



China Machinery & Diversified Industrials

Reassessing capex outlook, revise TP/EPS; Techtronic down to Neutral

We reassess the potential impact on China industrial companies in our coverage of the COVID-19 widespread globally. While we take no view on the development of the virus, we now factor in:

Slowing exports: The GS macro team lowered its world GDP growth forecast by 0.7pp for 2020E. Accordingly, we lower our 2020 overseas revenue growth forecasts for our coverage by **0-10%**;

Decline in domestic discretionary consumption: The COVID-19 impact and weak global economic growth outlook could translate into a slowdown in end-market sales volumes. We therefore cut volume-driven industrial component revenues of our sector by **0-6%**, weighted by exposure to those end markets, in line with our GS sector analysts lowering 2020E volume forecasts;

Corporate capex cut: On possibly declining equipment utilization rates amid demand weakness and the uncertainty of the COVID-19 situation, we cut our end-market capex to maintenance capex forecasts, on the criteria: (a) the volume outlook deteriorates further; (b) more stretched balance sheets, and (c) unattractive forward-looking cash returns. We cut our capex assumption more heavily for panel (LCD)/general industrials in particular. We do not make further large cuts to our capex assumptions for certain end-markets such as traditional auto & parts because these markets are probably close to maintenance capex already as a consequence of prolonged demand weakness and trade tension drag in 2019.

Potential policy support on “New Infrastructure”: We note a more positive tone from the government on potentially accelerated investment in **“New Infrastructure,”** which entails 7 key areas: **(1) 5G base stations, (2) datacenters, (3) UHV, (4) electric vehicle charging piles, (5) AI, (6) Industrial IoT, and (7) intercity high-speed rail/urban transit.** We raise our forecasts for these exposures by 5-8%.

Overall, we revise 2020E EPS for our coverage by -12% to +3%. We also revise our 12-month target prices by -12% to +2%, and downgrade Techtronic from Buy to Neutral on the highest US/EU slowing risk. We maintain ratings on the rest of our

Jacqueline Du
+86(21)2401-8948 |
jacqueline.du@ghsl.cn
Beijing Gao Hua Securities Company
Limited

Rosie Shen
+86(21)2401-8925 | rosie.shen@ghsl.cn
Beijing Gao Hua Securities Company
Limited

Goldman Sachs does and seeks to do business with companies covered in its research reports. As a result, investors should be aware that the firm may have a conflict of interest that could affect the objectivity of this report. Investors should consider this report as only a single factor in making their investment decision. For Reg AC certification and other important disclosures, see the Disclosure Appendix, or go to www.gs.com/research/hedge.html. Analysts employed by non-US affiliates are not registered/qualified as research analysts with FINRA in the U.S.

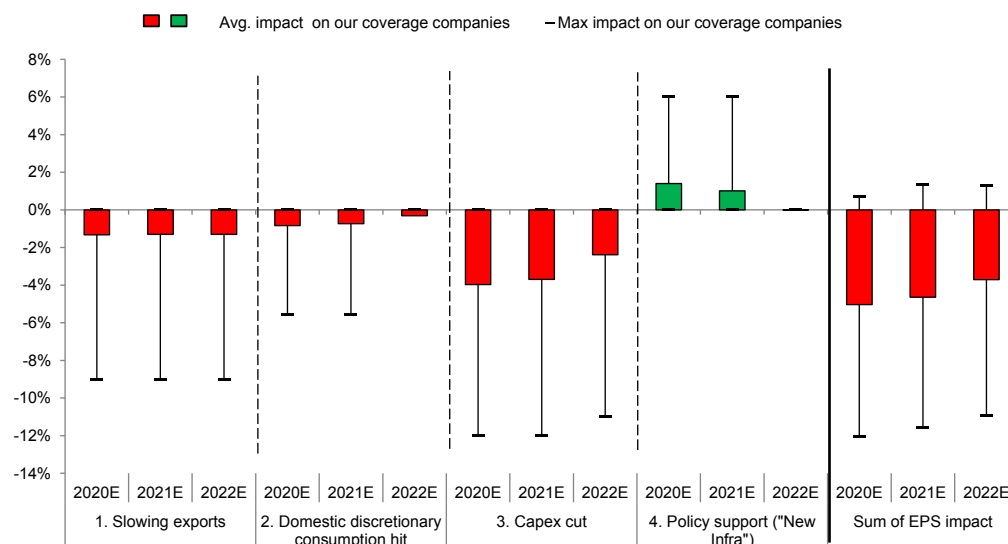
coverage unchanged.

