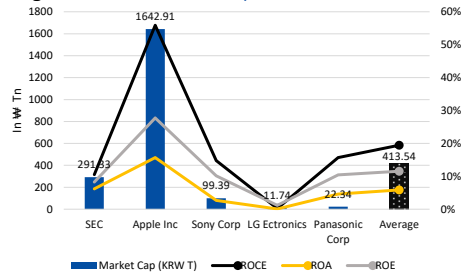
Source: Author

Figure 34 Peers' EV/Sales



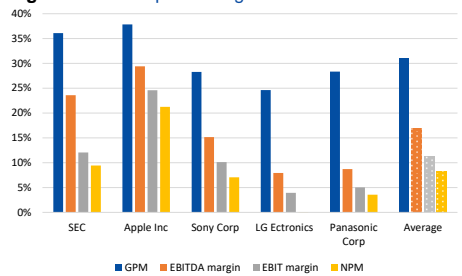
Source: Yahoo Finance

Figure 35 Peers' market cap



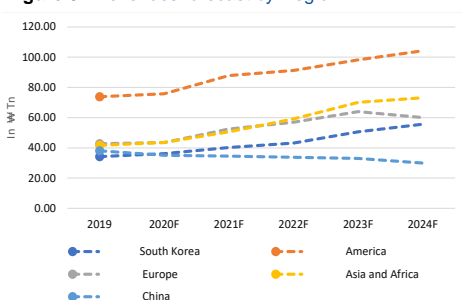
Source: Author and Bloomberg Terminal

Figure 36 Peers' profit margins



Source: Author and Bloomberg Terminal

Figure 37 Revenues forecast by Region



Source: SEC's Financial Report and the Author

Consumers will be driven by the 5G capability in most developed countries in this region (UK, Russia, France, and Germany). The forecast is based on GDP growth for Europe, consumers historical trend and segments outlook.

### China

Chinese market will continue to be challenging as the competition intensifies and the local brands are well established on the local market. Despite the positive outlook for the DP segment, the IT and CE segments will face tremendous competition by big international players and local brands (such as Apple Inc, Huawei, and Xiaomi). Our forecast is based in the GDP Growth and the presence and outlook of the big international players in the local market.

### Asian and Africa

We expect to see a continuous increase in revenues over the next years for these regions. In Africa, we expect to witness a significant increase over the next couple of years in markets such as South Africa, Kenya, Nigeria, Ghana, and Senegal. Alike the African market, the Asian market is expected to increase as well. Increasing consumers power of purchase, general growth in these regions, and mainly the strategic decision to diversified portfolio to aim at mid and low segments consumers will drive revenues to strive until 2024F. Despite several local competitors that supply those consumers with low-cost products and services, the brand and product quality are well recognized, thus SEC will continue to capture a large piece of market share.

### COGS

Over the last 4 years (2016-2019) the Company has registered some fluctuation in Gross Profit Margin (GPM), we believe that the GPM will tend to stabilize over the next 5 years, on an average of 42% starting in 2021. Please note that 2020's GPM was calculated based on the SEC's 1<sup>st</sup> semester of 2020 report.

### Remain Income Statement

The remaining items within the board were computed based on historical averages, please refer to the "Assumption" section for more details.

### Balance Sheet

#### Assets

Most of the items within assets were computed based on historical average, apart from those, the Intangible Assets and Property, Plant and Equipment (PP&E) were computed based on the following assumptions:

- (i) We predict that new patents and acquisitions are likely to occur, representing a 5% growth per annum.
- (ii) We predict that in 2020, the PP&E will be equal to 2019 as the Company will freeze major capex investments. After that, CapEx expenditures will grow 6.98% p.a, which is the CAGR's growth for the previous 4 years.

(For more details on assets forecasting, please refer to "Assumptions" section)

#### Liabilities

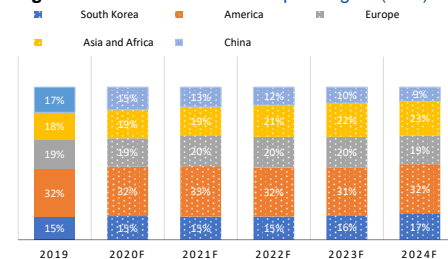
The same principle as for the assets was used for liabilities, most of the items were computed taking into account the historical average (for more details on liabilities forecasting, please refer to "Assumptions" section).

### WACC Assumptions:

#### Weights

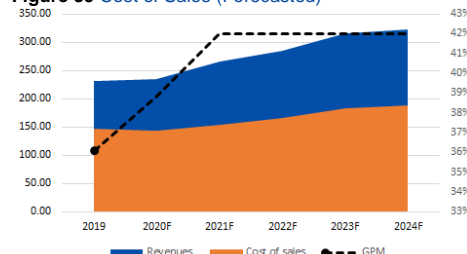
For *W<sub>e</sub>* computation, it was used the Company's market capitalization registered on the 4<sup>th</sup> of May 2020 (on the Korean Stock Exchange by Bloomberg.com), which was ₩ 290.43Tn. And for *W<sub>d</sub>*, it was used the average of the last 2 years of total amount of debt

Figure 38 Forecast of revenues per Region (in %)



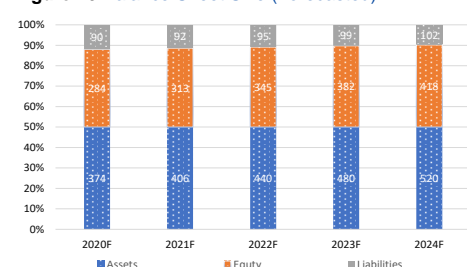
Source: SEC's Financial Report and Author

Figure 39 Cost of Sales (Forecasted)



Source: SEC's Financial Report and the Author

Figure 40 Balance Sheet Size (Forecasted)



Source: SEC's Financial Report and the Author

plus the operating lease commitments, which was ₩ 16.61Tn. Given the amounts, the Enterprise Value stood at ₩ 307.04T. So, Equity weights 94.59% and Debt weights 5.41%, it is assumed that it will not happen any sudden change in capital structure, therefore the current indebtedness corresponds to the target D/E in the long term.

### Cost of Equity

For *Re* computation, it was used the CAPM, which has three variables: *Rf* (Risk Free Rate),  $\beta$  (levered *beta*), market risk premium ( $MRP = R_m - R_f$ ).

- (i) Risk-Free was based on the South Korea 10-Years Government Bond has a 1.499% yield. Although the Company is a multinational Company, its headquarters are based in Seoul (South Korean).
- (ii) To find *Beta*, I started by extracting the SEC's daily price stock and historic price of The Korean Stock Exchange (Kospi) (both with a 5-Year time range). Once computed the daily return of both indexes, the *Beta* was calculated by using the excel function "Slope", which gave the value of 1.28.
- (iii) Market Risk Premium is 5.35% based on Damodaran's Country Default Spreads and Risk Premiums for South Korea as of 5<sup>th</sup> of May 2020.

After computing the three variables, the CAPM was equal to 8.35%.

### Cost of Debt

In order to estimate the cost of debt (*Rd*), it was computed the historical average of interest coverage ratio (%) (please refer to Appendix 4 for more details).

### Corporate Tax

Corporate tax was estimated based on the 4-year historical average, which was 26.74%.

### Terminal Value

To estimate terminal growth, it was assumed the World Real GDP growth by IMF until 2021, which is 5.8%. For a more realistic and conservative approach, we subtract the effects of the forecasted inflation to 2021 that is 4.6% (by WEO) and at the end, we add an adjustment of 0.50% to reach the final value of 1.7%. Worth to be mentioned that the calculation of terminal value is an important part of DCF analysis since terminal value normally accounts for about 70% to 80% of the total NPV.

