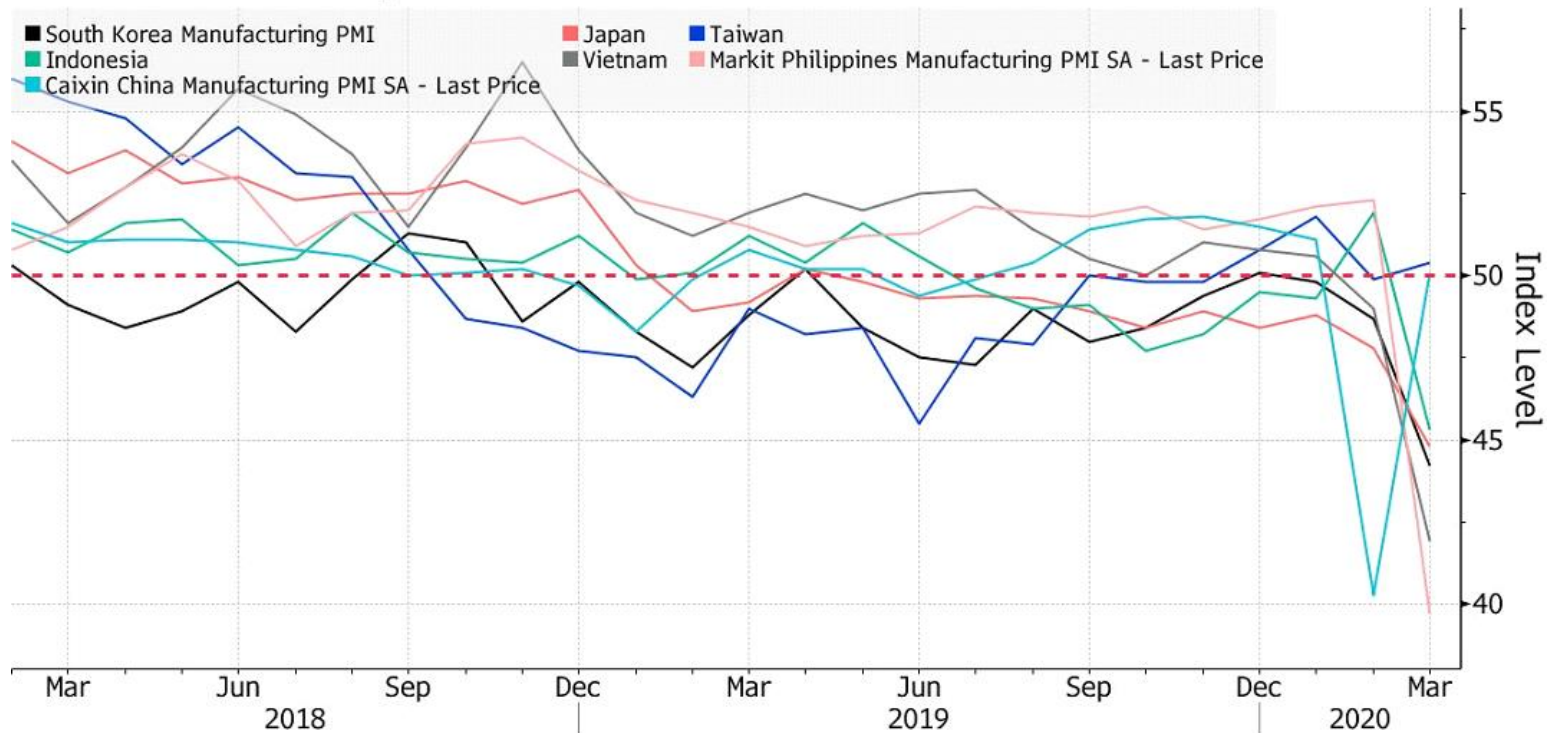


Electronics Industry After Pandemic

Dr. Hayao Nakahara, N.T. Information Ltd

Unprecedented Pain

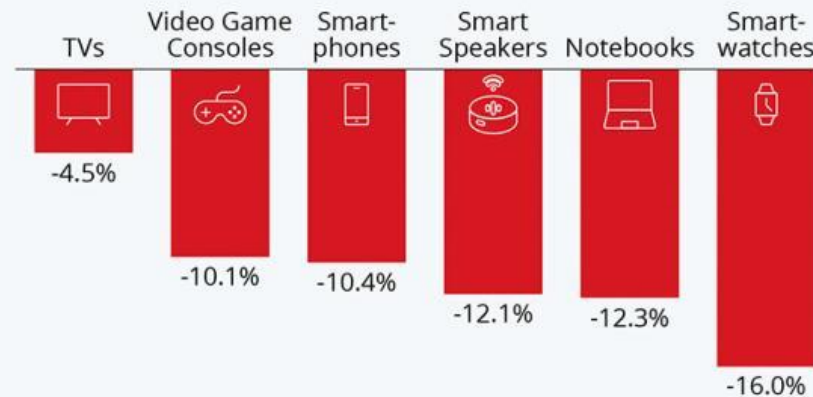
Asia's factories slump more while China heals a bit



