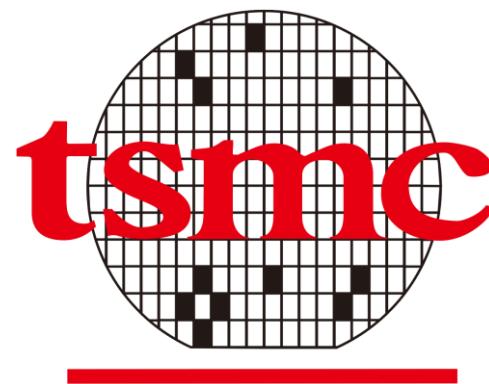


IMG

Baruch College  
Investment  
Management  
Group



# Taiwan Semiconductor Manufacturing Co. (NYSE: TSM)

Current: \$108.96  
Target: \$140.45 (+28.9%)  
Time Horizon: 12-24 Months

Industry Director: Ray Hatton  
Analysts: Benjamin Chan, Bricen Fisher, Nirmal Malhotra  
Junior Analyst: Samir Syed



# Company Overview

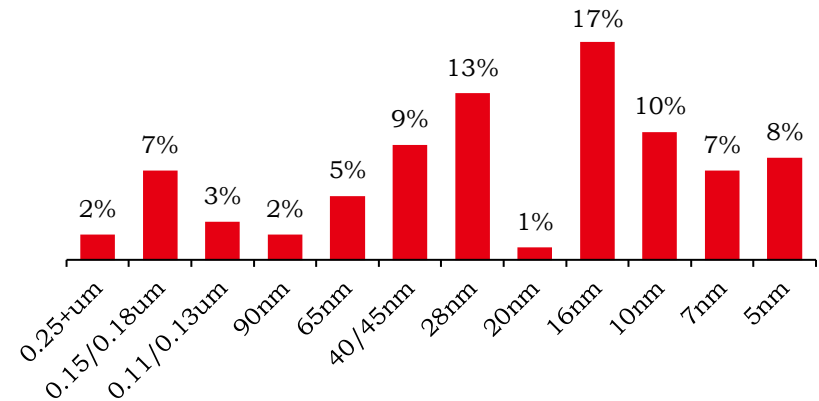
## Business Description

- ▶ Taiwan Semiconductor is based out of Taiwan and established in 1987 by Morris Chang
- ▶ World's largest pure-play semiconductor foundry
- ▶ TSM manufactures semiconductors for brands such as AMD, Apple, NVIDIA, Qualcomm, etc.
  - ▶ TSM does not design their chips, only manufacture
- ▶ Serving customers that operate in 175+ countries reaching 1+ billion people
- ▶ Operating fabs in China, Taiwan, and U.S.

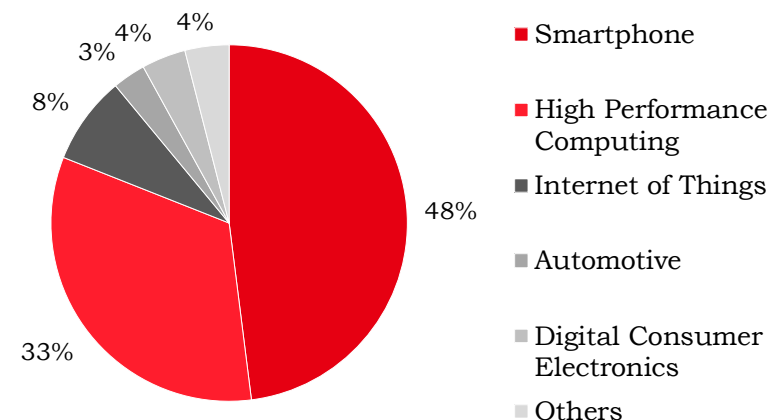
## Business Highlights

- ▶ TSM is opening a fab in Phoenix, AZ expected to generate 120k+ wafers annually for the U.S.
- ▶ TSM has faced 165% YoY stock growth and exponential revenue growth of 25% in 2020
- ▶ Apple's move away from Intel has immensely benefitted TSM with expected growth of 5%
- ▶ Expected total dividend of \$1.42 per share
- ▶ Over 20% increase in R&D YoY shows TSM's ambition in implementing new technologies

## 2020 Revenue by Technology



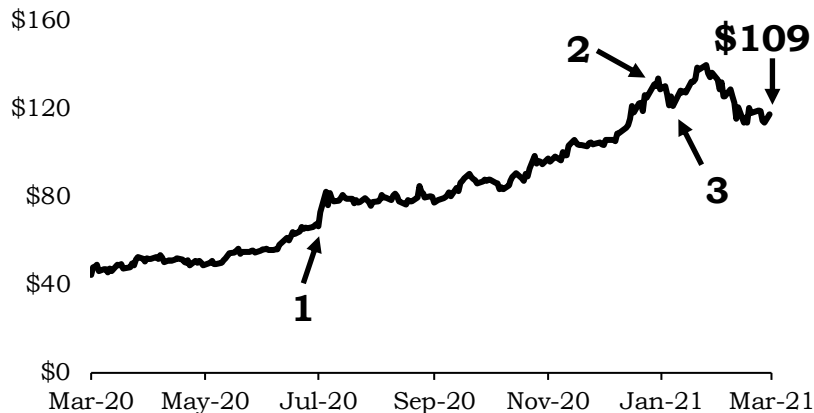
## Revenue Breakdown





# Financial Overview

## 52 Week Price Chart



## Financial Highlights

### 1. Intel's manufacturing struggles

- ▶ Intel announced a delay in the next generation of 7nm semiconductors allowing TSM to gain market share

### 2. New Intel CEO announces in house manufacturing decreasing share price

- ▶ Intel's struggles developing the next generation of chips led to speculation of outsourcing to TSM

### 3. New presidential administration

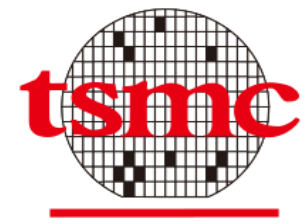
- ▶ The market went on an uptrend as Joe Biden became president indicating better trade relations with other nations

## Enterprise Value Walkthrough

\$ in Millions	
Share Price	\$109
Shares Outstanding	5.2B
<b>Equity Value</b>	<b>\$541.1B</b>
Cash & Short-Term Investments	24.8B
Total Debt	12.2M
Preferred Equity	-
Minority Interest	34M
<b>Enterprise Value</b>	<b>\$524.6B</b>

## Key Metrics

Market Cap	\$541.11B
52 Week Range	\$46.30 - \$142.20
LTM EV/EBITDA	16.70x
LTM Gross Profit Margin	53.10%
LTM P/E	29.70x
Beta	0.96



# Industry Overview

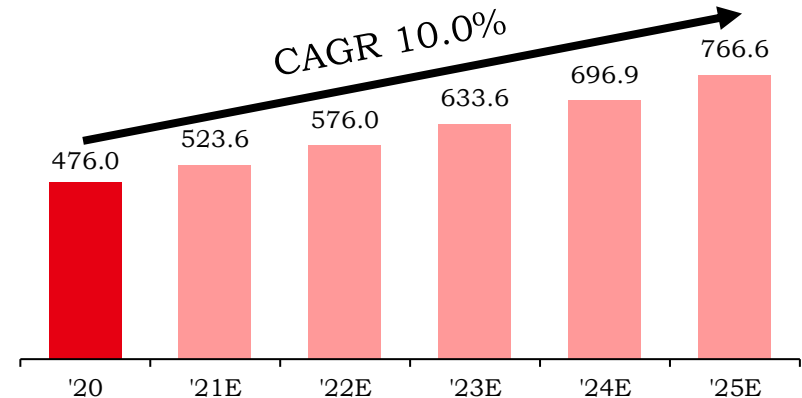
## Going Smaller

- ▶ TSM's 5nm chip is 22% faster, and consumes 30% less energy compared to 7nm counterpart
- ▶ Chip manufacturing is difficult and on average requires \$4B+ in initial cost and billions in R&D
- ▶ Companies are moving towards semiconductors 5nm and smaller, yet players like intel struggle
- ▶ Smaller semiconductors increase output for the same quantity of wafers used
  - ▶ Ex. 1000 chips on 10nm but 2000 chips on 5nm