### **Discounted Cash Flow**

As previously mentioned, the main methodology used to value Samsung Electronics Co. Ltd. was Discounted Cash Flow (DCF). By using the DCF valuation method, a target price of ₩ 68 624 in 2020YE was reached with a potential of 17.91% from its closing price of ₩ 58 200 on 29<sup>th</sup> September 2020. A two-stage FCF model was used to forecast the Company for a period of 5 years (2020-2024F) and a growth rate in the terminal value was assumed. The forecast was based on the following the above steps:

Methodology used:  $WACC = W_e * R_e + W_d * R_d (1-T_x)$

Cost of Equity:  $R_e = \text{Capital Asset Pricing Model (hereinafter CAPM)} = R_f + \beta (R_m - R_f)$

### Dividend Discount Model

On this absolute valuation methodology, we used the Two Stage Dividend Growth Model to reach SEC's intrinsic share value and then compare it with our DCF price. By using this approach, the target value was ₩ 24 196.53 (-57%). However, the result was not in line with DCF recommendation, in contrast, the model gives a selling recommendation. We believe that the discrepancy between the models is given to the fact that the Company have an inconstant growth in dividends (which happened in 2019).

Moreover, this method cannot be reliable since management changes can disrupt the growth rate. Nevertheless, the final result was obtained by assuming the forecasted

Table 7 WACC

WACC	Values
We	94.59%
Re	8.35%
Wd	5.41%
Rd	4.14%
(1-tx)	73.26%
<b>Wacc</b>	<b>8.06%</b>

Source: Author

Table 8 CAPM

CAPM	Value
Rf	1.499%
$\beta$	1.28
MRP	5.35%
<b>CAPM</b>	<b>8.35%</b>

Source: Author

Table 9 Terminal Growth Rate

Terminal Growth Rate	
GDP	5.80%
Inflation	4.60%
Adjustment	0.50%
<b>g</b>	<b>1.70%</b>

Source: Author

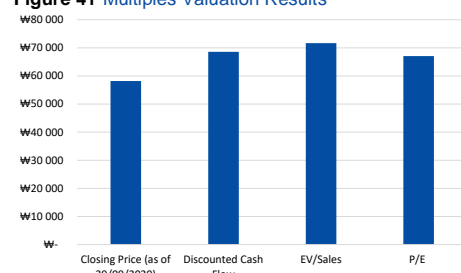
terminal growth rate of 1,7% and discounted at the percentage of 8,35% resulted from the cost of equity.

### Multiples Valuation

As mentioned before the multiples used on the SEC’s valuation were EV/Sales and P/E. Both multiples were used because they are appropriate to compare companies with different leverage and capital utilization. Based on the EV-to-Sales ratio, the SEC price target would be ₩ 70 754 (26.80%). In regard to P/E, it showed a price target of ₩ 67 119 (20.29%).

Thus, both multiples’ results showed that the Company’s stock is undervalued if compared with the closing price. In this case, both multiples support the buy recommendation.

Figure 41 Multiples Valuation Results



Source: Author

## 7. Financial Analysis

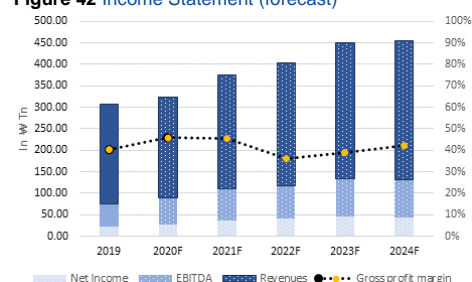
### Income Statement

In 2019 SEC has interrupted the growing trend recorded since 2015, the revenues dropped 5.48% to ₩ 230.40Tn on the back of weaker performance on DP segment (-19.43%), which represent 41% of the consolidated revenues. This decrease in the DP was due to soft demand for some premium products and lower HPC demand from China. However, we expect that the segment will rebound supported by the 1z nano DRAM and 6th generation V-NAND, which coupled with favorable macroeconomic and social conditions related to a ‘stay at home’ trend will boost the overall demand.

GPM evolved negatively (stood at 36% (-10pp)) on the back of the increased price of raw material and currency fluctuation. EBITDA and EBIT margins were highly affected by the continued growth in R&D expenses and higher D&A, which brought down both margins to 24%(-10pp) and 12%(-12pp) respectively.

At the bottom line, net income recorded the lowest value of the past 4 years at ₩ 21.74Tn, representing a net profit margin of 9%. All in all, the Company had a challenging year, resulting in a decrease of revenues and the consequent deterioration of profitability to the shareholders, that witnessed their EPS decrease to ₩ 3 234 (vs ₩ 6 461). Despite lower profitability ratios compared with previous years, we outline the favorable outlook for further years in terms of profitability, according to the management in a 1Q20 release, they are predicting to rebound the profitability in the late 3Q20 or the beginning of 4Q20.

Figure 42 Income Statement (forecast)



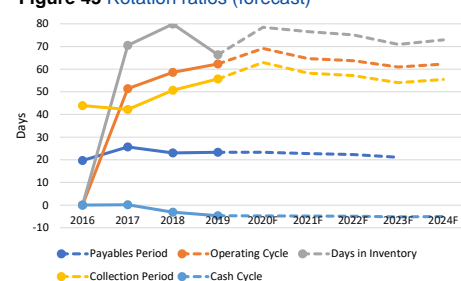
Source: Author

### Balance Sheet

#### Assets

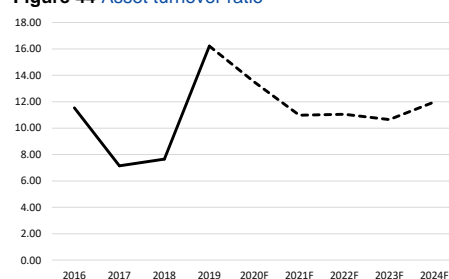
The assets side is largely comprised of PP&E (34% of TA), as a manufacture of electronics goods, their PP&E is mainly composed by Machinery & Equipment, and Buildings and Structures. The 2<sup>nd</sup> largest asset is the short-term financial instruments (21% of TA) that is consisted by derivative instruments. The WC item follows right behind the short-term financial instruments (combining to 20% of TA), the relevant efficiency ratios when compared with peers and the industry’s average reveals a weak WC management by SEC. As per example the collection period (56 Days) exceeds the payables period (22 Days) by 36 days, in addition, the Company held its inventory on average 66 Days, exceeding the collection period and peers’ average. The cash conversion cycle of 62 Days represents a degrading poor efficiency performance. Overall, these ratios demonstrate an inefficient management of resources, with potential liquidity risk by adding pressure to the WC management. However, it’s worth mentioning that SEC is present in the five continents with several subsidiaries which sometimes is difficult to apply WC management policies in all subsidiaries, and the numbers presented represent the average of all subsidiaries.

Figure 43 Rotation ratios (forecast)



Source: Author

Figure 44 Asset turnover ratio



Source: Author

**Liabilities**

On the liabilities side, the equity base has been very strong in the past few years, in FY19 equity was funding roughly 75% of assets. While the outstanding percentage was mainly composed by deferred income tax liabilities and WC items. Concerning debt, solvency ratios have shown stable and balance leverage levels throughout historical years, the Company’s debt metrics are below peers and within industry average, demonstrating a solid capital structure. WC items are gradually increasing since FY17, and in FY19 trade account payables were at ₩ 8.72Tn, representing a collection period of 56 Days.

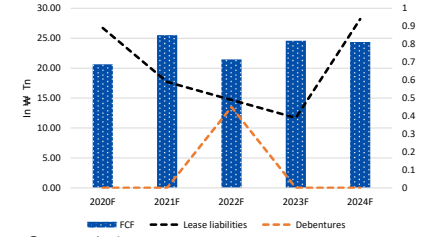
**Cash Flow Statement**

A lower net income coupled with negative Net Working Capital led to the lowest NOCF of the past 3years (₩ 45.63T). Net Working Capital is expected to be negative in all the forecasted years except for 2021 (mostly explained by the inflow on inventory and trade account receivables). The reason behind such expectation lays on the following predictions: (i) giving the market conditions the bargaining power over the clients may deteriorate and lead to wider credit periods, and (ii) the bargaining power over the suppliers may enhance and consequently leading to a larger payables periods.