Source: IHS Markit

Coronavirus Expected to Impact Tech Industry Shipments

Estimated impact of the COVID-19 outbreak on global tech shipments in Q1 2020*

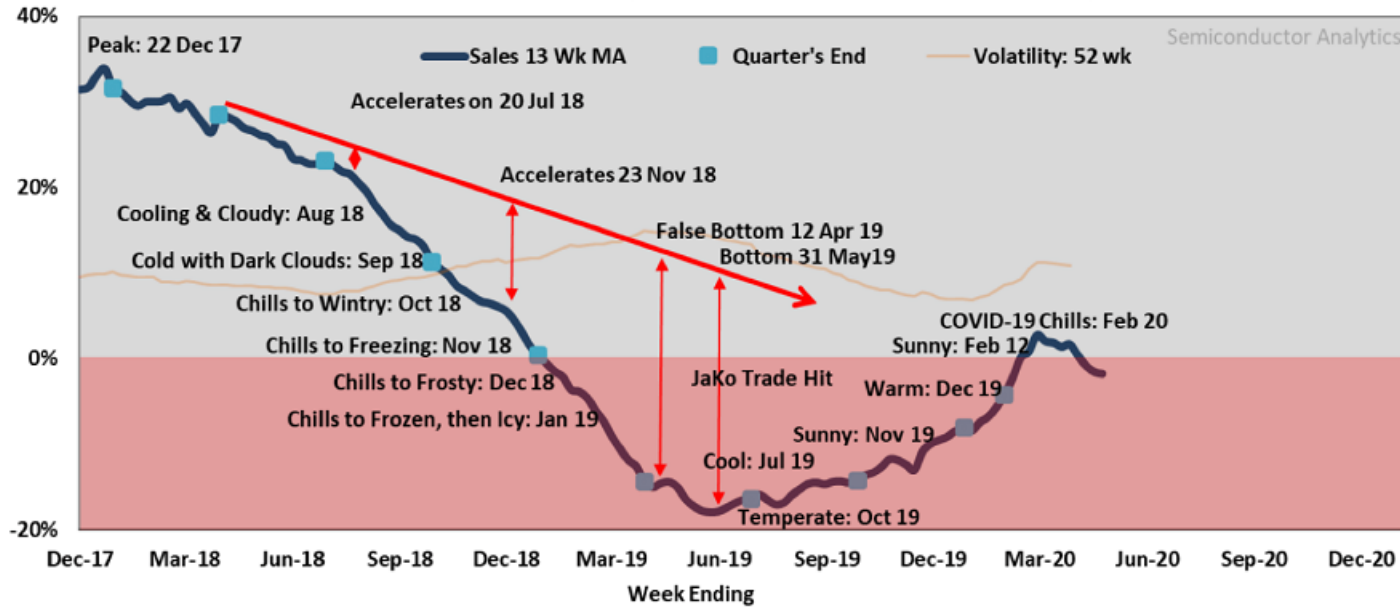


* smartphone forecast refers to production volume instead of shipments

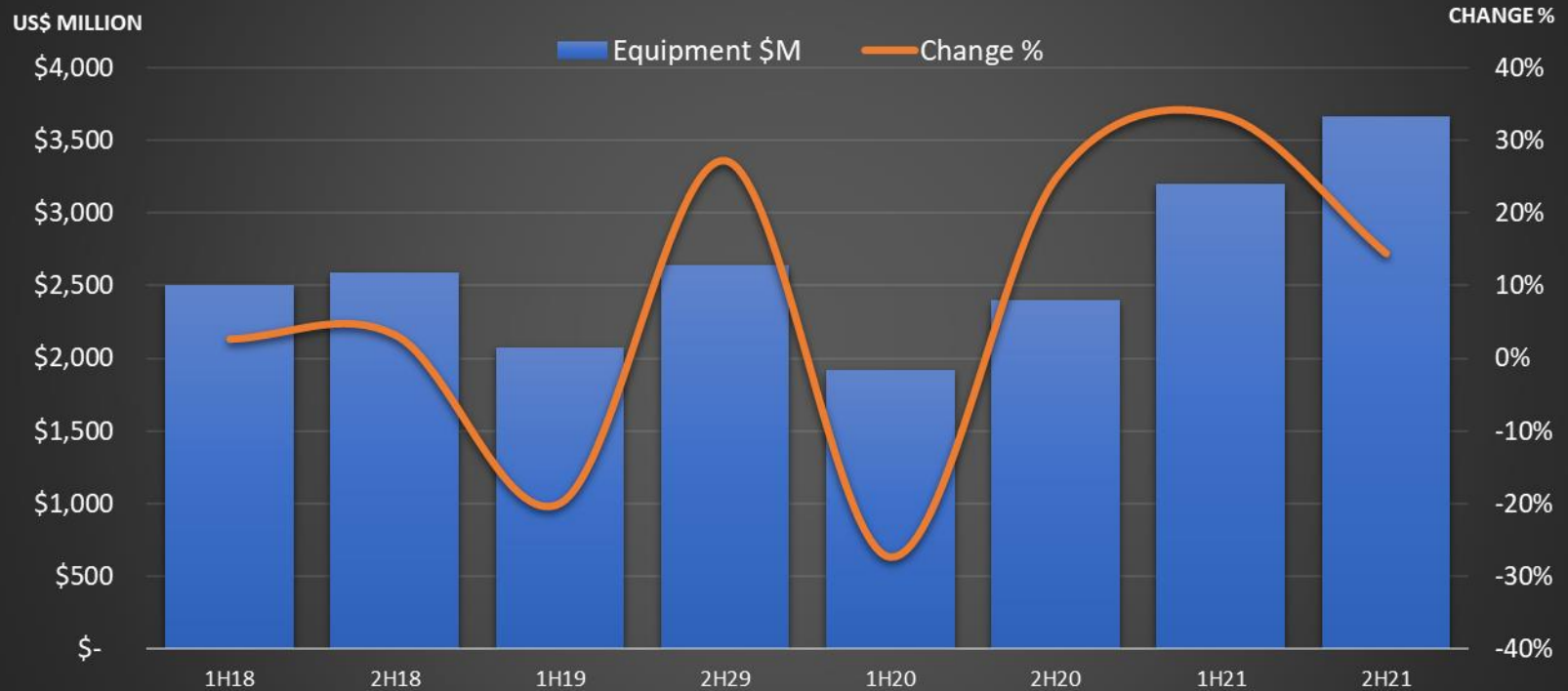
Source: TrendForce



Annual IC Sales Growth: Weekly Moving Averages vs. VLSI Weather Reports



Power & Compound Fab Equipment Spending (Front End)



SOURCE: POWER & COMPOUND FAB REPORT TO 2024, UPDATE APRIL 2020, PUBLISHED BY SEMI

Summary of IC Manufacturing Scenarios

	2018	2019	2020	2021
Electronic Sales (\$B)	2165.2	2121.9	2020.1	2361.6
<i>Growth</i>	4.8%	-2.0%	-4.8%	16.9%
IC Sales (\$B)	406.7	352.3	337.4	418.0
<i>Growth</i>	14.8%	-13.4%	-4.2%	23.9%
Semi CAPEX (\$B)	100.6	96.7	97.9	105.2
<i>Growth</i>	8.7%	-3.8%	1.2%	7.5%
SEMI Eqpt + Service	81.9	76.6	72.8	85.2
<i>Growth</i>	16.6%	-6.5%	-5.1%	17.2%

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Top 10 Semiconductor Vendors by Revenue, Worldwide, 2019 (Millions of U.S. Dollars)

2019 Rank	2018 Rank	Vendor	2019 Revenue	2019 Market Share (%)	2018 Revenue	2018-2019 Growth (%)
1	2	Intel	67,754	16.2	66,290	2.2
2	1	Samsung Electronics	52,191	12.5	73,708	-29.2
3	3	SK hynix	22,297	5.3	36,240	-38.5