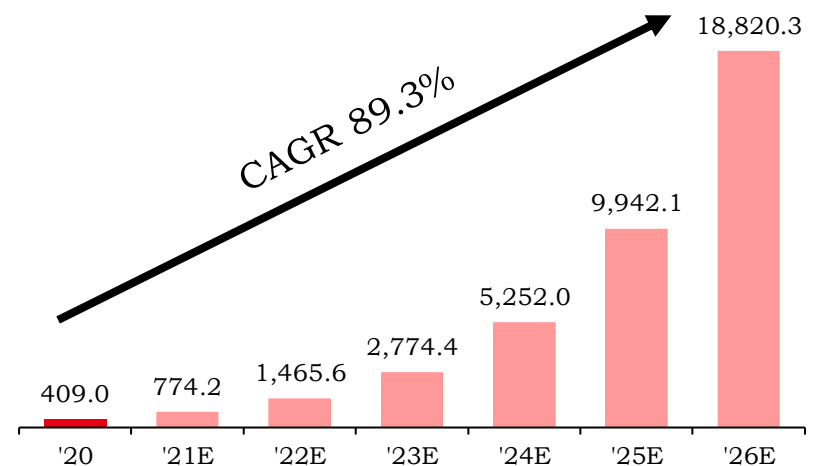
## Advancing Technology

- ▶ EVs will drive semiconductor demand as the EV market grows to \$800B+ globally by 2027
  - ▶ Ex. Battery management, safety systems, internal infotainment, autonomous driving computers, etc.
- ▶ The IoT market growing to \$6B+ globally will make semiconductors more relevant than ever
  - ▶ Ex. Home appliances, RC toys, LED bulbs, smart cities and more will be reliant on semiconductors
- ▶ The cloud computing market size will reach \$1T+ by 2026 increasing demand for semiconductors
- ▶ 240M+ estimated smartphone shipments in 2021

## Global Semiconductor Market Size (\$B)



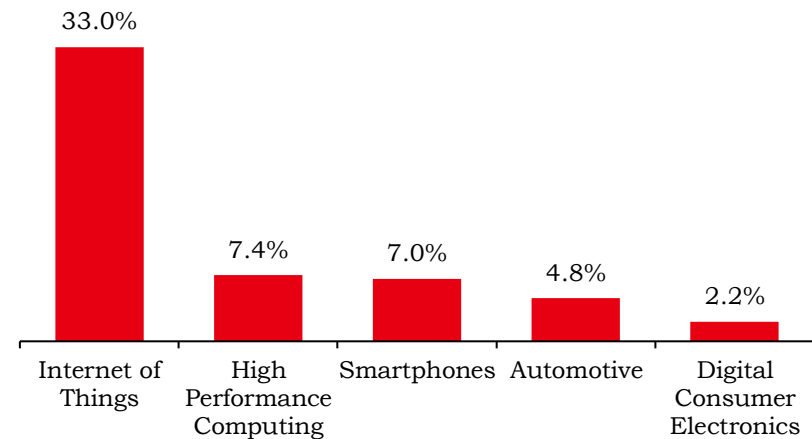
## Micro LED Display Market Size (\$M)



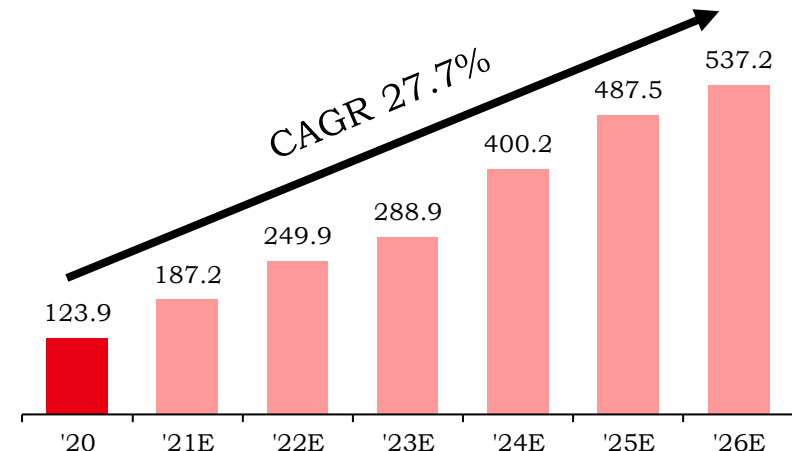
# Investment Rationale

- ▶ TSM is a direct beneficiary of high-growth industries leading to increased future demand
  - ▶ Companies have a hard time moving their products to a competing foundry due to unique customizations and increased cost
  - ▶ Smartphone, HPC, and IoT segments increased 23%, 39% and 28% while DCE and auto dropped
  - ▶ TSM will capture more demand than competitors due to large customer base of over 500 companies and relationship with industry leaders
  - ▶ TSM customers' projected revenue growth will directly correlate to increased demand for TSM
  
- ▶ Leading tech capabilities provide sustainable competitive advantage & increased demand
  - ▶ TSM were the first to release 5nm technology and are at least one generation ahead of competitors
  - ▶ 2021 guidance estimates CapEx of between \$25B-\$28B which indicates a 45%-63% YoY increase
  - ▶ Apple already ordered all TSM's 3nm technology which is starting risk production in 2021
  - ▶ TSM looking to expand into other markets and opportunities including augmented reality devices

Industry Growth CAGR to 2025



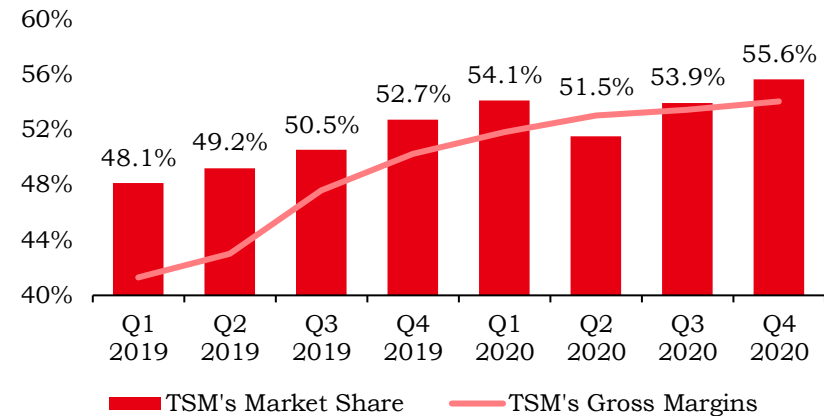
OLED Micro Display Market Growth (\$M)



# Investment Rationale

- ▶ Chip shortage shows heavy reliance on TSM and proves TSM's pricing power
  - ▶ TSM is one of the biggest beneficiaries of the chip shortage with capacity 100% booked until the fall
  - ▶ TSM's market share grows as they record rising gross margins which shows that companies are still going to TSM despite price increases
  - ▶ TSM still sees high demand amidst recently terminating discounts and raising prices 10%-15%
  - ▶ Considering another price hike in the near future
  
- ▶ TSM's operational excellence and competitive moat leads to lasting & effective pricing power
  - ▶ Semiconductor companies that could manufacture their own chips are some of TSM's largest clients
  - ▶ Intel, world leader in chip-making technology, plans to outsource their flagship CPUs with TSM
  - ▶ Only one competitor (Samsung) that can manufacture the 5-nanometer technology
  - ▶ Samsung's foundry has 2.3x less capacity than TSM and 60% of capacity are for internal use
  - ▶ TSM invests \$28B on increasing monthly capacity by at least 20,000 chips to capture future demand

## TSM's Market Share and Margin Growth



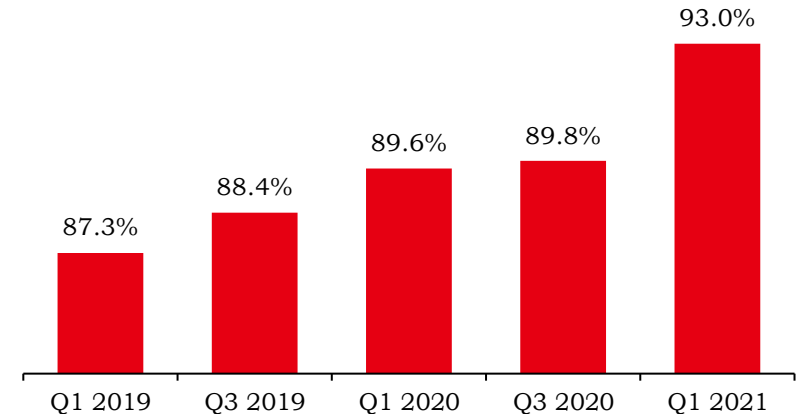
## Competitor's Most Advanced Chip

TSM	5-nanometer
Samsung	5-nanometer
Intel	10-nanometer
GlobalFoundries	12-nanometer
UMC	14-nanometer
SMIC	14-nanometer



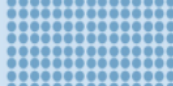






# Investment Rationale

- ▶ TSM to increase market share as industry consolidates with low chance of new entrants
  - ▶ The market share of competitors outside top 10 semiconductor foundries dropped to 0% in 2021
  - ▶ More market share to open in the future as R&D required to innovate smaller chips increases
  - ▶ Business model has high barriers of entrance as it requires \$4B+ in initial cost and billions in R&D
  - ▶ From 2019-2021, TSM (+7.9%) and SMIC (+0.5%) were the only companies to gain market share
  - ▶ TSM's technological and operational excellence positions themselves to capture market share
  