Buy-rated: Han's Laser (on CL), AVIC Jonhon, Zhuzhou CRRC, CRRC A/H, CRSC-H, Hollsys, Hongfa, Lead Intelligent;

Neutral-rated: Techtronic (D/G from Buy), Sanhua, Centre Testing, Raycus, Estun Automation, Shenzhen Inovance, CRSC-A;

Sell-rated: Haitian Intl; Siasun Robot.

Exhibit 1: We revise 2020E EPS for our coverage by -12% to +3% on four factors



Source: Gao Hua Securities Research

Exhibit 2: ... EPS revisions by single stock

Company	Ticker	Overseas revenue exposure (FY19E)	1.Slowing exports			Domestic consumption exposure	2.Domestic discretionary consumption hit			Domestic capex exposure	3. Capex cut			"New Infra" exposure	4. Potential policy support on "New Infrastructure"			Sum of revenue impact			EPS impact		
			2020E	2021E	2022E		2020E	2021E	2022E		2020E	2021E	2022E		2020E	2021E	2022E	2020E	2021E	2022E	2020E	2021E	2022E
Sanhua	002050.SZ	50%	-1%	-1%	-1%	50%	-4%	-4%	-2%	0%	0%	0%	0%	2%	0%	0%	0%	-4%	-4%	-3%	-6%	-6%	-3%
Inovance	300124.SZ	3%	0%	0%	0%	0%	0%	0%	0%	30%	-3%	-3%	-2%	30%	2%	2%	0%	-2%	-2%	-2%	-4%	-2%	-2%
Hongfa	600885.SS	41%	-1%	-1%	-1%	59%	-3%	-3%	-1%	0%	0%	0%	15%	1%	1%	0%	-3%	-3%	-2%	-4%	-3%	-2%	
Haitian	1882.HK	31%	-3%	-3%	-3%	0%	0%	0%	0%	69%	-6%	-6%	-3%	0%	0%	0%	0%	-9%	-9%	-6%	-9%	-9%	-9%
Centre Testing	300012.SZ	3%	0%	0%	0%	40%	-2%	-1%	-1%	0%	0%	0%	0%	5%	0%	0%	0%	-2%	-1%	-1%	-2%	-1%	-1%
Wuxi Lead	300450.SZ	2%	0%	0%	0%	0%	0%	0%	0%	98%	-1%	0%	0%	0%	0%	0%	0%	-1%	0%	0%	-1%	0%	0%
Hollsys	HOLI	15%	-1%	0%	0%	0%	0%	0%	0%	40%	0%	0%	0%	5%	0%	0%	0%	-1%	-1%	0%	-1%	-1%	0%
AVIC Jonhon	002179.SZ	9%	-1%	0%	0%	15%	0%	0%	0%	0%	0%	0%	0%	25%	2%	2%	0%	1%	1%	0%	1%	1%	1%
Raycus	300747.SZ	5%	0%	0%	0%	0%	0%	0%	0%	100%	-6%	-6%	-3%	10%	1%	1%	0%	-6%	-6%	-3%	-12%	-12%	-11%
Han's Laser	002008.SZ	11%	0%	0%	0%	0%	0%	0%	0%	100%	-7%	-7%	-3%	10%	1%	1%	0%	-7%	-7%	-4%	-9%	-8%	-4%
Estun	002747.SZ	21%	-1%	0%	0%	0%	0%	0%	0%	100%	-9%	-9%	-5%	100%	5%	1%	0%	-5%	-8%	-5%	-7%	-11%	-8%
Techtronic	0669.HK	96%	-6%	-6%	-6%	4%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	-6%	-6%	-6%	-9%	-9%	-9%
Siasun	300024.SZ	5%	0%	0%	0%	0%	0%	0%	0%	100%	-5%	-5%	0%	100%	5%	5%	0%	0%	0%	0%	0%	0%	0%
CRRC	1766.HK	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	2%	2%	0%	1%	1%	0%	1%	1%	0%
Zhuzhou CRRC	3898.HK	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	28%	2%	2%	0%	2%	1%	1%	3%	2%	2%
CRSC	3969.HK	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	25%	2%	2%	0%	1%	1%	0%	2%	2%	1%
Average			-1%	-1%	-1%		-1%	0%	0%		-2%	-2%	-1%		1%	1%	0%				-5%	-5%	-4%