4	4	Micron Technology	20,254	4.8	29,742	-31.9
5	5	Broadcom	15,322	3.7	16,261	-5.8
6	6	Qualcomm	13,613	3.2	15,375	-11.5
7	7	Texas Instruments	13,364	3.2	14,592	-8.4
8	8	ST Microelectronics	9,451	2.3	9,579	-1.3
9	10	NXP Semiconductors	8,758	2.1	9,022	-2.9
10	15	Apple	8,569	2	7,646	12.1
		Others (outside top 10)	187,575	44.8	197,696	-5.1
		Total Market	419,148	100	476,151	-12

Source: Gartner (April 2020)

5G Versions Rescue?

Worldwide Topline Smartphone Forecast Changes, Year-Over-Year Growth %, 2020 (Quarterly)

Forecast Version	1Q20	2Q20	3Q20	4Q20
4Q19 - Feb. 2020	-14.50%	-6.90%	1.80%	8.00%
3Q19 - Nov. 2019	-0.30%	0.30%	0.80%	4.90%

Source: IDC Worldwide Quarterly Mobile Phone Tracker, February

Note: *Figures are not exact due to rounding.*

Top 5 Smartphone Makers 2020Q1 (shipments in millions of units)

Company	1Q20 Shipment Volume	1Q20 Market Share	1Q19 Shipment Volume	1Q19 Market Share	Year-Over- Year Change
1. Samsung	58.3	21.10%	71.9	23.00%	-18.90%
2. Huawei	49	17.80%	59.1	18.90%	-17.10%
3. Apple	36.7	13.30%	36.8	11.80%	-0.40%
4. Xiaomi	29.5	10.70%	27.8	8.90%	6.10%
5. vivo	24.8	9.00%	23.2	7.40%	7.00%
Others	77.5	28.10%	93.5	29.90%	-17.20%
Total	275.8	100.00%	312.3	100.00%	-11.70%

Source: IDC Quarterly Mobile Phone Tracker, Apr 29, 2020

(M units)