**Overall investment profile**

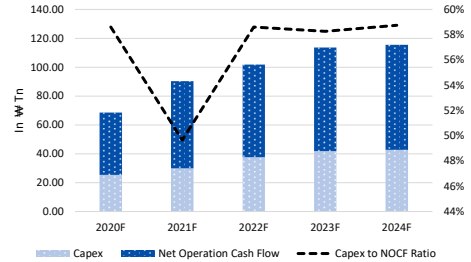
Concerning the overall ratios, the Company shows a healthy financial profile on the back of satisfactory profitability despite lower revenues in 2019, with ROE of 8% and ROCE 11%, which despite below peers average, the forecast indicates an improvement on both ratios, all **profitability ratios** are adequate and are expecting to enhance or keep reasonably stable until 2024. The Company’s **solvency ratios** are been kept stable throughout the historical years. And we anticipate it will continue to be as it is or be improved, with special attention to Debt-to-Equity Ratio that is expected to be very low (around 0.24x to 0.32x) as well as Debt-to-EBITDA (0.25x to 0.20x), which when compared with peers do not shows a warning position taking into account the size and the very good credit rating from international credit agencies. **Liquidity ratios** are strong and expected to strengthen throughout the forecasted period. Which goes in line with the board’s sustainable growth strategy. Regarding **Efficiency Ratios**, we anticipate some setbacks towards WC management. Nevertheless, given the solid cash reserves, we do not anticipate critical problems. All in all, taking into consideration the FY19 financials and the respective ratios, combined with the forecasted ratios figures until 2024, we issue a Buy recommendation as we believe that the Company will be able to run the business successfully and simultaneously adding value to their stakeholders.

**Figure 45 Lease liabilities & Debentures Vs FCF**



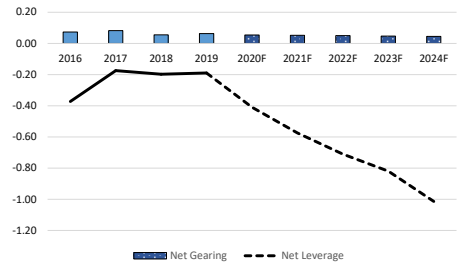
Source: Author

**Figure 46 NOCF vs Capex (forecast)**



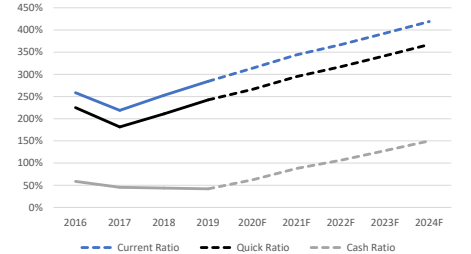
Source: Author

**Figure 47 Net Gearing vs Net leverage**



Source: Author

**Figure 48 Liquidity metrics**



Source: Author

## 8. Investment Risk

**Operational Risk | Distribution Channel (OR1)** – SEC’s expanding strategy relies on a good distribution channel and strategical relationship with suppliers by leaving distributors in charge of developing customer relationships, the Company retain limited or no direct contact with final customers, therefore establishing or maintaining a good strategical relationship can offset the risk of not provide technical support and other value-added services to customers. “Medium/Medium”

**Operational Risk | Information Security (OR2)** – Tech companies have their designs and technology patented and protected against other companies, however the potential leaks of information on new technologies or design as well as industrial espionage can cost millions on revenues and R&D projects. “Medium/High”

**Operational Risk | Data Compromise (OR3)** – SEC could be targeted to cyber theft or accidental disclosure of the Company’s and clients’ confidential information. A leak of clients’ information is a reputational risk that can damage the clients’ confidence in the Company’s security. “Low/Medium”

**Market Risk | Competition Risk (MR1)** – The Company is been experiencing growing competition. Throughout all the main segments, the industry is expected to face partnerships, mergers & acquisitions in the upcoming years. Which will make competitors bigger and eager to gain market share. Across all segments, some competitors will compete through price and/or product differentiation, which may lead the changes in a global or local market share. “Low/High”

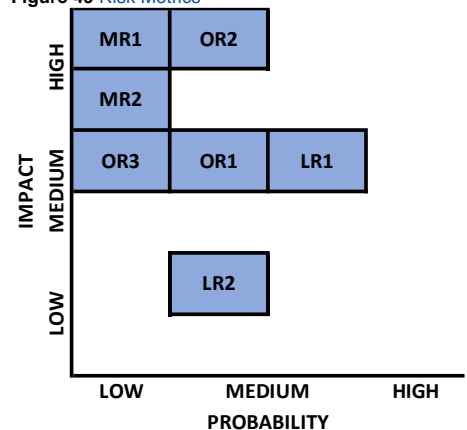
**Market Risk | Product Quality and Innovation (MR2)** – SEC as a tech Company must be updated technologically throughout its life cycle, the risk of not innovate in technology and deliver a good quality product is a key risk in this industry. It can lead to a reduction in sales, client loyalty and brand degrading image. The Company currently has 35 R&D Center worldwide, spent ₩ 19.91Tn in R&D expenditure in 2019, which is the highest R&D spending in the world. To ensure a high-quality delivery product, SEC runs several quality tests and meets its obligations in terms of safety and conformity of the products it manufactures, both internal and externally required. “Low/High”

**Legal Risks | Legal Cases (LR1)** – Legal cases and lawsuits can lead to reputation risks depending on the size and the country of the legal cases. Such legal cases can threaten the Company’s revenues and public perception of the brand. On the top of that, there’s heavy fines and penalties in cases of “negative outcome”. Yet, legal fees must be paid regardless of the cases outcome. “Medium/Medium”

**Legal Risks | Compliance Risks (LR2)** – Complying with legal and ethical standards in business conduct, is one of the risk priorities for Company’s sustainable growth. Noncompliance of corruption, labor force and Human Right practices can jeopardize a Company’s brand and consequently presents a reputational risk. To mitigate this risk, the Company puts in actions several programs such as Compliance Program Management System (CPMS) is in charge to report compliance violations, Ethics Management System to offset corruption practices, and GHRP Portal & Global Environment, Health and Safety System to comply with labor standards and environment & safety of workplaces and products. “Medium/Low”

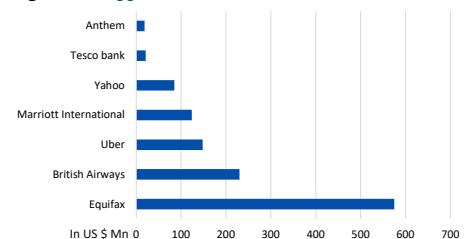
**Legal Risk | Products Regulation (LR3)** – SEC operates in highly regulated industries, where international and local entities impose several policies and procedures to be followed. The failure or non-compliant of these mandatory policies can jeopardize an entry or maintenance in certain markets. “Low/Medium”

Figure 49 Risk Metrics



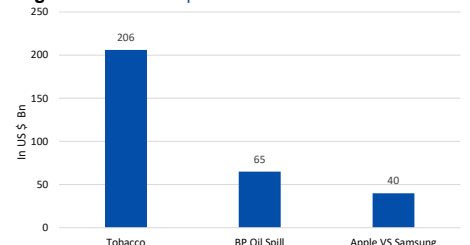
Source: Author

Figure 50 Biggest data breach fines



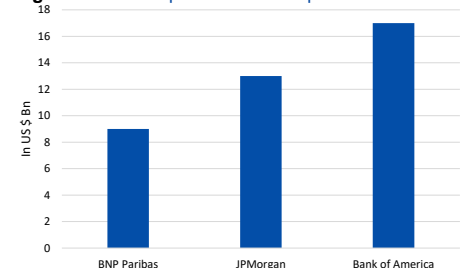
Source: CIO.com

Figure 51 3 Most expensive court cases in US



Source: Court Reporters and Reuters

Figure 52 Most expenses non-compliance fines



Source: Planetcompliance.com

## Sensitivity Analysis

A sensitivity analysis has been conducted to assess the impacts of several rates in our price target of ₩ 68 624 (based on DCF). Such analysis was completed using key components (variants) used to reach the target value, those components used were the Change in Beta, Terminal Growth Rate, Market Risk Premium and WACC.