Source: Company data, Gao Hua Securities Research

Prices in this report are as of the market close of Mar 12, 2020, unless otherwise stated.

Slowing exports

As the impact of COVID-19 spreads globally, we expect export demand may slow down for Chinese companies. Our global macro team cut global GDP growth to -2½% in Q1 and 2% in Q2, factoring in the potential COVID-19 impact, both on a quarter-on-quarter annualized basis (see [A Viral Global Slowdown](#), February 28, 2020). This would fall short of the two quarters of negative growth commonly viewed as a criterion for recession. With a rebound in Q3 and Q4, the full-year global GDP growth forecast would decline to about 2%.

We note Techtronic/Sanhua/Hongfa/Haitian are most exposed to export risk in our coverage given their 30%+ overseas revenue exposure. We now factor in -1%/-2%/-10% overseas revenue for Sanhua/Hongfa/Haitian in our 2020 estimates considering their 30-50% overseas sales exposure, while cutting Techtronic's overseas revenues by 9% given its highest export risk in our coverage.

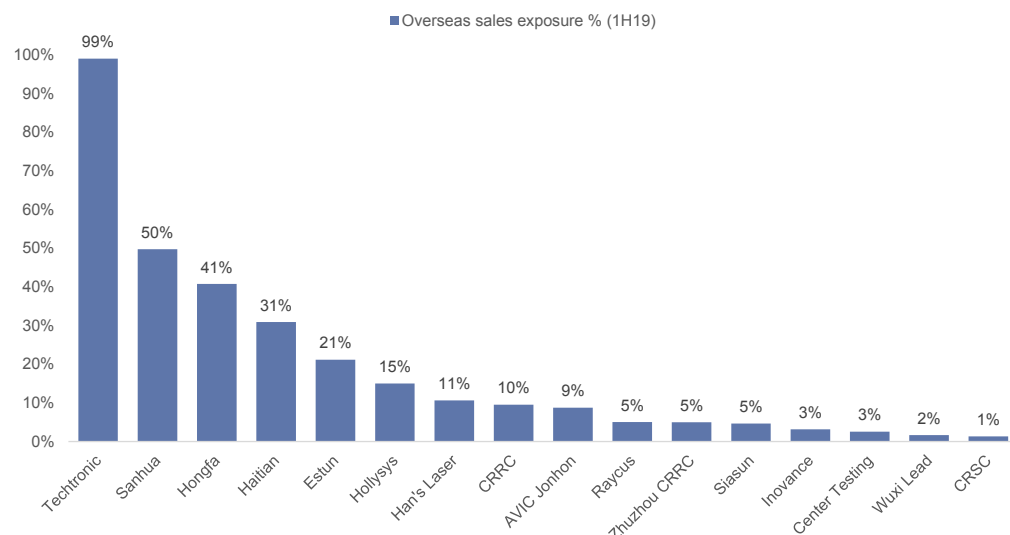
Exhibit 3: GS macro team lowered world GDP growth by 0.7pp in 2020E on COVID-19 shock