	2011		2012		2013		2014		2015		2016		2017		2018	2019	2020 F	
	Total	Smart-phone	Total	Smart-phone	Total	Smart-phone	Total	Smart-phone	Total	Smart-phone	Total	Smart-phone	Total	Smart-phone	Smart-phone	Smart-phone	Smartphone	
																	as of Jan2020	After outbreak of corona-virus
Samsung	315	94	400	200	460	300	450	330	400	315	370	310	360	310	295	295	300	290
Apple	90	90	135	135	155	155	193	193	232	232	215	215	217	217	208	190	205	205
LGE	86	19	58	27	65	44	67	57	70	57	69	52	65	50	46	36	35	35
Sony	33	19	34	34	40	40	38	38	30	30	17	17	13	13	7	4	4	4
Nokia/MS	423	77	340	33	280	27	210	35	150	30	110	10	80	9	14	11	10	9
HTC	43	44	32	31	20	20	22	22	15	15	10	10	7	7	3	2	2	2
ASUS	0	0	0	0	0	0	8	8	20	20	17	17	12	12	10	4	4	3
Motorola	40	17	29	16	30	25	34	34	21	21	11	11	27	27	35	33	30	35
Blackberry	51	51	29	29	20	20	9	9	8	8	5	5	2	2	2	2	2	2
Huawei	41	15	55	40	65	45	80	65	102	102	135	135	157	157	202	235	225	200
Lenovo	16	2	28	16	44	44	65	65	44	44	27	27	17	17	5	2	1	1
Xiaomi	n/a	n/a	7	7	18	18	61	61	67	67	60	60	95	95	120	120	125	117
ZTE	57	11	69	25	65	40	65	45	57	47	45	45	45	45	25	10	12	12
Coolpad	n/a	n/a	n/a	n/a	40	40	44	44	29	29	15	15	9	9	6	4	0	0
TCL	34	1	40	10	45	15	50	35	65	45	60	37	60	30	20	16	20	15
Oppo	n/a	n/a	7	7	13	13	28	28	40	40	92	92	115	115	112	135	135	127
Vivo	n/a	n/a	6	6	12	12	26	26	42	42	73	73	90	90	92	110	115	103
Transsion	n/a	n/a	4	0	21	0	38	5	46	14	78	17	129	35	40	37	45	45
Gionee	n/a	n/a	n/a	n/a	18	18	18	15	18	18	27	27	23	23	12	3	0	0
LeEco	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4	4	19	19	10	10	0	0	0	0
Meizu	n/a	n/a	2	2	3	3	5	5	21	21	18	18	19	19	12	2	2	2
Others	571	11	575	62	516	161	429	130	440	130	407	218	348	228	244	189	228	234
Total	1,800	450	1,850	680	1,930	1,040	1,940	1,250	1,920	1,330	1,880	1,430	1,900	1,520	1,510	1,440	1,500	1,440

+4% ↑ flat ↑

(Mizuho Security)

It's a bit hard to swallow this forecast

5G smartphone shipments (M units)

	2019E	2020E	2021E	2022E
Apple	0	90	130	160
Samsung	6	40	80	135
Huawei	5	100	130	155
Xiaomi	1	15	35	55
OPPO	1	15	35	55
VIVO	1	15	30	55
Others	1	5	10	15
Total	15	280	450	630
% of adoption rate	1%	19%	29%	40%

(Mizuho Security)

Tablet sales started to **increase in April** because of “Home Office” and “Home School”

Top Five Tablet Companies, Worldwide Shipments, YoY Growth, First Quarter 2020 (Preliminary results)

(million units)

Vendor	1Q20 Unit Shipments	1Q20 Market Share	1Q19 Unit Shipments	1Q19 Market Share	Year-Over-Year Growth
1. Apple	6.9	28.00%	9.9	32.30%	-30.40%
2. Samsung	5	20.20%	4.8	15.70%	3.90%
3. Huawei	3	12.00%	3.2	10.50%	-8.30%
4. Lenovo	1.6	6.40%	1.6	5.10%	1.90%
5. Amazon.com	1.4	5.80%	1.9	6.20%	-24.50%
Others	6.8	27.50%	9.2	30.20%	-26.60%
Total	24.6	100.00%	30.6	100.00%	-19.60%

Source: IDC Worldwide Quarterly PCD Tracker, April 30, 2020

Like Tablets, PC Shipment started to **increase in April** because of “Home Office” and “Home School”

Preliminary Worldwide PC Shipment Estimates for 1Q20 (Thousands of Units)

Company	1Q20 Shipments	1Q20 Market Share (%)	1Q19 Shipments	1Q19 Market Share (%)	1Q20-1Q19 Growth (%)
Lenovo	12,613	24.4	13,026	22.1	-3.2
HP Inc.	11,114	21.5	12,648	21.5	-12.1
Dell	10,158	19.7	9,944	16.9	2.2
Apple	3,555	6.9	3,791	6.4	-6.2
Acer Group	2,900	5.6	3,322	5.6	-12.7
ASUS	2,603	5	3,526	6	-26.2
Others	8,693	16.8	12,604	21.4	-31
Total	51,637	100	58,860	100	-12.3

Notes: Data includes desk-based PCs, notebook PCs and ultramobile premiums (such as Microsoft Surface), but not Chromebooks or iPads. All data is estimated based on a preliminary study. Final estimates will be subject to change. The statistics are based on shipments selling into channels. Numbers may not add up to totals shown due to rounding.