As previously mentioned, the Terminal Growth Value comprises about (~70-80%) of the price target. Noting that, we choose to perform a sensibility analysis between the Terminal Growth Rate and WACC. The variation of the terminal growth rate, will led to a significant impact in the stock price as observed on table 11, the stock price can fluctuate between ₩ 55 614 (decrease of 4.44%) and ₩ 97 822 (increase of 68.08%) in the worst and best-case scenario, respectively.

**Table 11 Sensibility Analysis on the change in Terminal Growth Rate and WACC**

Change in Terminal Growth Rate	Change in WACC							
	₩ 68 624	6.54%	7.04%	7.54%	8.06%	8.54%	9.04%	9.54%
1.40%	₩ 88 954	₩ 80 154	₩ 72 847	₩ 66 473	₩ 61 443	₩ 56 920	₩ 52 988	
1.50%	₩ 90 285	₩ 81 212	₩ 73 702	₩ 67 168	₩ 62 023	₩ 57 406	₩ 53 398	
1.60%	₩ 91 671	₩ 82 310	₩ 74 586	₩ 67 885	₩ 62 620	₩ 57 905	₩ 53 819	
1.70%	₩ 93 113	₩ 83 448	₩ 75 500	₩ 68 624	₩ 63 235	₩ 58 418	₩ 54 251	
1.80%	₩ 94 617	₩ 84 630	₩ 76 446	₩ 69 387	₩ 63 868	₩ 58 945	₩ 54 693	
1.90%	₩ 96 185	₩ 85 858	₩ 77 425	₩ 70 175	₩ 64 520	₩ 59 486	₩ 55 148	
2.00%	₩ 97 822	₩ 87 134	₩ 78 440	₩ 70 988	₩ 65 192	₩ 60 043	₩ 55 614	

Source: Author

According to the above table, we conclude that by keeping WACC constant not even a change by 30-bps in the Terminal Growth Rate would change our recommendation to Buy. In the other hand, if we keep *g* constant, it is necessary a 50-bps increase in WACC to change our recommendation to Hold. Hence, a change in WACC would have a higher volatility in prices.

In the below table, we have computed the sensibility between the Beta ( $\beta$ ) and Market Risk Premium (MRP). We have observed that stock price can fluctuate between ₩ 56 814 (decrease of 2.38%) and ₩ 84 515 (increase 45.21%) in the worst and best-case scenario, respectively. We do not anticipate major changes in the South Korean Country Default Spreads and Risk Premiums. Hence, maintaining Beta ( $\beta$ ) steady, it would necessary more than a 10-bps increase to change our recommendation to Hold.

**Table 12 Sensibility Analysis on the change in Beta and Market Risk Premium**

Change in Beta	Change in Market Risk Premium							
	₩ 68 624	5.05%	5.15%	5.25%	5.35%	5.45%	5.55%	5.65%
1.13	₩ 84 515	₩ 82 645	₩ 80 850	₩ 79 126	₩ 77 470	₩ 75 878	₩ 74 346	
1.18	₩ 80 439	₩ 78 658	₩ 76 949	₩ 75 308	₩ 73 732	₩ 72 216	₩ 70 757	
1.23	₩ 76 716	₩ 75 016	₩ 73 386	₩ 71 821	₩ 70 317	₩ 68 871	₩ 67 480	
1.28	₩ 73 302	₩ 71 678	₩ 70 120	₩ 68 624	₩ 67 187	₩ 65 806	₩ 64 477	
1.33	₩ 70 162	₩ 68 607	₩ 67 116	₩ 65 684	₩ 64 309	₩ 62 987	₩ 61 716	
1.38	₩ 67 264	₩ 65 774	₩ 64 345	₩ 62 973	₩ 61 655	₩ 60 388	₩ 59 169	
1.43	₩ 64 584	₩ 63 153	₩ 61 781	₩ 60 464	₩ 59 199	₩ 57 984	₩ 56 814	

Source: Author

## Monte Carlo Simulation

In order to perform the Monte Carlo's simulation, we used the Crystal Ball program, which the results were based on ten thousand trials considering 8 assumptions (Gross Profit Margin, Cost of Debt, Market Risk Premium, Beta, Risk-free, Cost of Debt, Terminal Growth Rate and interest rate). Such assumptions were chosen since they have more impact on our price target, the results reported a mean price target of ₩ 68 923 (upside potential of 18.42%). The distribution resulted from the trials had a skewness of 0.06, which represents a very low probability of the price target to reach extreme values. Moreover, having a kurtosis of 2.95, which is slightly lower than a normal distribution (3) means that its tails are lighter when compared with a normal distribution.

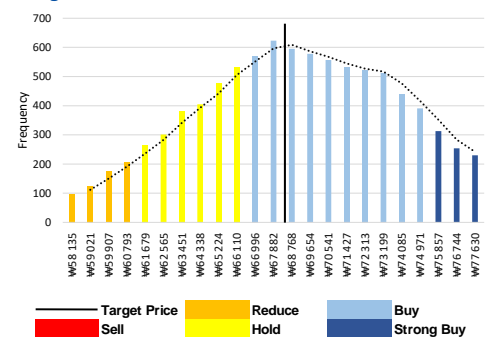
In regard to the Monte Carlo sensitivity price distribution, the R&D expenses, the Revenues and the tax expenses are the variables that have a higher impact on SEC's price target. Lastly, according to the simulation, there is only a 4.02% probability to have an intrinsic value lower than the price target, and a 62.73% probability of a Buy recommendation (Intrinsic value  $\geq$  ₩ 64 021).

**Table 10 Recommendation System**

Level of Risk	Sell	Reduce	Hold	Buy	Strong Buy
High Risk	0% $\leq$	>0% & $\leq$ 10%	>10% & $\leq$ 20%	>20% & $\leq$ 45%	>45%
Medium Risk	-5% $\leq$	>-5% & $\leq$ 5%	>5% & $\leq$ 15%	<b>&gt;15% &amp; <math>\leq</math>30%</b>	>30%
Low Risk	-10% $\leq$	>-10% & $\leq$ 0%	>0% & $\leq$ 10%	>10% & $\leq$ 20%	>20%

Source: Author

**Figure 53 Monte Carlo Simulation**



Source: The Crystal Ball by ORACLE



# Appendices

## Appendix 1: Statement of Financial Position

Assets (In trillion ₩)	2016	2017	2018	2019	2020F	2021F	2022F	2023F	2024F
<b>Current Assets</b>									
Intangible assets	5.34	14.76	14.89	20.70	21.74	22.82	23.96	25.16	26.42
Property, plant and equipment	91.47	111.66	115.42	119.83	120.18	125.08	136.61	149.93	161.39
Deferred income tax assets	5.32	5.06	5.47	4.51	5.09	5.09	5.09	5.09	5.09
Other assets	1.57	4.36	12.69	7.99	6.65	6.65	6.65	6.65	6.65
Other financial assets	17.04	18.93	16.19	18.14	17.58	17.58	17.58	17.58	17.58
<b>Total Non-Current Assets</b>	<b>121</b>	<b>155</b>	<b>165</b>	<b>171</b>	<b>171</b>	<b>177</b>	<b>190</b>	<b>204</b>	<b>217</b>
<b>Non-Current Assets</b>									
Short-term financial instruments	52.43	49.45	65.89	76.25	76.25	80.06	84.07	88.27	92.68
Inventories	18.35	24.98	28.98	26.77	30.79	32.32	33.94	35.64	37.42
Trade receivables	24.28	27.70	33.87	35.13	40.40	42.42	44.54	46.77	49.11
Other current assets	14.26	14.30	15.62	16.35	15.13	15.13	15.13	15.13	15.13
Cash and cash equivalents	32.11	30.55	30.34	26.89	40.68	59.08	73.76	91.34	110.17
<b>Total Current Assets</b>	<b>141</b>	<b>147</b>	<b>175</b>	<b>181</b>	<b>203</b>	<b>229</b>	<b>251</b>	<b>277</b>	<b>305</b>
<b>Total Assets</b>	<b>262</b>	<b>302</b>	<b>339</b>	<b>353</b>	<b>374</b>	<b>406</b>	<b>441</b>	<b>482</b>	<b>522</b>