	New		Prior		Change (by pp)		New		Prior		Change (by pp)			
	2020E	2021E	2020E	2021E	2020E	2021E	1Q20E	2Q20E	3Q20E	4Q20E	1Q20E	2Q20E	3Q20E	4Q20E
World														
Real GDP growth %	2.7	3.8	3.4	3.6	-0.7	0.2								
US														
Real GDP growth %	1.3	2.3	2.3	2.4	-1.0	-0.1	1.8	1.3	1.0	1.0	2.4	2.6	2.5	2.5
Business fixed investments	-0.7	3.4	1.9	4.1	-2.6	-0.7	0.6	-1.3	0.2	2.3	3.0	3.5	3.9	3.9
Residential fixed investment	3.6	4.1	3.8	3.6	-0.2	0.5	9.0	-2.0	0.0	4.0	5.0	4.0	4.0	2.0
											-0.6	-1.3	-1.5	-1.5
											-2.4	-4.8	-3.7	-1.6
											4.0	-6.0	-4.0	2.0

Prior macro team view is cited from world/US economic outlook in 2020 report by GS macro team published in November 2019.

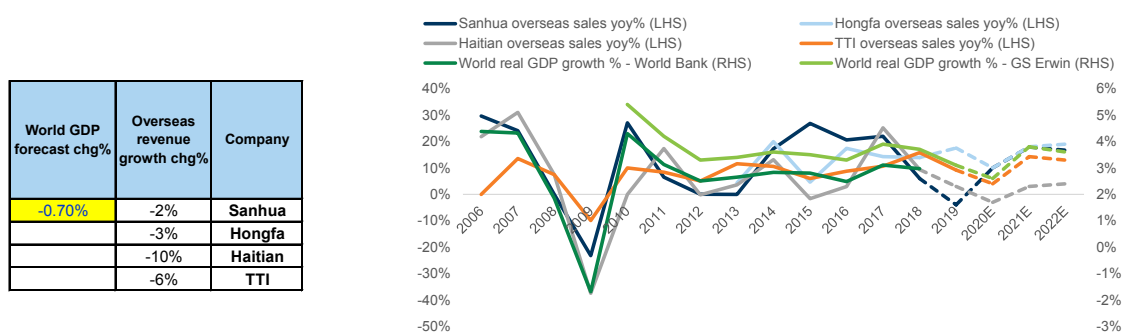
Source: Goldman Sachs Global Investment Research

Exhibit 4: Techtronic/Sanhua/Hongfa/Haitian are most exposed to overseas slowdown risk with 30%+ overseas sales weightings



Source: Company data, Gao Hua Securities Research

Exhibit 5: We cut overseas revenue growth forecasts for Techtronic/Sanhua/Hongfa/Haitian in 2020E based on our macro team lowering its world GDP growth forecast for 2020 by 0.7pp