Source: Gartner (April 2020)

World Car Sales got hit hard

	Sales (units)						Selling rate (Units/year)			
	Apr 2020	Apr 2019	Percent change	Year to date 2020	Year to date 2019	Percent change	Apr 2020	Year to date 2020	Year 2019	Percent change
WORLD	3,967,406	7,193,464	-44.8%	21,011,687	29,676,090	-29.2%	49,040,001	64,760,049	90,325,283	-28.3%
USA	721,825	1,326,075	-45.6%	4,190,642	5,310,770	-21.1%	8,730,197	13,394,440	16,991,473	-21.2%
CANADA	65,815	182,047	-63.8%	395,351	593,611	-33.4%	654,337	1,415,734	1,927,737	-26.6%
WESTERN EUROPE	274,881	1,381,594	-80.1%	3,409,145	5,680,379	-40.0%	3,169,478	10,314,404	16,283,901	-36.7%
EASTERN EUROPE	104,412	345,813	-69.8%	994,965	1,263,282	-21.2%	1,195,620	3,495,996	4,129,023	-15.3%
JAPAN	267,312	374,737	-28.7%	1,620,990	1,882,954	-13.9%	4,017,048	4,498,600	5,128,473	-12.3%
KOREA	164,311	151,699	8.3%	545,731	557,392	-2.1%	2,005,615	1,694,137	1,750,320	-3.2%
CHINA	1,935,567	1,935,402	0.0%	5,484,034	8,181,553	-33.0%	23,502,865	16,605,925	25,500,447	-34.9%
BRAZIL / ARGENTINA	55,299	257,567	-78.5%	675,394	973,517	-30.6%	693,853	2,185,517	3,105,825	-29.6%
OTHER	377,984	1,238,530	-69.5%	3,695,435	5,232,633	-29.4%	5,070,987	11,155,296	15,508,085	-28.1%

Notes:

The percentage change in the final column compares the average selling rate in the year-to-date with the last full year.

Late reporting countries and estimates are included in "Other".

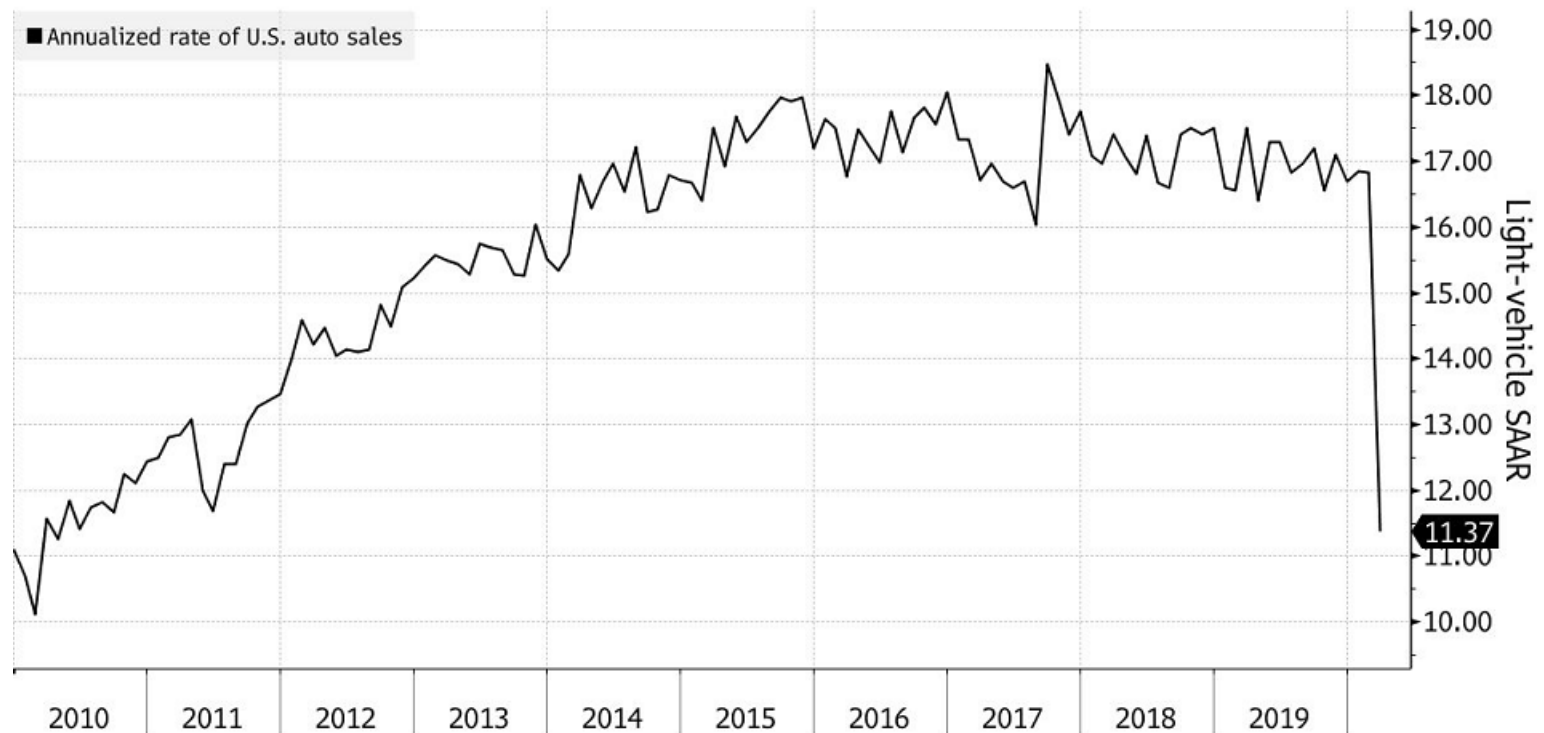
Eastern Europe includes Turkey.