- ▶ 3D stacking technology allows TSM to continue innovating and offer more services
  - ▶ TSM's SoIC technology is working to stack and link several different chips into one package
  - ▶ Google and AMD will be the first customers for SoIC chips and are helping to test/certify them
  - ▶ Full production planned for 2022 and will be used for autonomous driving systems and HPC
  - ▶ TSM to also grow back-end revenue from services including research and testing through SoIC

## Market Share of the Top 5 Foundries

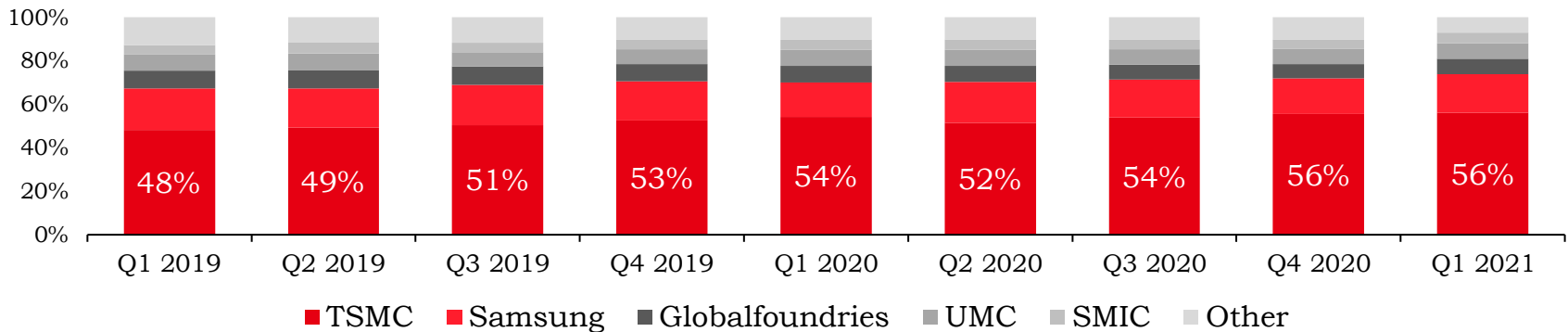


## Advantages of TSM's SoIC

	2D	3D IC	TSM SoIC
Bonding density			
Speed			
Power Consumption			

# Competitive Advantage

## Worldwide Semiconductor Foundries by Market Share



## Foundry Roadmaps





# Competitive Landscape

## SAMSUNG

Mkt Cap	\$485B
Net Income	\$41B
Beta	.91

- ▶ Samsung is a South Korean producer of electronics that manufactures internally
- ▶ Samsung's foundry overall has 2.3x less capacity and 2.5x less revenue
- ▶ Samsung has 4.0x less capacity at 5nm and 3.5x less with 7nm
- ▶ TSM has 50% CapEx foundry increases from 2020-2021 compared to 32% for Samsung
- ▶ Samsung has limited customers as 60% of their capacity is utilized internally

## UMC

Mkt Cap	\$21B
Net Income	\$1B
Beta	.89

- ▶ UMC operates as a semiconductor wafer foundry primarily in Asia while also manufacturing products in the solar energy and LED industries
- ▶ UMC fabs are only based in china and 1 fab in Taiwan
- ▶ UMC is manufacturing 14nm chips compared to TSM at 3nm
- ▶ UMC R&D expenses were \$437M vs. TSM at \$4B UMC increased 10% compared to 24% by TSM

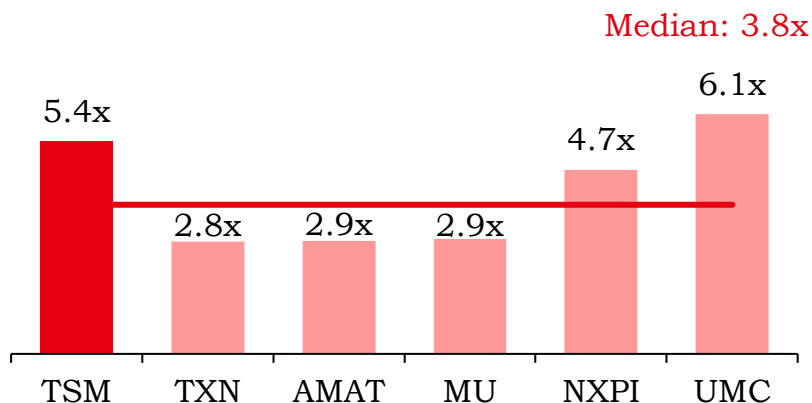
## SMIC

Mkt Cap	\$34B
Net Income	\$347M
Beta	.49

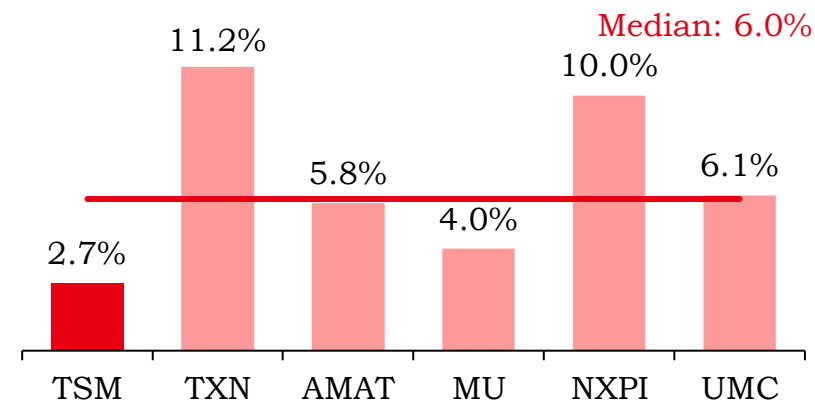
- ▶ SMIC is an investment holding company, engaged in integrated circuits and other semiconductor services
- ▶ In China, SMIC is the only mass producer of 14nm wafers (4 years behind TSM)
- ▶ SMIC's total capacity for 8nm is 2.4x less than TSM
- ▶ SMIC's total capacity for 12nm is 6.9x less than TSM
- ▶ SMIC was banned from accessing U.S. suppliers and technology

# Public Comparables Benchmark

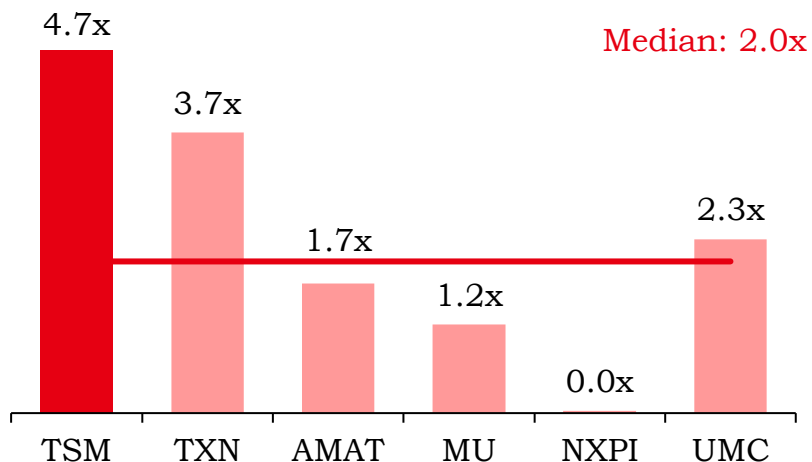
## Inventory Turnover



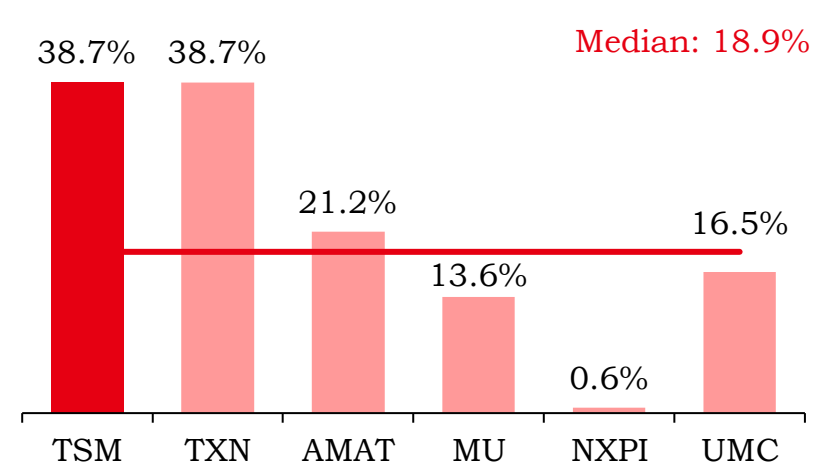
## LTM SG&A Margin (%)