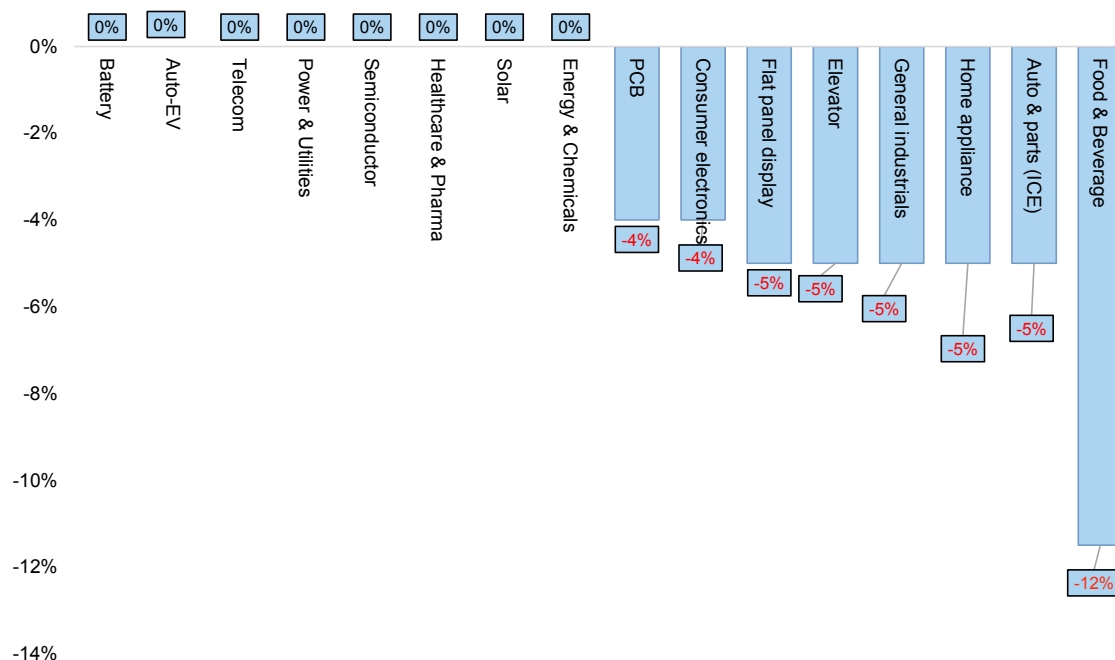


Source: Company data, Goldman Sachs Global Investment Research, World Bank

Decline in domestic discretionary consumption

The COVID-19 impact and weak global economic growth outlook could translate into consumer behavior skewed towards cash saving, rather than spending on discretionary items. We cut our estimates for end-market volume-driven industrial components revenue of our sector by 0-6% in line with GS sector analysts revising 2020 volume forecasts, as shown in [Exhibit 6](#).

Exhibit 6: Our GS sector analysts have revised down volume forecasts in F&B, auto & parts (ICE), and home appliances etc.



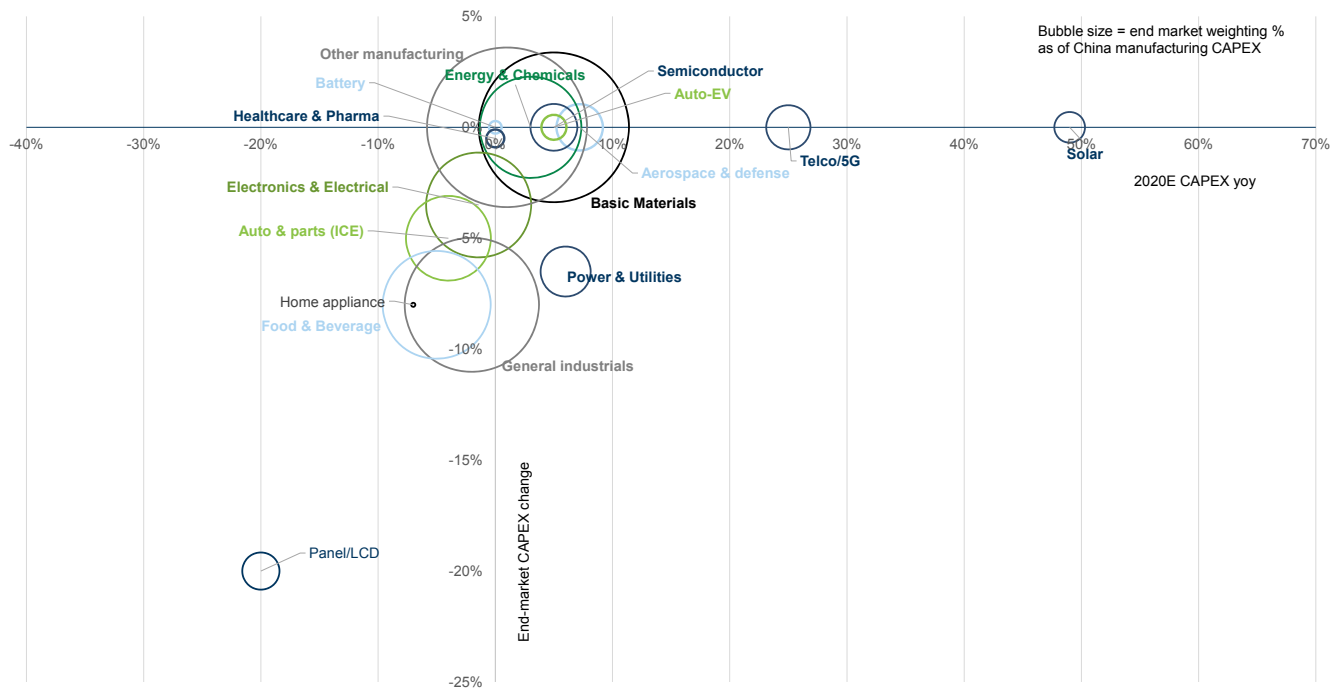
Source: Data compiled by Goldman Sachs Global Investment Research