China includes estimate of light vehicle imports.

US Car Sales Plunged in 2020Q1

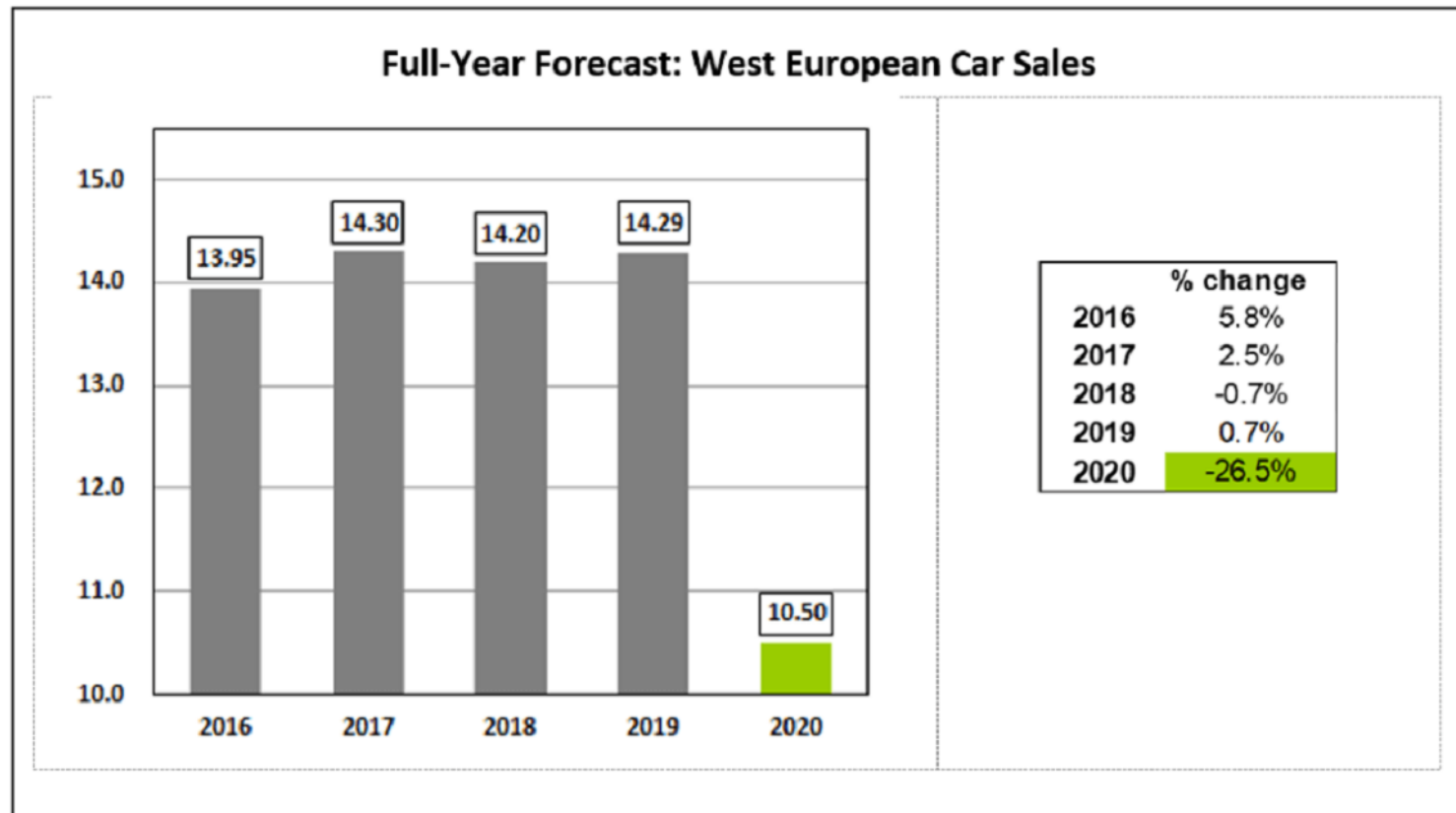
Car Crash

U.S. auto sales rate slows to 2010 levels



Source: Bloomberg

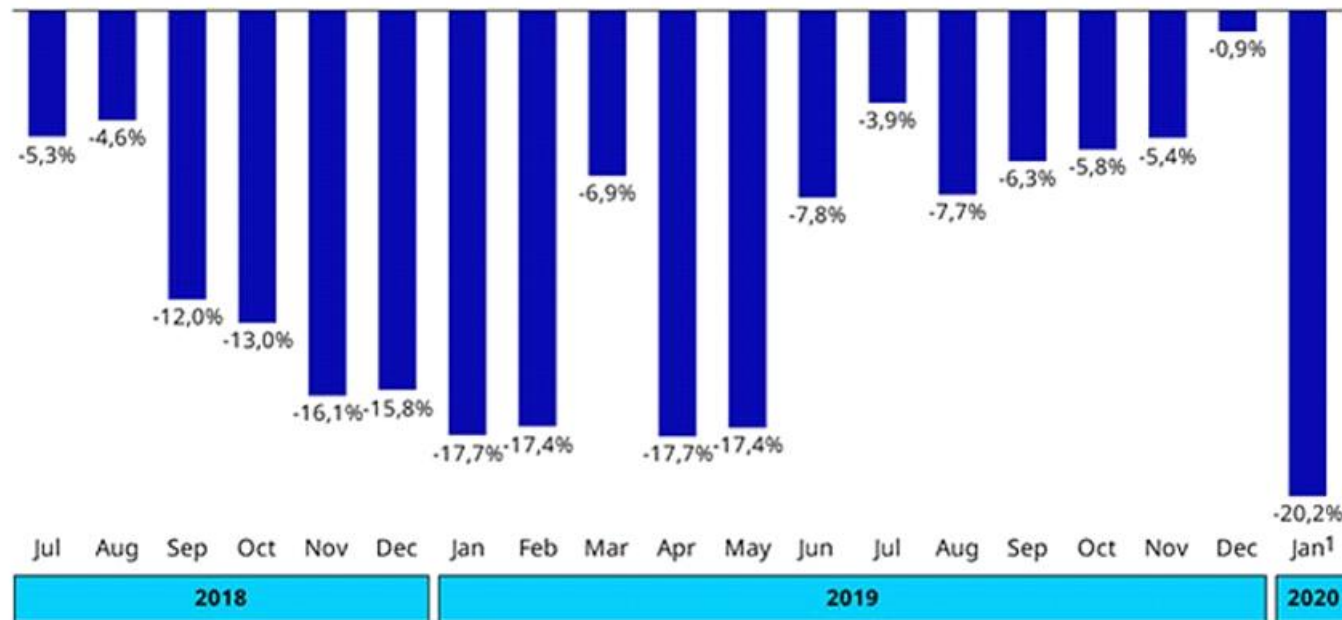
Western Europe Car sales is going to be bad



The world largest car market, China