## LTM Net Income / R&D Expense



## LTM Net Profit Margin (%)





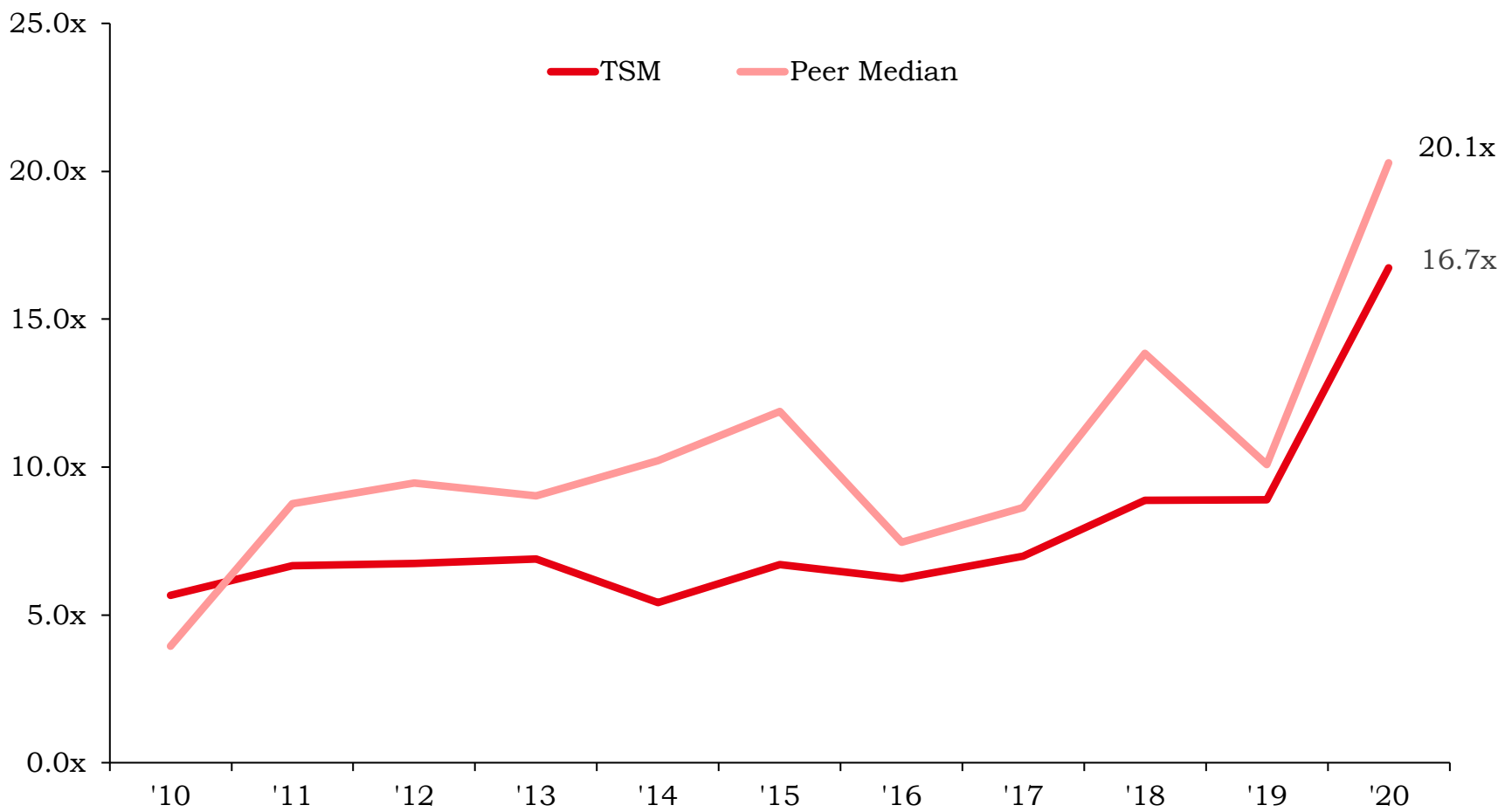
# Public Comparables

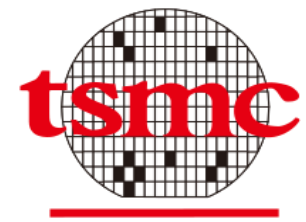
Company	Market Cap (USD)	TEV (USD)	TEV / EBITDA			P / E			Debt / LTM EBITDA
			LTM	2021E	2022E	LTM	2021E	2022E	
Texas Instruments Inc.	\$165,015	\$165,218	24.1x	20.2x	19.2x	29.5x	26.5x	25.0x	1.0x
Applied Materials, Inc.	106,797	105,623	20.1x	15.1x	14.1x	27.7x	19.4x	17.7x	1.0x
Micron Technology, Inc.	95,535	94,601	10.2x	6.7x	4.3x	31.9x	15.5x	8.7x	0.7x
NXP Semiconductors N.V.	53,080	58,621	24.7x	15.6x	14.2x	1020.8x	36.9x	33.9x	3.2x
United Microelectronics Co.	20,960	18,267	7.7x	6.8x	6.4x	20.4x	18.5x	15.5x	0.9x
Low	20,960	18,267	7.7x	6.7x	4.3x	20.4x	15.5x	8.7x	0.7x
High	165,015	165,218	24.7x	20.2x	19.2x	1020.8x	36.9x	33.9x	3.2x
25th Percentile	37,020	38,444	9.0x	6.7x	5.4x	24.1x	17.0x	12.1x	0.8x
75th Percentile	135,906	135,421	24.4x	17.9x	16.7x	526.3x	31.7x	29.4x	2.1x
Mean	88,277	88,466	17.4x	12.9x	11.7x	226.1x	23.3x	20.1x	1.4x
Median	95,535	94,601	20.1x	15.1x	14.1x	29.5x	19.4x	17.7x	1.0x
Taiwan Semiconductor	\$541,108	\$524,583	16.7x	14.2x	12.2x	29.7x	26.8x	23.7x	0.4x