Equity (In Trillion ₩)	2016	2017	2018	2019	2020F	2021F	2022F	2023F	2024F
Preferred stock	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Common stock	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Share premium	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40
Retained earnings	173.79	181.27	209.00	236.79	254.58	275.63	303.58	333.69	367.71
Net income	22.41	41.34	43.89	27.43	27.90	37.03	39.90	45.09	43.41
Dividends paid	-3.11	-6.80	-10.19	-9.64	-6.85	-9.09	-9.79	-11.07	-10.65
Other components of equity	-11.96	-13.90	-7.93	-4.96	-4.36	-3.76	-2.16	0.44	4.04
Non-controlling interests	6.54	7.28	7.68	7.96	8.26	8.65	9.08	9.56	10.03
<b>Total Equity</b>	<b>193</b>	<b>214</b>	<b>248</b>	<b>263</b>	<b>285</b>	<b>314</b>	<b>346</b>	<b>383</b>	<b>420</b>

Liabilities (In trillion ₩)	2016	2017	2018	2019	2020F	2021F	2022F	2023F	2024F
<b>Non-Current Liabilities</b>									
Long-term borrowings	1.24	1.81	0.09	2.20	1.34	1.40	1.47	1.55	1.62
Long-term other payables	3.32	2.04	3.19	2.18	2.68	2.82	2.96	3.11	3.26
Deferred income tax liabilities	7.29	11.71	15.16	17.05	17.05	17.90	18.80	19.74	20.72
Provisions	0.36	0.46	0.66	0.61	0.52	0.52	0.52	0.52	0.52
Other non-current liabilities	2.29	4.07	3.43	3.86	3.41	3.41	3.41	3.41	3.41
<b>Total Non-current liabilities</b>	<b>15</b>	<b>20</b>	<b>23</b>	<b>26</b>	<b>25</b>	<b>26</b>	<b>27</b>	<b>28</b>	<b>30</b>
<b>Current Liabilities</b>									
Trade payables	6.49	9.08	8.48	8.72	9.16	9.61	10.09	10.60	11.13
Short-term borrowings	12.75	15.77	13.59	14.39	14.13	14.83	15.57	16.35	17.17
Other payables	11.53	13.90	10.71	12.00	12.04	12.64	13.27	13.93	14.63
Accrued expenses	12.53	14.00	20.34	19.36	16.56	16.56	16.56	16.56	16.56
Provisions	4.60	4.29	4.38	4.07	4.34	4.34	4.34	4.34	4.34
Other current liabilities	6.80	10.13	11.58	5.24	8.44	8.44	8.44	8.44	8.44
<b>Total Current Liabilities</b>	<b>55</b>	<b>67</b>	<b>69</b>	<b>64</b>	<b>65</b>	<b>66</b>	<b>68</b>	<b>70</b>	<b>72</b>
<b>Total Liabilities</b>	<b>69</b>	<b>87</b>	<b>92</b>	<b>90</b>	<b>90</b>	<b>92</b>	<b>95</b>	<b>99</b>	<b>102</b>

<b>Total Liabilities + Equity</b>	<b>262</b>	<b>302</b>	<b>339</b>	<b>353</b>	<b>374</b>	<b>406</b>	<b>441</b>	<b>482</b>	<b>522</b>
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Source: Company's data and author's estimates

## Appendix 1: Income Statement

Income Statement	2016	2017	2018	2019	2020F	2021F	2022F	2023F	2024F
In Trillion of Korean Won (₩)	31-Dec-2016	31-Dec-2017	31-Dec-2018	31-Dec-2019					
<b>Revenues</b>	<b>201.87</b>	<b>239.57</b>	<b>243.77</b>	<b>230.40</b>	<b>234.18</b>	<b>265.73</b>	<b>284.38</b>	<b>316.04</b>	<b>323.02</b>
Korea	20.23	31.54	33.92	34.18	36.18	40.18	43.18	50.68	55.68
America	68.72	81.01	81.69	73.85	75.85	87.85	91.25	98.25	104.23
Europe	38.25	44.41	42.96	42.71	43.49	52.49	56.99	63.99	59.99
Asia and Africa	39.09	44	41.99	41.62	43.62	50.67	59.17	70.13	73.13
China	35.58	38	43.21	38.04	35.04	34.54	33.79	32.99	29.99
Growth in Sales	-	18.68%	1.75%	-5.48%	1.64%	13.47%	7.02%	11.13%	2.21%
Cost of sales	-120.27	-129.29	-132.39	-147.24	-143.19	-154.12	-164.94	-183.30	-187.35
<b>Gross profit</b>	<b>82</b>	<b>110</b>	<b>111</b>	<b>83</b>	<b>91</b>	<b>112</b>	<b>119</b>	<b>133</b>	<b>136</b>
Gross profit margin	40%	46%	46%	36%	39%	42%	42%	42%	42%
R&D Expenses	-14.79	-16.36	-18.35	-19.91	-21.45	-23.10	-24.88	-26.80	-28.87
Selling & Administrative Expenses	-18.24	-19.68	-8.97	-8.91	-8.91	-15.20	-16.27	-18.08	-18.48
<b>EBITDA</b>	<b>49</b>	<b>74</b>	<b>84</b>	<b>54</b>	<b>61</b>	<b>73</b>	<b>78</b>	<b>88</b>	<b>88</b>
Depreciations & Amortization	-19	-20.59	-25.17	-26.57	-25.02	-25.10	-26.12	-28.53	-31.31
<b>EBIT</b>	<b>29</b>	<b>54</b>	<b>59</b>	<b>28</b>	<b>36</b>	<b>48</b>	<b>52</b>	<b>59</b>	<b>57</b>
Others	0.79	1.79	0.88	0.77	1.06	1.06	1.06	1.06	1.06
Financial Income	11.37	9.73	9.99	10.16	10.31	10.31	10.31	10.31	10.31
Financial Expense	-10.12	-8.32	-7.93	-7.58	-7.84	-7.84	-7.84	-7.84	-7.84
Interest Expenses	-0.59	-0.65	-0.67	-0.69	-0.65	-0.65	-0.65	-0.65	-0.65
<b>EBT</b>	<b>31</b>	<b>56</b>	<b>61</b>	<b>30</b>	<b>38</b>	<b>51</b>	<b>55</b>	<b>62</b>	<b>60</b>
Income tax expense	-8.0	-14	-17	-9	-10	-14	-15	-17	-16
<b>Net Income</b>	<b>22.73</b>	<b>42.19</b>	<b>44.34</b>	<b>21.74</b>	<b>28.20</b>	<b>37.43</b>	<b>40.33</b>	<b>45.57</b>	<b>43.88</b>
Attributable to owners of the parent	22.41	41	44	21.51	27.90	37.03	39.90	45.09	43.41
Attributable to minoring interests	0.31	0.84	0.45	0.23	0.30	0.40	0.43	0.48	0.46