Corporate capex cut

Considering most industrial product volumes will likely be lower than the prior peak in our previous base case (as we discussed in [2020 outlook](#)), further deceleration in end-market sales growth (from slower exports and the domestic consumption decline discussed in the previous two sections) implies that the equipment utilization rate will likely run even lower than 2019. Coupled with likely tougher cash flow pressures, we believe there is rising likelihood of an industrial capex cut or at least project pushouts for most affected end-markets.

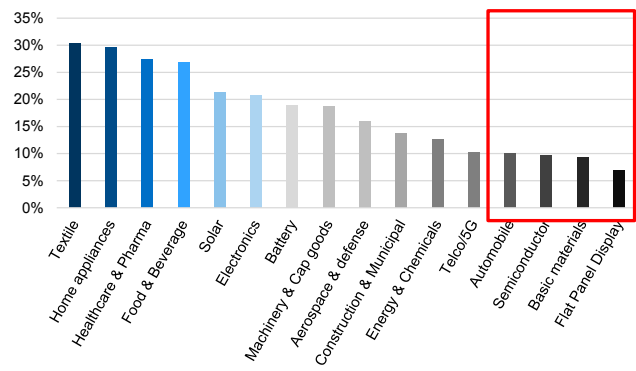
To estimate the magnitude of capex cut by sector, we assume: (1) if end-customers do not have a strong balance sheet position and forward-looking 2021E-2022E CROCI is unattractive, there is more likelihood of a capex cut by them. We have identified automobiles/basic materials/semiconductors/flat panel displays as having the lowest tier of average 2021-22E CROCI (<10%). Automobile/FPD/basic materials/construction & municipal seem to be the sectors with the highest balance sheet risk (with 2020E net debt/EBITDA higher than 1.0x); (2) On the other hand, if capex can be supported by maintenance demand (i.e. fewer new start capex projects in the mix), the risk of a large magnitude capex cuts is less likely. **We have identified flat panel displays (likely LCD) and general industrials as having the highest risk of capex cuts.** Meanwhile, automobiles/basic materials have an 2020E average depreciation/capex ratio very close to the historical maximum level (2009-2018), indicating limited room for further downside. **In conclusion, we apply a 20% cut to panel displays/LCD; a c.10% cut for general industrials, F&B, and home appliances; and 0-10% cuts for the remaining end-markets, as summarized in [Exhibit 7](#).**

Exhibit 7: We cut our 2020E capex expectation for Panel (LCD)/General industrials/F&B/home appliance etc.
China manufacturing capex by sectors



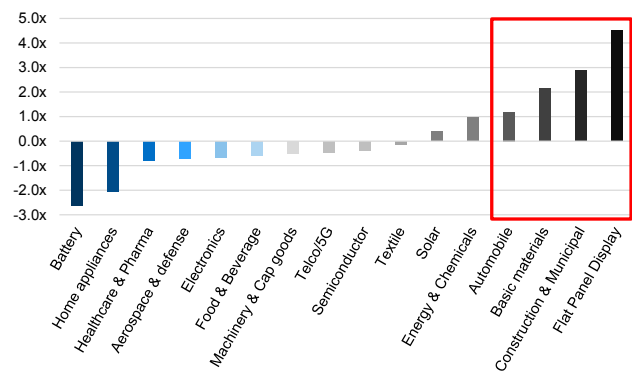
Source: NBS, Data compiled by Goldman Sachs Global Investment Research, Gao Hua Securities Research