NEW PASSENGER VEHICLE SALES IN CHINA ARE DECLINING

Year-over-year comparisons of factory shipments (in %)



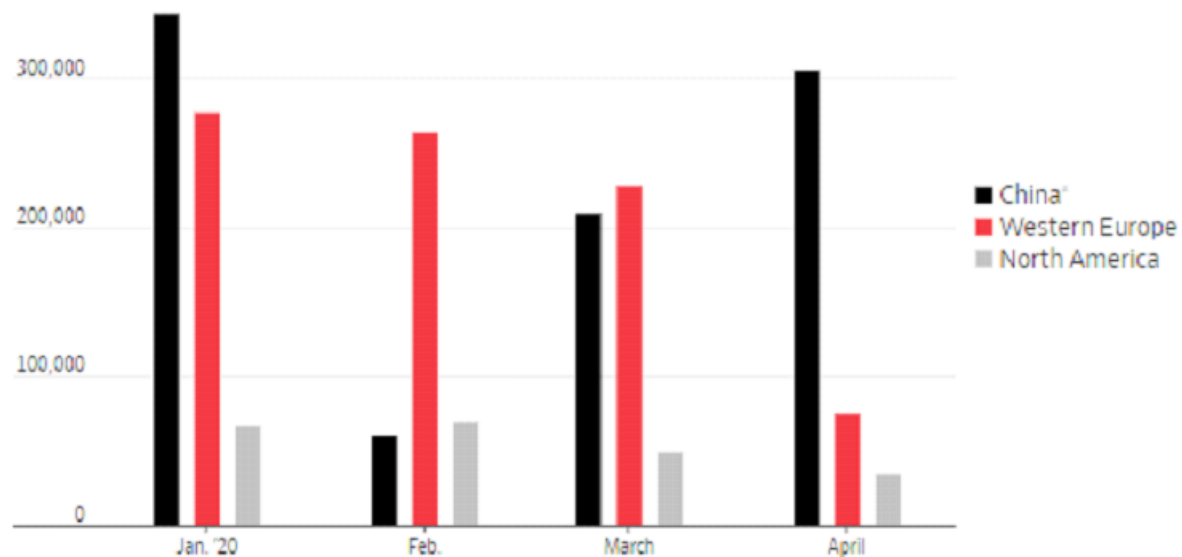
¹The coronavirus is starting to impact sales.
Source: CAAM, Marklines

China's car sales is coming back because of government subsidies (\$1,800 for NEV)

Divergence

VW sales in China rebound, Europe and U.S. languish.