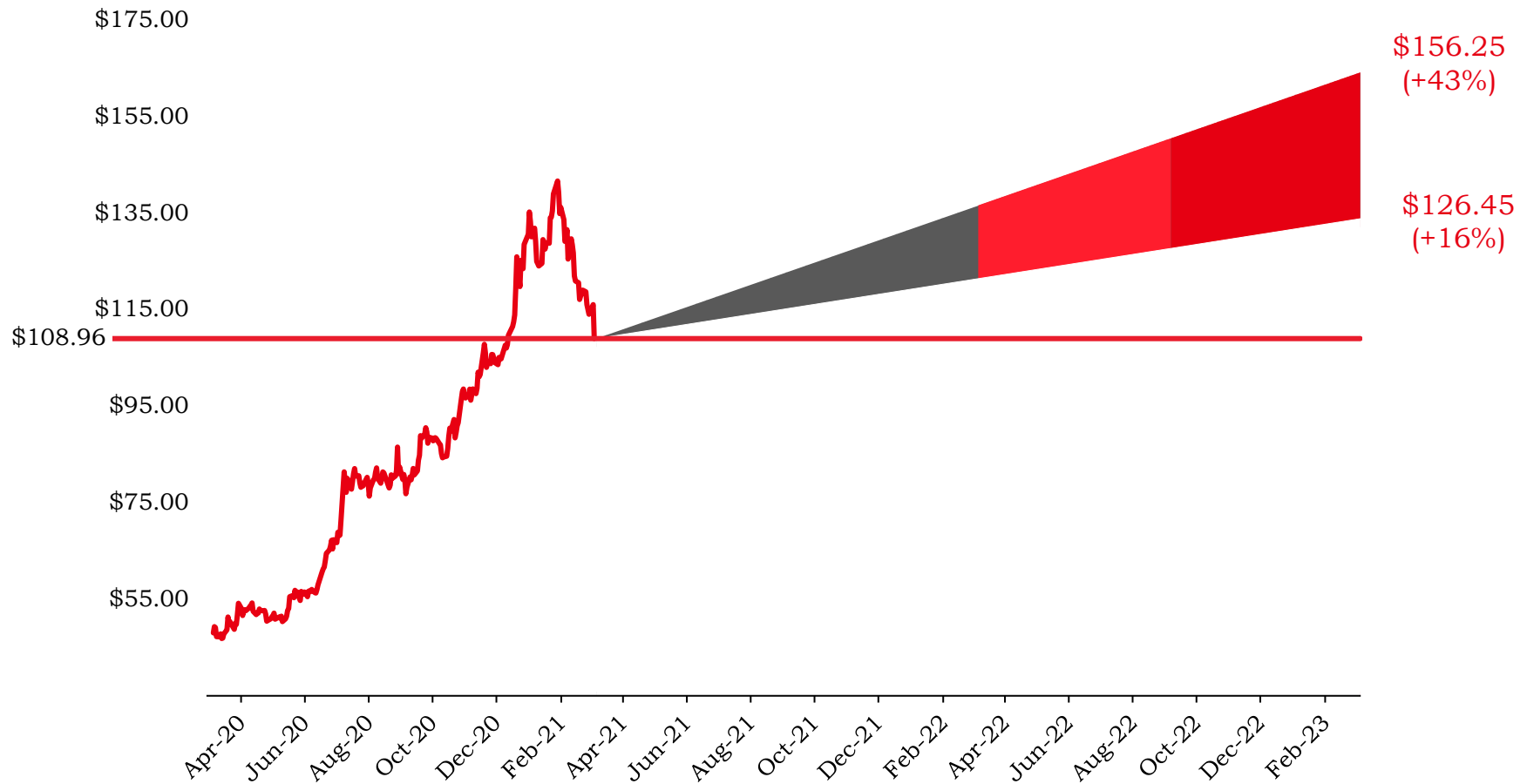
# Historic Exit Multiple

TSM vs. Median Consensus Historic EV / EBITDA Multiple





# Valuation



# DCF



<b>Discounted Cash Flow Analysis</b>								
<b>Taiwan Semiconductor Manufacturing Co. (NYSE:TSM)</b>								
<i>Fiscal Year Ending Dec 31,</i>	2018A	2019A	2020A	2021E	2022E	2023E	2024E	2025E
<b>Revenue</b>	<b>\$34,234</b>	<b>\$34,635</b>	<b>\$45,487</b>	<b>\$53,675</b>	<b>\$61,533</b>	<b>\$68,628</b>	<b>\$73,884</b>	<b>\$77,578</b>
(-) COGS	(17,710)	(18,686)	(21,334)	(28,448)	(32,612)	(35,686)	(37,847)	(39,565)
<b>Gross Profit</b>	<b>\$16,524</b>	<b>\$15,949</b>	<b>\$24,153</b>	<b>\$25,227</b>	<b>\$28,920</b>	<b>\$32,941</b>	<b>\$36,037</b>	<b>\$38,013</b>
(-) Op. Ex	(5,423)	(5,666)	(7,094)	(4,831)	(5,245)	(5,181)	(5,575)	(5,939)
<b>EBIT</b>	<b>\$11,101</b>	<b>\$10,283</b>	<b>\$17,059</b>	<b>\$20,396</b>	<b>\$23,675</b>	<b>\$27,760</b>	<b>\$30,462</b>	<b>\$32,075</b>
(-) Tax Affect	(1,538)	(1,441)	(2,263)	(2,652)	(3,315)	(3,886)	(3,960)	(3,849)
<b>NOPAT</b>	<b>\$9,564</b>	<b>\$8,843</b>	<b>\$14,796</b>	<b>\$23,048</b>	<b>\$26,990</b>	<b>\$31,647</b>	<b>\$34,422</b>	<b>\$35,924</b>
(+) D&A	9,710	9,286	11,267	12,882	14,153	15,784	16,993	17,843
(-) CapEx	(11,100)	(16,194)	(17,840)	(21,470)	(24,613)	(27,451)	(29,554)	(31,031)
(Inc) / Dec in NWC	3,002	(8,129)	(773)	(514)	524	530	495	254
<b>Free Cash Flow</b>	<b>\$11,176</b>	<b>(\$6,195)</b>	<b>\$7,450</b>	<b>\$13,946</b>	<b>\$17,053</b>	<b>\$20,510</b>	<b>\$22,356</b>	<b>\$22,990</b>
<b>PV of Cash Flow</b>				<b>\$6,764</b>	<b>\$15,803</b>	<b>\$17,882</b>	<b>\$18,340</b>	<b>\$17,744</b>



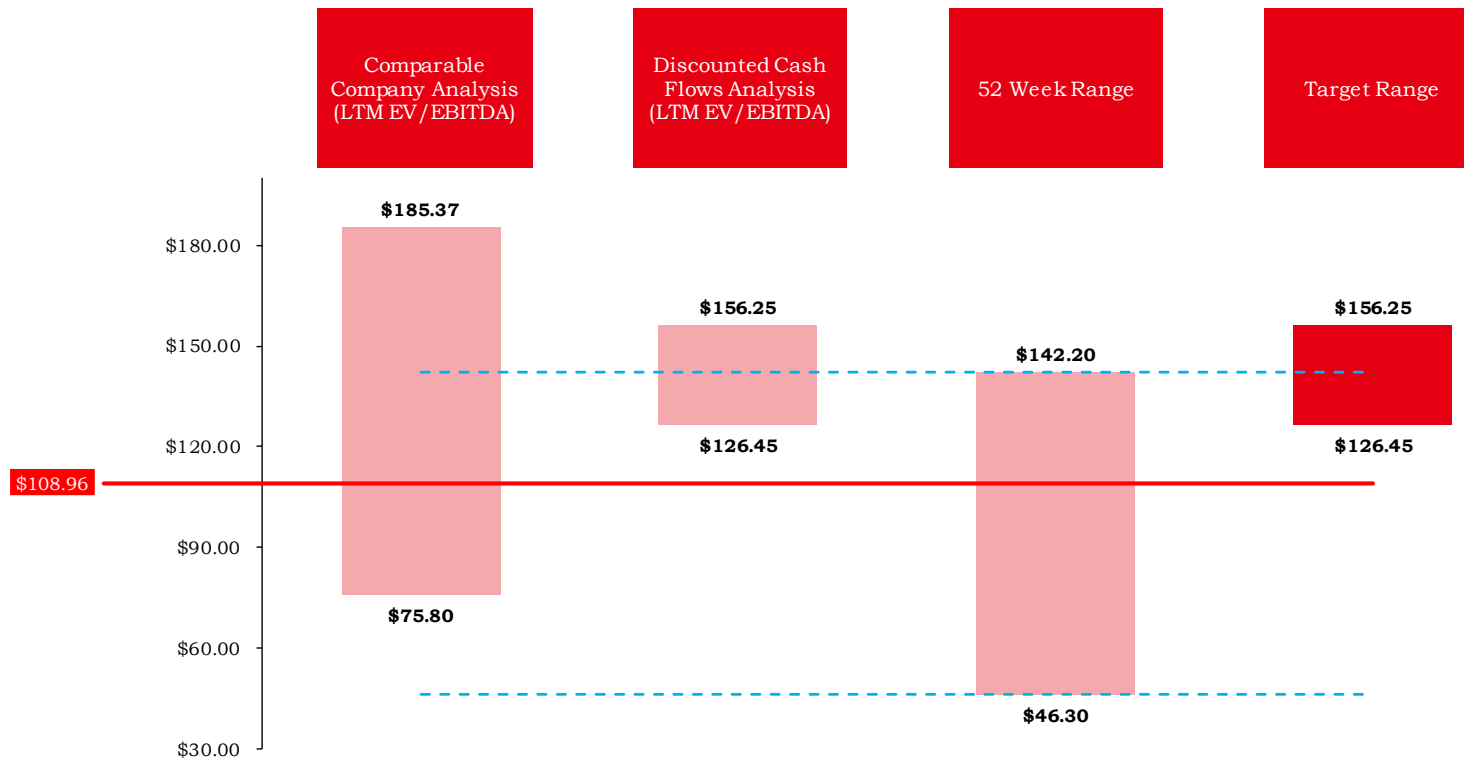
# DCF Output

WACC	
Risk Free Rate	1.67%
Levered Beta	0.96
Market Risk Premium	5.3%
<b>Cost of Equity</b>	<b>6.7%</b>
Pre-Tax Cost of Debt	4.6%
<b>After-Tax Cost of Debt</b>	<b>4.0%</b>
% Equity	83.4%
% Debt	16.6%
<b>WACC</b>	<b>6.3%</b>

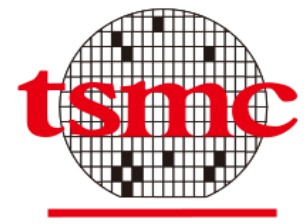
Implied Share Price	
Sum of Free Cash Flow	\$76,533
Exit Multiple (TEV/EBITDA LTM)	20.1x
Terminal Value	\$1,004,478
Discounted Terminal Value	\$740,663
Implied Enterprise Value	\$817,197
Less: Net Debt	12,985
Less: Noncontrolling Interest	75,819
Implied Equity Value	\$728,392
Diluted Shares Outstanding	5,186
<b>Implied Share Price</b>	<b>\$140.45</b>