Exhibit 8: Automobile/semiconductor/basic materials/flat panel display have the lowest avg. 2021-22E CROCI profile



Source: Goldman Sachs Global Investment Research, Gao Hua Securities Research

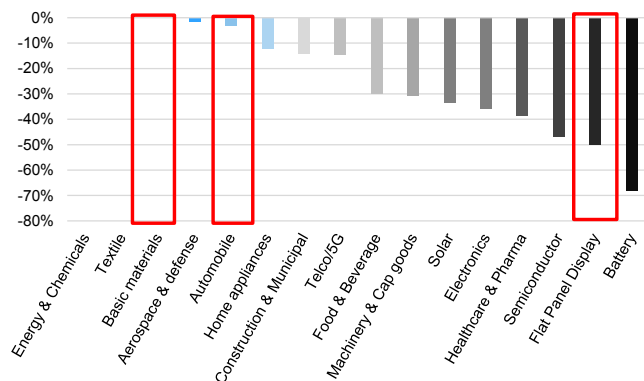
Exhibit 9: Automobile/basic materials/Construction & Municipal/FPD have the highest balance sheet pressure (net debt/EBITDA>1.0x)
2020E avg. Net debt/EBITDA



Source: Goldman Sachs Global Investment Research, Gao Hua Securities Research

Exhibit 10: Our analysis shows basic materials/automobile sectors' depreciation already represents majority of capex spending, while new capex accounts for a sizable share for FPD

2020E depreciation/capex's gap vs historical max level



Source: Goldman Sachs Global Investment Research, Gao Hua Securities Research

“New infrastructure” may see policy support

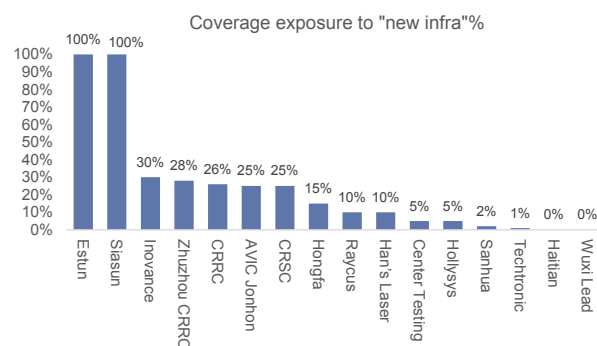
On March 4, sina reported that the Politburo Standing Committee of Communist Party of China held a meeting and announced it planned to accelerate investment in “New Infrastructure”, which entails 7 key areas: (1) 5G base stations and networks, (2) datacenters, (3) UHV, (4) electric vehicle charging piles, (5) artificial intelligence, (6) Industrial IoT, and (7) intercity high-speed rail/urban transit.

We raise our revenue expectations for subway, intercity, industrial AI, and IIoT investments by 5-8% in 2020-2021E to factor in potential policy support based on our projections of demand for these areas. Among our coverage, Estun/Siasun/Inovance/Zhuzhou/CRRC/AVIC Jonhon/CRSC have 25%+ (FY19 basis) exposure to “New Infra” initiatives thanks to their exposure to robotics & automation, urban transit, and 5G base stations.