Source: Company's data and analyst's estimates

## Appendix 2: Cash Flow Statement

Cashflow from Statement (In trillion ₩)	2016	2017	2018	2019	2020F	2021F	2022F	2023F	2024F
Net Income	22.73	42.19	44.34	21.74	28.20	37.43	40.33	45.57	43.88
Adjustments	25.85	30.21	32.60	26.44	23.16	25.95	27.02	29.47	32.30
Depreciation & Amortization	20.71	22.11	26.48	29.59	25.02	25.10	26.12	28.53	31.31
Change in WC	-1.18	-11	-9.92	-2.55	-7.60	-2.50	-2.62	-2.76	-2.89
<b>Net Operation Cash Flow</b>	<b>47.40</b>	<b>61.78</b>	<b>67.02</b>	<b>45.63</b>	<b>43.76</b>	<b>60.88</b>	<b>64.72</b>	<b>72.29</b>	<b>73.28</b>
<b>Cash Flow from investing activities</b>									
Capex	-24.14	-42.79	-29.56	-25.37	-25.37	-30.00	-37.65	-41.84	-42.77
Acquisition of intangible assets	-1.05	-0.98	-1.02	-3.25	-1.04	-1.09	-1.14	-1.20	-1.26
Other investing activities	-4.20	-5.62	-21.66	-11.33	3.76	-3.81	-4.00	-4.20	-4.41
<b>Net cash outflow from investing activities</b>	<b>-29.39</b>	<b>-49.39</b>	<b>-52.24</b>	<b>-39.95</b>	<b>-22.64</b>	<b>-34.90</b>	<b>-42.80</b>	<b>-47.25</b>	<b>-48.44</b>
<b>Cash flows from financing activities</b>									
Δ in short-term borrowings	1.36	2.73	-2.04	0.87	-0.27	0.71	0.74	0.78	0.82
Net increase in other payables and liabilities	1.04	1.00	0.00	0.00	0.05	0.13	0.14	0.15	0.16
Δ on long-term borrowings	-0.25	-1.14	-1.98	-0.71	-0.87	0.07	0.07	0.07	0.08
Dividends paid	-3.11	-6.80	-10.19	-9.64	-6.85	-9.09	-9.79	-11.07	-10.65
Other Financing activities	-7.7	-7.35	-1.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Net cash outflow from financing activities</b>	<b>-8.66</b>	<b>-11.56</b>	<b>-15.21</b>	<b>-9.48</b>	<b>-7.92</b>	<b>-8.18</b>	<b>-8.84</b>	<b>-10.07</b>	<b>-9.60</b>
FX effects cash and cash equivalents	0.41	-1.78	0.09	0.60	0.60	0.60	1.60	2.60	3.60
<b>Net increase (decrease) in cash</b>	<b>9.76</b>	<b>-0.95</b>	<b>-0.34</b>	<b>-3.20</b>	<b>13.79</b>	<b>18.40</b>	<b>14.68</b>	<b>17.57</b>	<b>18.84</b>

Cash and cash equivalents	2016	2017	2018	2019	2020F	2021F	2022F	2023F	2024F
Beginning of the period	22.64	32.11	30.55	30.34	27.14	40.93	59.33	74.01	91.59
End of the period	32.11	30.55	30.34	27.14	40.93	59.33	74.01	91.59	110.42

Source: Company's data and analyst's estimates

### Appendix 3: Balance Sheet Assumptions

Income Statement	2020F	2021F	2022F	2023F	2024F	Assumptions
Percentage Growth	Change (%)					
Revenues	234.18	265.73	284.38	316.04	323.02	Please refer to valuation for more detail on revenues projection for each region, for reference the absolute values has been attached to this project. For each value a combination of financial terminal sources and personal analysis were used.
Korea	6%	11%	7%	17%	10%	
America	3%	16%	4%	8%	6%	
Europe	2%	21%	9%	12%	-6%	
Asia and Africa	5%	16%	17%	19%	4%	
China	-8%	-1%	-2%	-2%	-9%	
Cost of sales	-143.19	-154.12	-164.94	-183.30	-187.35	COGS for 2020 are based on SEC's annualized financial reports for 1Q20 and 2Q20. The following years are based on the 4-years average GPM (2016-2019).
<b>Gross profit</b>						
R&D Expenses	7.71%	7.71%	7.71%	7.71%	7.71%	R&D expenses increases on the rate of 7.71%, which is the CAGR increase of R&D between 2016 and 2019.
Selling & Administrative Expenses	-8.91	6%	6%	6%	6%	Stagnant in 2020 then after that is based on 5-Years average SG&A/Sales ratio.
Depreciations & Amortization	21%	21%	21%	21%	21%	Equal to the y-o-y historical average D&A/Revenues ratio.
<b>EBIT</b>						
Others	1.06	1.06	1.06	1.06	1.06	Equal to the 4-years Y-o-Y historical average (2016-2019).
Financial income	10.31	10.31	10.31	10.31	10.31	Equal to the 4-years Y-o-Y historical average (2016-2019).
Financial expense	-8.49	-8.49	-8.49	-8.49	-8.49	Equal to the 4-years Y-o-Y historical average (2016-2019).
Interest expenses	-0.65	-0.65	-0.65	-0.65	-0.65	Equal to the 4-years Y-o-Y historical average (2016-2019).
<b>EBT</b>						
Income tax expense	-26.74%	-26.74%	-26.74%	-26.74%	-26.74%	Based on average Income Tax/EBT ratio of the previous 4 years (2016-2019).
<b>Net Income</b>						
<b>Profit for the period</b>						
Profit attributable to owners of the parent	98.63%	98.63%	98.63%	98.63%	98.63%	Forecast based on the average percentage of profit attributable to owners of parent company value between 2016-2019.
Profit attributable to non-controlling interests	1.37%	1.37%	1.37%	1.37%	1.37%	Forecast based on the remaining percentage of left for the non-controlling interest.
Dividends	-24.28%	-24.28%	-24.28%	-24.28%	-24.28%	Forecast based on the average dividend distributed between 2016-2019.

Non-Current Assets	2020F	2021F	2022F	2023F	2024F	Assumptions
Intangible assets	5%	5%	5%	5%	5%	In 2020 it will be equal to 2019 and then we expect new patents and acquisitions are predictable to happen.
Property, Plant and Equipment	6.98%	6.98%	6.98%	6.98%	6.98%	In 2020 it will be equal to 2019 as the company will freeze major capex investments. Then Capex will growth 6.98% p.a, which is the CAGR's growth for the previous 4 years.
Deferred income tax assets	5.09	5.09	5.09	5.09	5.09	Based on a 4-year Y-o-Y historical average.
Other assets	6.65	6.65	6.65	6.65	6.65	Based on a 4-year Y-o-Y historical average.
Other financial assets	17.58	17.58	17.58	17.58	17.58	Based on a 4-year Y-o-Y historical average.
<b>Total Non-Current Assets</b>						
Short-term financial instruments	76.25	5%	5%	5%	5%	2020 will be equal to previous year then grows 5% p.a.
Inventories	15%	5%	5%	5%	5%	Increase 15% on the 1st year, after 2021 it grows 5% p.a.
Trade receivables	15%	5%	5%	5%	5%	Increase 15% on the 1st year, after 2021 it grows 5% p.a.
Other current assets	15.13	15.13	15.13	15.13	15.13	Based on a 4-year YoY historical average (2016-2019).
<b>Total Current Assets</b>						

Equity In million of KRW	2020F	2021F	2022F	2023F	2024F	Assumptions
Preferred stock	0.12	0.12	0.12	0.12	0.12	There is no significant change on preferred stock. Thus, it remains equal Y-o-Y.
Common stock	0.78	0.78	0.78	0.78	0.78	There is no significant change on common stock. Thus, it remains equal Y-o-Y.
Share premium	4.40	4.40	4.40	4.40	4.40	There is no significant change on share premium. Thus, it remains equal Y-o-Y.