400,000 vehicles



*Includes Hong Kong

Source: the company

From PCB point of view, PCB makers catered to 5G related infrastructure boards and IC substrates did well and continue to do well. Smartphone and Automotive PCB makers had a Hiccup

Revenue History of Japanese Stock-listed PCB Makers (Calendar Year, Unit; 100 millionYen)

Maker	CY2018				CY2019				CY2018	CY2019	YoY Growth Rate
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4			
Nippon Mektron*	772.00	692.65	850.75	1345.98	590.29	496.84	826.16	867.46	3,661.38	2,780.75	-24.05%
Sumitomo Denko*	252.00	211.00	289.00	293.00	206.00	135.00	236.00	223.00	1,045.00	800.00	-23.44%
Fujikura Corp*	241.00	255.00	398.00	184.00	184.00	189.00	346.00	360.00	1,078.00	1,079.00	0.00%
Nitto Denko*	102.51	106.33	111.28	106.30	78.35	97.94	108.35	118.25	426.42	402.89	-5.52%
Ibiden	315.00	287.25	314.75	277.22	280.60	327.33	300.34	351.42	1,194.22	1,259.69	5.48%
Shinko Denki	144.12	207.80	198.12	208.19	137.72	213.30	219.56	232.73	775.04	803.31	3.65%
Meiko	273.49	303.38	314.20	298.00	273.00	292.00	299.00	307.00	1,190.00	1,171.00	-1.60%
CMK	226.05	220.76	226.93	229.65	224.95	213.11	216.70	204.02	898.69	858.78	-4.44%
Kyoden	105.47	109.81	107.16	120.82	103.79	100.52	103.66	103.97	443.26	411.94	-7.06%
Hitachi Chemical	100.00	110.00	115.00	94.88	87.68	85.61	94.19	95.57	419.00	363.05	-13.35%
Taiyo Kogyo*	6.56	6.55	6.63	7.24	6.06	6.06	5.89	6.34	26.98	24.36	-9.71%
Kyosha	53.56	52.41	56.65	51.26	50.03	46.96	46.16	48.85	213.88	192.00	-10.23%
Shirai Denshi	72.73	68.08	71.86	78.35	68.03	62.07	66.54	66.29	291.02	262.93	-9.65%
Total	2664.49	2631.02	3060.33	3294.89	2290.50	2265.74	2868.55	2984.90	11,662.89	10,409.70	-10.75%

* FPC Maker Taiyo Kogyo's FY is CY

(N.T. Information Ltd based on Company reports)

CYQ2= April-June (Japanese FY Q1), CYQ3= JPFY Q2, CYQ4= JPFY Q3 & CYQ1=JPFY Q4

Calendar Year 2019/2018: Q1/-14.04%, Q2/-13.88%, Q3/-6.25% Q4/-9.41%

CY2019(10,409)/CY2018(11,662.89): -10.75%%

Taiwan's Top 15 PCB Makers Revenue Trend in 2020

(NT\$30.5/USD)

Rank	Maker	Jan	Feb	Mar	Apr	Total
1	Unimicron	220.0	201.4	243.5	240.0	904.9
2	ZDT	216.5	82.7	267.0	321.0	887.2
3	Compeq	130.8	104.6	155.5	152.0	542.9
4	Tripod	129.2	119.8	129.8	136.0	514.8
5	HannStar	97.5	68.2	114.2	127.0	406.9
6	Nanya PCB	80.2	75.9	99.8	96.3	352.2
7	Flexium	141.9	42.5	37.0	72.5	293.9
8	Kinsus	61.1	58.6	70.8	67.6	258.1
9	GCE	46.7	54.0	63.0	73.2	236.9
10	T.P.T	51.7	43.3	60.1	66.0	221.1
11	Chin Poon	45.0	42.5	43.9	32.9	164.3
12	Unitech	46.4	37.2	36.6	25.4	145.6
13	Career	35.0	16.1	35.7	47.0	133.8
14	Dynamic	34.4	30.4	33.4	30.5	128.7
15	Apex	27.2	30.5	27.0	33.2	117.9
Total		1,363.6	1,007.7	1,417.3	1,520.6	5,309.2

(Source: TSE)

2020 PCB Production will definitely be less

World PCB Production* by Region (US\$ Million)

Region	2017	2018	YoY	2019E	YoY
America	3,037	3,158	4.0%	3,174	0.5%
Germany	960	994	3.5%	810	-13.8%
Other Europe+Russia	1,385	1,646	1.2%	1,663	1.0%
Africa & Middle East	142	143	0.0%	145	1.4%
West Total	5,524	5,941	3.1%	5,792	-2.2%
China	37,200	40,510	8.9%	41,930	3.5%
Taiwan	7,685	7,780	1.2%	7,850	0.9%
S. Korea	7,215	7,515	4.1%	7,215	-4.0%
Japan	5,625	5,654	0.5%	5,430	-4.0%
Thailand	2,980	3,132	5.1%	3,160	0.9%
Vietnam	2,620	2,704	3.2%	2,905	3.7%
Other Asia	1,738	1,668	-4.0%	1,710	9.1%
Asia Total	65,063	68,963	6.0%	70,200	2.2%
World Total	70,587	74,904	5.6%	75,992	1.4%

(N.T. Information Ltd)

* Note; Production includes assembly by PCB makers, particularly FPC