Sensitivity Analysis										
Weighted Average Cost of Capital	Exit Multiple									
		19.7x	19.8x	19.9x	20.0x	20.1x	20.2x	20.3x	20.4x	20.5x
	2.3%	\$167	\$168	\$169	\$170	\$171	\$172	\$172	\$173	\$174
	3.3%	\$159	\$160	\$161	\$162	\$162	\$163	\$164	\$165	\$166
	4.3%	\$152	\$152	\$153	\$154	\$155	\$155	\$156	\$157	\$158
	5.3%	\$144	\$145	\$146	\$147	\$147	\$148	\$149	\$150	\$150
	6.3%	\$138	\$138	\$139	\$140	\$140.45	\$141	\$142	\$143	\$143
	7.3%	\$131	\$132	\$133	\$133	\$134	\$135	\$135	\$136	\$137
	8.3%	\$125	\$126	\$126	\$127	\$128	\$128	\$129	\$130	\$130
	9.3%	\$119	\$120	\$121	\$121	\$122	\$123	\$123	\$124	\$124
	10.3%	\$114	\$115	\$115	\$116	\$116	\$117	\$118	\$118	\$119

# Football Field Analysis







# Potential Risks & Mitigants

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- ▶ China's increased influence on state-owned enterprises might influence the presence of competing multinational corporations in domestic and foreign markets
  - ▶ Mitigant: Global market share mitigates this risk as Taiwan, South Korea, Other, and then China own the market share of 63%, 18%, 13%, and 6% respectively
  - ▶ Mitigant: State backed enterprises have political, ethical, and more conflicts and as a result companies like SMIC were placed on an entity list, limiting the company's access to technology and machinery
  
- ▶ TSM may be limited in expansion and face more scrutiny due to their exposure to the Taiwanese economy
  - ▶ Mitigant: TSM announced plans for a domestic factory in Arizona. This project is valued at \$12B and will receive United States federal subsidies
  - ▶ Mitigant: The Taiwanese economy is forecasted to grow 4.7% in 2021 and grew 3.1% in 2020 (outpacing China's 2.3% expansion) and placing Taiwan as Asia's top-performing economy
  - ▶ Mitigant: Taiwanese goods exports grew 4.9% in 2020 and are forecasted to grow 9.6% in 2021
  
- ▶ TSM's revenue is largely tied into U.S. dollars so fluctuations between NT and other currency exchange rates can negatively impact them
  - ▶ Mitigant: TSM hedges currency risk with FOREX derivative contracts, which allows transactions at a set price and predetermined time

Q&A

# Appendix

# Inputs



In Millions	2017A	2018A	2019A	2020A	2021E	2022E	2023E	2024E	2025E
<i>From Income Statement</i>									
<b>Segment Revenues</b>									
Product Revenue	\$32,116	\$30,246	\$30,017	\$40,026	\$47,230	\$54,315	\$60,833	\$65,699	\$68,984
Product Revenue Growth (%)		(6%)	(1%)	33%	18%	15%	12%	8%	5%
Other Revenue	17	3989	4618	5461	6444	7218	7795	8185	8594
Other Revenue Growth (%)		23090%	16%	18%	18%	12%	8%	5%	5%
<b>Total Revenue</b>	<b>32133</b>	<b>34234</b>	<b>34635</b>	<b>45487</b>	<b>53675</b>	<b>61533</b>	<b>68628</b>	<b>73884</b>	<b>77578</b>
Revenue (Growth Rate)		7%	1%	31%	18%	15%	12%	8%	5%
(-) COGS	(15,866)	(17,710)	(18,686)	(21,334)	(28,448)	(32,612)	(35,686)	(37,847)	(39,565)
COGS (% of Sales)	49%	52%	54%	47%	53%	53%	52%	51%	51%
<b>Gross Profit</b>	<b>16,267</b>	<b>16,524</b>	<b>15,949</b>	<b>24,153</b>	<b>25,227</b>	<b>28,920</b>	<b>32,941</b>	<b>36,037</b>	<b>38,013</b>
(-) Selling, General, & Admin Exp.	(1,786)	(1,743)	(1,818)	(2,416)	(3,220)	(3,692)	(3,431)	(3,694)	(3,879)
SG&A(% of Sales)	6%	5%	5%	5%	6%	6%	5%	5%	5%
(-) R&D Expense	(2,654)	(2,851)	(2,959)	(3,719)	(4,189)	(4,692)	(5,067)	(5,320)	(5,586)
R&D Expense (% of Sales)	15430%	71%	64%	68%	65%	65%	65%	65%	65%
(-) Other Deductions	(716)	(830)	(888)	(960)	(1,610)	(1,553)	(1,750)	(1,881)	(2,060)
Other Deductions (% of Sales)	2%	2%	3%	2%	3%	3%	3%	3%	3%
(-) Operating Expense	(5,156)	(5,423)	(5,666)	(7,094)	(4,831)	(5,245)	(5,181)	(5,575)	(5,939)
Operating Expense (%of Sales)	16%	16%	16%	16%	16%	16%	16%	16%	16%
<b>EBIT</b>	<b>11,111</b>	<b>11,101</b>	<b>10,283</b>	<b>17,059</b>	<b>20,396</b>	<b>23,675</b>	<b>27,760</b>	<b>30,462</b>	<b>32,075</b>
(-) Interest Expense	(202)	(386)	(419)	(236)	(347)	(347)	(347)	(339)	(323)
<b>EBT</b>	<b>10,910</b>	<b>10,715</b>	<b>9,864</b>	<b>16,823</b>	<b>20,049</b>	<b>23,328</b>	<b>27,413</b>	<b>30,123</b>	<b>31,752</b>
(-) Income Tax Expense	(1,742)	(1,538)	(1,441)	(2,263)	(2,652)	(3,315)	(3,886)	(3,960)	(3,849)
Income Tax Rate	16%	14%	15%	13%	13%	14%	14%	13%	12%
<b>NOPAT</b>	<b>9,369</b>	<b>9,564</b>	<b>8,843</b>	<b>14,796</b>	<b>23,048</b>	<b>26,990</b>	<b>31,647</b>	<b>34,422</b>	<b>35,924</b>
(+) Depreciation and Amortization	8,552	9,710	9,286	11,267	12,882	14,153	15,784	16,993	17,843
D&A (% of Sales)	27%	28%	27%	25%	24%	23%	23%	23%	23%
(-) CapEX	(11,627)	(11,100)	(16,194)	(17,840)	(21,470)	(24,613)	(27,451)	(29,554)	(31,031)
CapEx (% of Sales)	36%	32%	47%	39%	40%	40%	40%	40%	40%
<b>Change in Working Cap</b>	<b>230</b>	<b>3,002</b>	<b>(8,129)</b>	<b>(773)</b>	<b>(514)</b>	<b>524</b>	<b>530</b>	<b>495</b>	<b>254</b>
Change in Working Cap(%of Sales)	1%	9%	(23%)	(2%)	(1%)	1%	1%	1%	0%
<b>Free Cash Flow</b>	<b>\$6,524</b>	<b>\$11,176</b>	<b>(\$6,195)</b>	<b>\$7,450</b>	<b>\$13,946</b>	<b>\$17,053</b>	<b>\$20,510</b>	<b>\$22,356</b>	<b>\$22,990</b>
<b>Discount Factor</b>					75%	175%	275%	375%	475%
<b>Stub</b>					0.5	1	1	1	1
<b>PV of Cash Flow</b>					\$ 6,764	\$ 15,803	\$ 17,882	\$ 18,340	\$ 17,744



# EV / EBITDA Valuation

Mean	
Implied Target Price	
Exit Multiple (EV/EBITDA)	17.4x
Sum of FCF	\$76,533
Terminal Value	\$866,670
Discounted TV	\$639,049
Implied Enterprise Value	715,582
Less Net Debt	12,985
Implied Equity Value	<b>702,597</b>
Diluted Shares Outstanding	5,186
Implied Share Price	<b>\$135.48</b>

25th Percentile	
Implied Target Price	
Exit Multiple (EV/EBITDA)	9.0x
Sum of FCF	\$76,533
Terminal Value	\$446,912
Discounted TV	\$329,536
Implied Enterprise Value	406,069
Less Net Debt	12,985
Implied Equity Value	<b>393,084</b>
Diluted Shares Outstanding	5,186
Implied Share Price	<b>\$75.80</b>

Low	
Implied Target Price	
Exit Multiple (EV/EBITDA)	7.7x
Sum of FCF	\$76,533
Terminal Value	\$383,254
Discounted TV	\$282,597
Implied Enterprise Value	359,130
Less Net Debt	12,985
Implied Equity Value	<b>346,145</b>
Diluted Shares Outstanding	5,186
Implied Share Price	<b>\$66.75</b>

Median	
Implied Target Price	
Exit Multiple (EV/EBITDA)	20.1x
Sum of FCF	\$76,533
Terminal Value	\$1,004,478
Discounted TV	\$1,004,478
Implied Enterprise Value	1,081,011
Less Net Debt	12,985
Implied Equity Value	<b>1,068,026</b>
Diluted Shares Outstanding	5,186
Implied Share Price	<b>\$205.94</b>