Non-Current Liabilities	2020F	2021F	2022F	2023F	2024F	Assumptions
Long-term borrowings	1.34	5%	5%	5%	5%	2020 is based on a 4-year historical average (2016-2019), and then grows 5% p.a.
Long-term other payables	2.68	5%	5%	5%	5%	2020 is based on a 4-year historical average (2016-2019), and then grows 5% p.a.
Deferred income tax liabilities	17.05	5%	5%	5%	5%	2020 is based on a 4-year historical average (2016-2019), and then grows 5% p.a.
Provisions	0.52	0.52	0.52	0.52	0.52	Forecast based on a 4-year Y-o-Y historical average.
Other non-current liabilities	3.41	3.41	3.41	3.41	3.41	Forecast based on a 4-year Y-o-Y historical average.
<b>Current Liabilities</b>						
Trade payables	5%	5%	5%	5%	5%	Increasing 5% YoY.
Short-term borrowings	14.13	5%	5%	5%	5%	2020 is based on a 4-year Y-o-Y historical average and then it grows 5% p.a.
Other payables	12.04	5%	5%	5%	5%	2020 is based on a 4-year Y-o-Y historical average and then it grows 5% p.a.
Accrued expenses	16.56	16.56	16.56	16.56	16.56	Based on a 4-year Y-o-Y historical average.
Provisions	4.34	4.34	4.34	4.34	4.34	Based on a 4-year Y-o-Y historical average.
Other current liabilities	8.44	8.44	8.44	8.44	8.44	Based on a 4-year Y-o-Y historical average.

CashFlow Statement	2020F	2021F	2022F	2023F	2024F	Assumptions
Capex	-25.37	-30.00	-37.65	-41.84	-42.77	We expected the major investments will be held, thus Capex will be equal to 2019. In 2021 the Capex is expected to be ₩ 30Tn to support the manufacturing of DP and IT products linked to 5G technology, after that Capex is expected to grow 13.24% Y-o-Y.

Source: Company's data and analyst's estimates

## Appendix 5: Revenues Projection

In ₩ Tn	2019	2020F	2021F	2022F	2023F	2024F
<b>Revenues</b>	230.4	234.18	265.73	284.38	316.04	300.06
<b>Korea</b>	34.18	36.18	40.18	43.18	50.68	55.68
<b>America</b>	73.85	75.85	87.85	91.25	98.25	104.23
<b>Europe</b>	42.71	43.49	52.49	56.99	63.99	59.99
<b>Asia and Africa</b>	41.62	43.62	50.67	59.17	70.13	73.13
<b>China</b>	38.04	35.04	34.54	33.79	32.99	29.99

**Source:** Author estimates, Bloomberg and Samsung.com

Company's note considered for the revenues forecasting:

### IM

- **Mobile:** Expand sales by further differentiating flagship line-up by reinforcing competitiveness of foldable phones to increase their popularity; and by strengthening 5G lineup for the mass market Continue efforts to bolster profitability by improving product mix and efficiently managing operations.
- **N/W:** Actively attract new orders for global 5G business and continue timely response to 5G commercialization in both the domestic and overseas markets.

### Semiconductor:

- **Memory:** Business environment highly likely to recover in 1H21 with the introduction of new server CPUs amid strong mobile set demand and continued growth of 5G. The focus on anticipating and responding flexibly to demand changes while also expanding process node migration.
- **S.L.SI:** Increase supply mainly for products with solid demand (eg, 5G SoCs, high-resolution sensors, and DDIs).
- **Foundry:** Grow substantially by diversifying areas of application and attracting large customers.

### DP

- **Mobile:** Smartphone market to recover gradually despite uncertainties such as COVID-19 and the US-China trade dispute Differentiate technologies and strengthen price competitiveness to embrace 5G smartphone market expansion.
- **Large:** Establish strong foundation within premium TV segment via timely development of QD display.

### Consumer Electronics

- **TV:** Strengthen leadership in the premium TV market via innovative products such as QLED TVs, Micro LEDs for homes, and Lifestyle TVs.
- **DA:** Continue to grow by expanding sales of premium products, including Bespoke models, marketing efficiently, and strengthening online and B2B businesses.

## Appendix 6: Key Financial Ratios

Key Financial Ratios	Units	2016	2017	2018	2019	2020F	2021F	2022F	2023F	2024F
<b>Liquidity Ratios</b>										
Current Ratio	%	259%	219%	253%	284%	314%	345%	368%	395%	421%
Quick Ratio	%	225%	182%	211%	242%	267%	296%	319%	344%	370%
Cash Ratio	%	59%	45%	44%	42%	63%	89%	108%	130%	152%
<b>Efficiency Ratios</b>										
Total Assets Turnover	Times	11.53	7.15	7.65	16.22	13.28	10.85	10.94	10.57	11.89
Accounts Receivables Turnover	Times	-	9.22	7.92	6.68	6.20	6.42	6.54	6.92	6.74
Collection Period	Days	44	42	51	56	63	58	57	54	55
Inventory Turnover	Times	6.55	5.18	4.57	5.50	4.65	4.77	4.86	5.14	5.01
Days in Inventory	Days	-	71	80	66	78	77	75	71	73
Payables Turnover	Times	18.53	14.24	15.61	16.89	15.64	16.03	16.34	17.29	16.83
Payables Period	Days	20	26	23	22	23	23	22	21	22
Operating Cycle	Days	-	51	59	62	69	65	64	61	62
Cash Cycle	Days	-	0.15	-3.13	-4.71	-4.79	-4.85	-4.94	-5.23	-5.09
<b>Profitability Ratios</b>										
Gross Profit Margin	%	40%	46%	46%	36%	39%	42%	42%	42%	42%
EBITDA Margin	%	24%	31%	34%	24%	26%	28%	28%	28%	27%
EBIT Margin	%	14%	22%	24%	12%	15%	18%	18%	19%	18%
Net Profit Margin	%	11%	18%	18%	9%	12%	14%	14%	14%	14%
ROA	%	9%	14%	13%	6%	8%	9%	9%	9%	8%
ROCE	%	15%	24%	23%	11%	12%	15%	15%	15%	13%
ROE	%	12%	20%	18%	8%	10%	12%	12%	12%	10%
EPS	Times	3354	6535	6461	3166	4674	6203	6684	7553	7272
SG&A/Revenues	%	9%	8%	4%	4%	4%	6%	6%	6%	6%
<b>Solvency Ratios</b>										
Debt-to-Equity Ratio	Times	0.36	0.41	0.37	0.34	0.31	0.29	0.28	0.26	0.24
Equity Multiplier	Times	1.36	1.41	1.37	1.34	1.31	1.29	1.28	1.26	1.24
Interest to Total Debt Ratio	Times	0.04	0.04	0.05	0.04	0.04	0.04	0.04	0.04	0.03
Debt to EBITDA	Times	0.29	0.24	0.16	0.31	0.25	0.22	0.22	0.20	0.21
Net Gearing	Times	0.07	0.08	0.06	0.06	0.05	0.05	0.05	0.05	0.04
Net Leverage	Times	-0.37	-0.17	-0.20	-0.19	-0.42	-0.58	-0.72	-0.84	-1.03
Interest Coverage Ratio	Times	49.93	82.03	87.37	40.48	54.78	74.17	80.26	91.27	87.71
Equity Ratio	%	74%	71%	73%	75%	76%	77%	78%	80%	80%