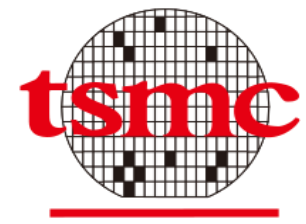
75th Percentile	
Implied Target Price	
Exit Multiple (EV/EBITDA)	24.4x
Sum of FCF	\$76,533
Terminal Value	\$1,217,525
Discounted TV	\$897,756
Implied Enterprise Value	974,289
Less Net Debt	12,985
Implied Equity Value	<b>961,304</b>
Diluted Shares Outstanding	5,186
Implied Share Price	<b>\$185.37</b>

High	
Implied Target Price	
Exit Multiple (EV/EBITDA)	24.7x
Sum of FCF	\$76,533
Terminal Value	\$1,232,108
Discounted TV	\$908,509
Implied Enterprise Value	985,042
Less Net Debt	12,985
Implied Equity Value	<b>972,057</b>
Diluted Shares Outstanding	5,186
Implied Share Price	<b>\$187.44</b>



# Working Capital Schedule

<b>WORKING CAPITAL SCHEDULE</b>							
<i>Fiscal Year Ending December 31,</i>	<b>2019A</b>	<b>2020A</b>	<b>2021E</b>	<b>2022E</b>	<b>20223E</b>	<b>2024E</b>	<b>2025E</b>
<b>Accounts receivable</b>							
Beginning of period	4,202	4,644	5,178	6,654	7,316	8,334	8,879
Increases / (decreases)	442	534	1,475	663	1,017	545	493
End of period	4,644	5,178	6,654	7,316	8,334	8,879	9,372
AR as % of sales	13.4%	11.4%	12.4%	11.9%	12.1%	12.0%	12.1%
Days sales outstanding (DSO)	49 days	42 days	45 days	43 days	44 days	44 days	44 days
<b>Inventory</b>							
Beginning of period	3373	2774	4889	5371	6816	7098	7719
Increases / (decreases)	(598)	2,115	482	1,444	282	621	251
End of period	2,774	4,889	5,371	6,816	7,098	7,719	7,969
Inventory as % of COGS	14.8%	22.9%	18.9%	20.9%	19.9%	20.4%	20.1%
<b>Other Current Assets</b>							
Beginning of period	1796	2043	2717	3366	4006	4303	4606
Increases / (decreases)	247	674	650	640	297	303	187
End of period	2,043	2,717	3,366	4,006	4,303	4,606	4,793
Inventory as % of COGS	10.9%	12.7%	11.8%	12.3%	12.1%	12.2%	12.1%
<b>Accounts payable</b>							
Beginning of period	192	14	1388	936	1597	1461	1701
Increases / (decreases)	(178)	1,374	(452)	661	(136)	241	(2)
End of period	14	1,388	936	1,597	1,461	1,701	1,699
AP as % of COGS	0.1%	6.5%	3.3%	4.9%	4.1%	4.5%	4.3%
Days payables outstanding (DPO)	2 days	12 days	15 days	14 days	16 days	15 days	16 days
<b>Accrued expenses &amp; Other</b>							
Beginning of period	5,517	9,681	12,547	14,904	17,029	19,024	20,464
Increases / (decreases)	4,163	2,866	2,357	2,125	1,995	1,440	1,032
End of period	9,681	12,547	14,904	17,029	19,024	20,464	21,497
Accrued expenses as % of sales	28.0%	27.6%	27.8%	27.7%	27.7%	27.7%	27.7%
<b>Tax effect</b>							
Beginning of period	1,538	1,441	2,263	2,451	2,935	3,204	3,487
Increases / (decreases)	(97)	822	188	484	269	283	155
End of period	1,441	2,263	2,451	2,935	3,204	3,487	3,642
Tax effect as a % of sales	4.2%	5.0%	4.6%	4.8%	4.7%	4.7%	4.7%



# Income Statement

<b>Income Statement</b>				
<b>For the Fiscal Period Ending</b>				
<b>Units</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
	<b>Millions</b>	<b>Millions</b>	<b>Millions</b>	<b>Millions</b>
<b>Revenue</b>	<b>32,133.20</b>	<b>34,234.20</b>	<b>34,634.90</b>	<b>45,487.20</b>
+ Sales & Services Revenue	\$32,116	30,245.60	30,016.80	40,025.70
+ Other Revenue	\$17	3,988.60	4,618.10	5,461.40
- Cost of Revenue	\$15,866	17,710.00	18,686.40	21,334.00
+ Cost of Goods & Services	\$8,038	8,852.40	10,283.20	11,003.70
+ Depreciation & Amortization	\$7,828	8,857.60	8,403.10	10,330.30
<b>Gross Profit</b>	<b>\$16,267</b>	<b>16,524.30</b>	<b>15,948.50</b>	<b>24,153.20</b>
+ Other Operating Income	—	—	—	0
- Operating Expenses	\$3,556	3,744.50	3,863.40	4,903.90
+ Selling, General & Admin	\$893	871.4	909.1	1,208.10
+ Selling & Marketing	\$196	198.7	205.5	241.6
+ General & Administrative	\$697	672.6	703.6	966.5
<b>SGA TOTAL</b>	<b>\$1,786</b>	<b>\$1,743</b>	<b>\$1,818</b>	<b>\$2,416</b>
+ Research & Development	\$2,654	2,850.80	2,959.20	3,718.60
+ Depreciation & Amortization	\$724	851.9	883.1	936.6
+ Prov For Doubtful Accts	(\$0)	-7.3	10.3	-2.7
+ Other Operating Expense	(\$715)	-822.3	-898.4	-956.8
<b>OTHER DEDUCTIONS TOTAL</b>	<b>(\$716)</b>	<b>(\$830)</b>	<b>(\$888)</b>	<b>(\$960)</b>
<b>Operating Income (Loss)</b>	<b>\$12,712</b>	<b>12,779.80</b>	<b>12,085.10</b>	<b>19,249.30</b>
- Non-Operating (Income) Loss	(\$267)	-569.8	-614.2	-283.6
+ Interest Expense, Net	(\$202)	-386.4	-418.8	-235.6
+ Interest Expense	\$110	101.3	105.2	70.7
- Interest Income	\$311	487.7	524	306.3
+ Other Investment (Inc) Loss	(\$5)	-5.3	-13.5	—
+ Foreign Exch (Gain) Loss	\$0	-80.9	-67.8	112.2
+ (Income) Loss from Affiliates	(\$98)	-101.5	-92.1	-122
+ Other Non-Op (Income) Loss	\$38	4.3	-22	-38.1
<b>Pretax Income (Loss), Adjusted</b>	<b>\$12,978</b>	<b>13,349.50</b>	<b>12,699.30</b>	<b>19,532.90</b>
<b>Pretax Income (Loss), GAAP</b>	<b>13,022.70</b>	<b>13,193.20</b>	<b>12,619.10</b>	<b>19,861.70</b>
- Income Tax Expense (Benefit)	1,741.90	1,537.50	1,440.50	2,262.70
+ Current Income Tax	1,866.00	1,688.50	1,475.00	2,475.80
+ Deferred Income Tax	-124.1	-150.9	-34.5	-213.1
<b>Income (Loss) from Cont Ops</b>	<b>11,280.80</b>	<b>11,655.70</b>	<b>11,178.60</b>	<b>17,599.00</b>
<b>Income (Loss) Incl. MI</b>	<b>11,280.80</b>	<b>11,655.70</b>	<b>11,178.60</b>	<b>17,599.00</b>
- Minority Interest	1.2	1.8	2.6	9.3
<b>Net Income, GAAP</b>	<b>11,279.70</b>	<b>11,653.90</b>	<b>11,176.00</b>	<b>17,589.70</b>