Source: SEC's data and Author's estimates

## Appendix 7: Income Statement Assumptions

Income Statement	2020F	2021F	2022F	2023F	2024F	Assumptions
Percentage Growth	Change (%)					
Revenues	234.18	265.73	284.38	316.04	323.02	Please refer to valuation for more detail on revenues projection for each region, for reference the absolute values has been attached to this project. For each value a combination of financial terminal sources and personal analysis were used.
Korea	6%	11%	7%	17%	10%	
America	3%	16%	4%	8%	6%	
Europe	2%	21%	9%	12%	-6%	
Asia and Africa	5%	16%	17%	19%	4%	
China	-8%	-1%	-2%	-2%	-9%	
Cost of sales	-143.19	-154.12	-164.94	-183.30	-187.35	COGS for 2020 are based on SEC's annualized financial reports for 1Q20 and 2Q20. The following years are based on the 4-years average GPM (2016-2019).
<b>Gross profit</b>						
R&D Expenses	7.71%	7.71%	7.71%	7.71%	7.71%	R&D expenses increases on the rate of 7.71%, which is the CAGR increase of R&D between 2016 and 2019.
Selling & Administrative Expenses	-8.91	6%	6%	6%	6%	Stagnant in 2020 then after that is based on 5-Years average SG&A/Sales ratio.
Depreciations & Amortization	21%	21%	21%	21%	21%	Equal to the y-o-y historical average D&A/Revenues ratio.
<b>EBIT</b>						
Others	1.06	1.06	1.06	1.06	1.06	Equal to the 4-years Y-o-Y historical average (2016-2019).
Financial income	10.31	10.31	10.31	10.31	10.31	Equal to the 4-years Y-o-Y historical average (2016-2019).
Financial expense	-8.49	-8.49	-8.49	-8.49	-8.49	Equal to the 4-years Y-o-Y historical average (2016-2019).
Interest expenses	-0.65	-0.65	-0.65	-0.65	-0.65	Equal to the 4-years Y-o-Y historical average (2016-2019).
<b>EBT</b>						
Income tax expense	-26.74%	-26.74%	-26.74%	-26.74%	-26.74%	Based on average Income Tax/EBT ratio of the previous 4 years (2016-2019).
<b>Net Income</b>						
<b>Profit for the period</b>						
Profit attributable to owners of the parent	98.63%	98.63%	98.63%	98.63%	98.63%	Forecast based on the average percentage of profit attributable to owners of parent company value between 2016-2019.
Profit attributable to non-controlling interests	1.37%	1.37%	1.37%	1.37%	1.37%	Forecast based on the remaining percentage of left for the non-controlling interest.
Dividends	-24.28%	-24.28%	-24.28%	-24.28%	-24.28%	Forecast based on the average dividend distributed between 2016-2019.

Source: Analyst's estimates

## Appendix 8: Free Cash Flow to Firm

Years	2020F	2021F	2022F	2023F	2024F
EBIT(1-t)	28.10	38.04	41.16	46.81	44.98
D&A	25.02	25.10	26.12	28.53	31.31
Net increase in NWC	-7.60	-2.50	-2.62	-2.76	-2.89
Capex	25.37	30.00	37.65	41.84	42.77
<b>FCFF</b>	<b>35.35</b>	<b>35.63</b>	<b>32.25</b>	<b>36.25</b>	<b>36.42</b>

Source: Analyst's estimates

## Appendix 9: Peers' Financial Overview

	SEC	Apple Inc	Sony Corp	LG Electronics	Panasonic Corp	Average
<b>GPM</b>	36%	38%	28%	25%	28%	<b>31%</b>
<b>EBITDA margin</b>	24%	29%	15%	8%	9%	<b>17%</b>
<b>EBIT margin</b>	12%	25%	10%	4%	5%	<b>11%</b>
<b>NPM</b>	9%	21%	7%	0%	4%	<b>8%</b>

<b>Collection Period</b>	56	32	46	37	46	<b>43</b>
<b>Days in Inventory</b>	66	9	38	46	64	<b>45</b>
<b>Payables Period</b>	22	115	27	55	73	<b>58</b>

<b>Current Ratio</b>	284%	154%	92%	112%	110%	<b>150%</b>
<b>Quick Ratio</b>	242%	117%	70%	63%	59%	<b>110%</b>
<b>Cash Ratio</b>	42%	95%	54%	27%	26%	<b>49%</b>

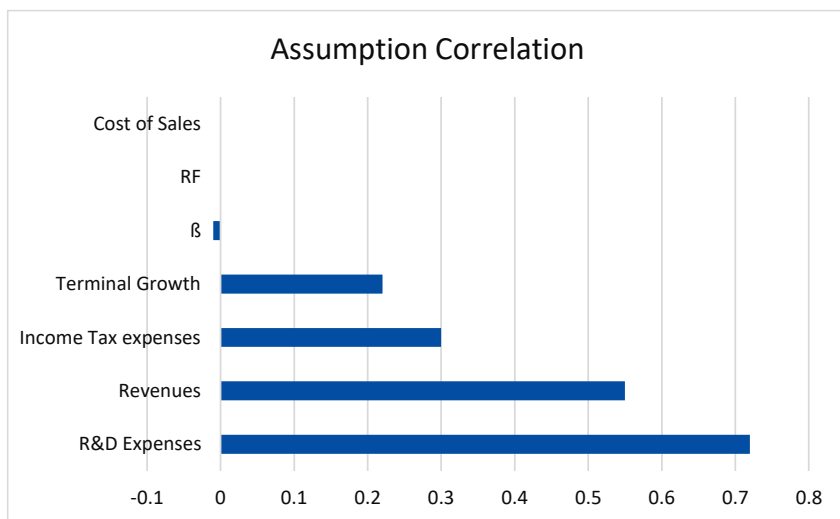
<b>Market Cap (KRW T)</b>	291.33	1642.91	99.39	11.74	22.34	<b>413.54</b>
<b>ROCE</b>	11%	55.92%	14.79%	0.19%	15.69%	<b>19.43%</b>
<b>ROA</b>	6%	15.69%	2.65%	0.07%	4.62%	<b>5.84%</b>
<b>ROE</b>	8%	27.73%	10.14%	1.16%	10.42%	<b>11.54%</b>

Source: Bloomberg



## Appendix 10: Monte Carlo Simulation

Forecast values	
<b>Trials</b>	<b>10 000</b>
<b>Base Case</b>	<b>68624</b>
<b>Mean</b>	<b>68923</b>
<b>Median</b>	<b>68827</b>
<b>Mode</b>	<b>---</b>
<b>Standard Deviation</b>	<b>5852</b>
<b>Variance</b>	<b>34240809</b>
<b>Skewness</b>	<b>0.06</b>
<b>Kurtosis</b>	<b>2.95</b>
<b>Coeff. of Variation</b>	<b>0.08</b>
<b>Minimum</b>	<b>47505</b>
<b>Maximum</b>	<b>91804</b>
<b>Range Width</b>	<b>44298</b>
<b>Mean Std. Error</b>	<b>59</b>



Source: Crystal Ball by Oracle

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## Abbreviations

~	Around (approximately)
₩	Korean Won
AI	Artificial Intelligence
Bn	Billions
CAGR	Compound Annual Growth Rate
CFO	Chief Financial Officer
CEO	Chief Executive Officer
D&A	Depreciations & Amortizations
DRAM	Dynamic Random-Access Memory
EBIT	Earnings Before Interests and Taxes
EBITDA	Earnings Before Interest Depreciation and Amortization
EPS	Earnings Per Share
EV	Enterprise Value
FY	Financial Year
GDP	Gross Domestic Product
GHRP	Global Humanitarian Response Plan
HPC	High Performance Computing
IoT	Internet Of Things
IMF	International Monetary Fund
IOS	iPhone Operating System
Nano	unit prefix meaning "one billionth"
N/W	Network
Ph. D	Philosophiae Doctor
ROCE	Return On Capital Employed
ROE	Return On Equity
S.LSI	super large-scale integration
SWOT	Strengths, Weaknesses, Opportunities and Threats
TA	Total Assets
Tn	Trillions
V-NAND	Types of flash memory
WACC	Weighted Average Cost of Capital
WC	Working Capital Changes
WEO	World Economic Outlook

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