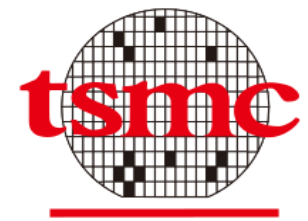
# Balance Sheet

<b>Balance Sheet</b>				
<b>For the Fiscal Period Ending</b>				
<b>Units</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
<b>Millions</b>	<b>Millions</b>	<b>Millions</b>	<b>Millions</b>	<b>Millions</b>
<b>Total Assets</b>				
+ Cash, Cash Equivalents & STI	21,866.40	22,708.90	19,499.00	28,092.00
+ Cash & Cash Equivalents	18,652.20	18,877.90	15,225.10	23,498.60
+ ST Investments	3,214.20	3,831.00	4,273.90	4,593.40
+ Accounts & Notes Receiv	4,122.70	4,202.00	4,644.10	5,178.30
+ Inventories	2,490.20	3,372.70	2,774.30	4,889.10
+ Raw Materials	357.1	647.8	738.4	853.4
+ Work In Process	1,798.60	2,354.70	1,737.50	3,263.10
+ Finished Goods	334.5	370.2	298.4	772.6
+ Other ST Assets	412.9	809	584.7	716.7
+ Derivative & Hedging Assets	20.4	3.6	7.2	80.4
+ Misc ST Assets	392.6	805.5	577.6	636.3
<b>Total Current Assets</b>	<b>28,892.20</b>	<b>31,092.50</b>	<b>27,502.10</b>	<b>38,876.10</b>
+ Property, Plant & Equip, Net	35,813.20	35,025.20	45,789.50	56,357.90
+ Property, Plant & Equip	103,832.80	110,192.70	131,369.40	158,588.30
- Accumulated Depreciation	68,019.60	75,167.60	85,579.90	102,230.40
+ LT Investments & Receivables	799.1	373.7	383.6	316.3
+ LT Investments	799.1	373.7	383.6	316.3
+ Other LT Assets	1,631.60	1,795.60	2,043.00	2,716.60
+ Total Intangible Assets	477.8	555.5	690.5	917.2
+ Goodwill	190.4	189.3	190.3	193.5
+ Other Intangible Assets	287.4	366.1	500.1	723.7
+ Deferred Tax Assets	408	549.1	599.4	924
+ Investments in Affiliates	602	583.7	625.1	670.6
+ Misc LT Assets	143.8	107.3	128	204.8
Total Noncurrent Assets	38,243.90	37,194.50	48,216.10	59,390.80
<b>Total Assets</b>	<b>67,136.10</b>	<b>68,287.00</b>	<b>75,718.10</b>	<b>98,266.90</b>
<b>Liabilities &amp; Shareholders' Equity</b>				
+ Payables & Accruals	5,622.40	5,517.30	9,680.70	12,546.80
+ Accounts Payable	957.7	1,077.50	1,296.20	1,387.70
+ Accrued Taxes	1,128.40	1,273.80	1,085.40	1,918.90
+ Interest & Dividends Payable	—	—	4,334.60	4,614.90
+ Other Payables & Accruals	3,536.30	3,166.00	2,964.50	4,625.20
+ ST Debt	4,117.70	4,039.90	5,101.70	3,309.90
+ ST Borrowings	2,149.30	2,899.70	3,962.50	3,152.20
+ ST Lease Liabilities	0	0	76.1	65.1
+ ST Finance Leases	0	0	—	—
+ Current Portion of LT Debt	1,968.40	1,140.20	1,063.20	92.5
+ Other ST Liabilities	2,350.20	1,568.70	4,967.40	6,110.70
+ Deferred Revenue	1,878.20	1,562.30	4,934.50	6,107.40
+ Derivatives & Hedging	1.4	6.4	32.9	3.4
+ Misc ST Liabilities	470.6	0	0	0
<b>Total Current Liabilities</b>	<b>12,090.30</b>	<b>11,125.90</b>	<b>19,749.80</b>	<b>21,967.40</b>
+ LT Debt	3,094.10	1,859.00	1,342.00	9,846.70
+ LT Borrowings	3,094.10	1,859.00	839.2	9,114.90
+ Other LT Liabilities	626.8	496.2	395.6	580.4
+ Pension Liabilities	298.3	315.3	307	424.1
+ Deferred Tax Liabilities	10.2	7.6	11.5	61.6
+ Misc LT Liabilities	318.3	173.3	77.1	94.7
<b>Total Noncurrent Liabilities</b>	<b>3,720.90</b>	<b>2,355.20</b>	<b>1,737.60</b>	<b>10,427.10</b>
<b>Total Liabilities</b>	<b>15,811.20</b>	<b>13,481.20</b>	<b>21,487.40</b>	<b>32,394.40</b>
+ Share Capital & APIC	10,623.40	10,297.50	10,537.50	11,219.00
+ Common Stock	8,739.90	8,471.80	8,669.20	9,229.90
+ Additional Paid in Capital	815.2	790.2	808.6	860.9
+ Other Share Capital	1,068.40	1,035.60	1,059.70	1,128.30
+ Retained Earnings	41,570.70	44,976.70	44,576.70	56,548.90
+ Other Equity	-892.9	-490.6	-906.4	-1,929.80
Equity Before Minority Interest	51,301.30	54,783.60	54,207.80	65,838.20
+ Minority/Non Controlling Interest	23.7	22.2	22.9	34.3
Total Equity	51,324.90	54,805.80	54,230.70	65,872.50
<b>Total Liabilities &amp; Equity</b>	<b>67,136.10</b>	<b>68,287.00</b>	<b>75,718.10</b>	<b>98,266.90</b>



# Cash Flow

<b>Cash Flow</b>				
<b>For the Fiscal Period Ending</b>				
<b>Units</b>	<b>2017 Millions</b>	<b>2018 Millions</b>	<b>2019 Millions</b>	<b>2020 Millions</b>
<b>Cash from Operating Activities</b>				
+ Net Income	11,279.70	11,653.90	11,176.00	17,589.70
+ Depreciation & Amortization	8,552.10	9,709.50	9,285.50	11,266.90
+ Non-Cash Items	-573.2	223.4	-411.3	410.6
+ Other Non-Cash Adj	-573.2	223.4	-411.3	410.4
+ Chg in Non-Cash Work Cap	326.6	-2,044.60	357.3	-935.8
+ (Inc) Dec in Accts Receiv	34.9	-440.5	-586.5	-274.5
+ (Inc) Dec in Inventories	-829.4	-974.8	655.5	-1,846.70
+ Inc (Dec) in Accts Payable	84.6	150.7	191.6	13.7
+ Inc (Dec) in Other	1,036.50	-780.1	96.7	1,171.70
<b>Cash from Operating Activities</b>	<b>19,585.10</b>	<b>19,542.10</b>	<b>20,407.50</b>	<b>28,331.40</b>
<b>Cash from Investing Activities</b>				
+ Change in Fixed & Intang	-11,031.50	-10,703.70	-15,196.30	-17,691.00
+ Disp in Fixed & Intang	10.7	6	9.3	20.6
+ Disp of Fixed Prod Assets	10.7	6	9.3	20.6
+ Disp of Intangible Assets	0	0	0	0
+ Acq of Fixed & Intang	-11,042.20	-10,709.70	-15,205.60	-17,711.60
+ Acq of Fixed Prod Assets	-10,894.90	-10,474.00	-14,903.60	-17,387.50
+ Acq of Intangible Assets	-147.3	-235.7	-302	-324.1
+ Other Investing Activities	58.2	-326.9	-267.1	61.9
<b>Cash from Investing Activities</b>	<b>-11,508.80</b>	<b>-11,030.60</b>	<b>-15,463.40</b>	<b>-17,629.10</b>
<b>Cash from Financing Activities</b>				
+ Dividends Paid	-5,967.20	-6,885.00	-8,393.50	-8,807.10
+ Cash From (Repayment) Debt	-911.8	-1,131.80	-195.1	5,853.20
+ Cash From (Repay) ST Debt	341.7	794	1,029.50	-1,072.80
+ Cash From LT Debt	0	0	0	8,108.20
+ Repayments of LT Debt	-1,253.60	-1,925.80	-1,224.60	-1,182.20
+ Other Financing Activities	-97.5	-11.5	-23	4.6
<b>Cash from Financing Activities</b>	<b>-6,976.50</b>	<b>-8,028.30</b>	<b>-8,611.60</b>	<b>-2,949.30</b>
<b>Effect of Foreign Exchange Rates</b>	<b>-700.8</b>	<b>327.3</b>	<b>-295</b>	<b>-798.1</b>
<b>Net Changes in Cash</b>	<b>399</b>	<b>810.6</b>	<b>-3,962.50</b>	<b>6,955.00</b>
<b>CapEx</b>	<b>-11627.3</b>	<b>-11099.5</b>	<b>-16193.8</b>	<b>-17840.4</b>



# Currency Exchange Rate

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Date		Hedging Exchange Rate
		NTD / USD
<b>2020</b>		<b>29.4x</b>
	Q4	28.5x
	Q3	29.4x
	Q3	29.9x
	Q1	30.1x
<b>2019</b>		<b>30.9x</b>
	Q4	30.5x
	Q3	31.2x
	Q2	31.1x
	Q1	30.8x
<b>2018</b>		<b>30.2x</b>
	Q4	30.8x
	Q3	30.7x
	Q2	29.7x
	Q1	29.3x
<b>2017</b>		<b>30.5x</b>
	Q4	30.1x
	Q3	30.3x
	Q2	30.3x
	Q1	31.2x
<b>2016</b>		<b>31.8x</b>
	Q4	31.8x
	Q3	32.9x
	Q2	32.4x
	Q1	33.1x