Exhibit 11: We raise our expectations for urban transit, intercity, industrial AI, and IIoT investments, considering potential policy support

5G base station					Revisions	
	2018	2019	2020E	2021E	2020E	2021E
5G base station investment (Rmb bn)	0	41	167	227		
yoy growth	n.m.	n.m.	307.2%	35.9%		
Data center						
	2018	2019	2020E	2021E		
China data center investment (Rmb bn)	94	106	122	141		
Yoy growth	13.0%	13.0%	15.0%	15.0%		
UHV						
	2018	2019	2020E	2021E		
UHV investment (Rmb bn)	19	69	86	48		
yoy growth	-83.6%	263.2%	24.6%	-44.2%		
Intercity Rail & Urban transit						
	2018	2019	2020E	2021E		
Subway investment (Rmb bn)	560	644	741	800	+7%	+5%
yoy growth	15.0%	15.0%	15.0%	8.0%		
Intercity rail investments (Rmb bn)	121	140	151	194		+8%
yoy growth	-3.4%	15.8%	7.8%	28.4%		
EV charging pile						
	2018	2019	2020E	2021E		
China EV charging pile investment (Rmb bn)	22	24	29	39		
Yoy growth	30.0%	9.1%	20.0%	35.0%		
Industrial AI & Industrial IOT						
	2018	2019	2020E	2021E		
China automatic warehouse market size (Rmb bn)	104	98	104	121		
China total robotics system integration market (Rmb bn)	57	53	56	65		
China machine vision market size (Rmb bn)	10	13	15	18		
China AOI equipment market size (Rmb bn)	10	11	12	14		
China total sensor market size (Rmb bn)	147	168	191	223		
China Industrial software market size (Rmb bn)	168	195	226	265		
Total Industrial AI & Industrial IOT market size (Rmb bn)	497	537	604	706	+8%	+8%
yoy growth	12%	8%	12%	17%		
IIOT penetrated industrial firms	104,434	192,701	300,000	433,169		
Total registered industrial firms	3,867,940	4,100,016	4,346,017	4,606,778		
China industrial firm IIoT penetration rate %	2.7%	4.7%	6.9%	9.4%		
Total "new infra" investment (Rmb bn)	1,314	1,562	1,900	2,155		
yoy growth		19%	22%	13%		

Source: NBS, Gao Hua Securities Research

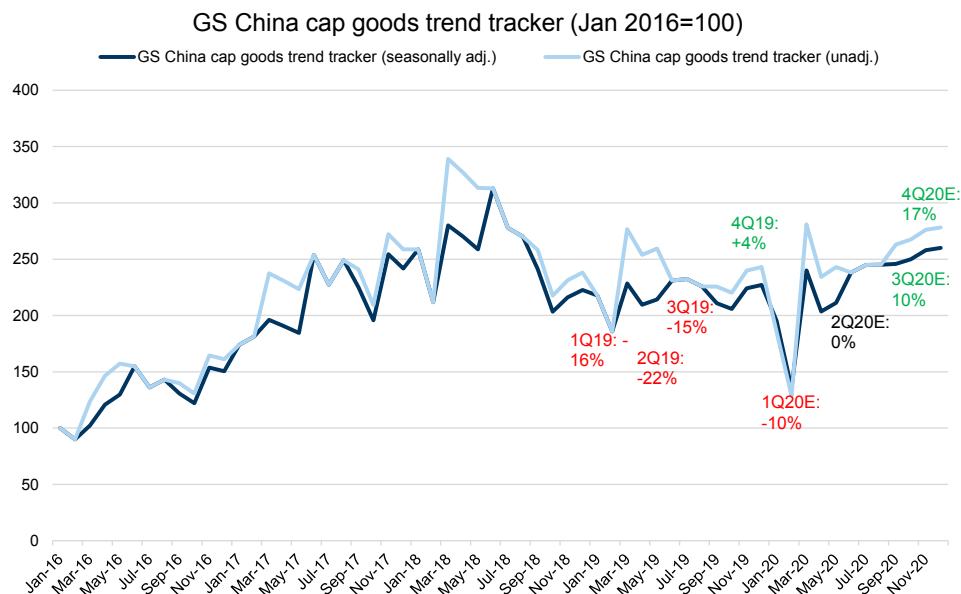
Exhibit 12: Estun/Siasun/Inovance/Zhuzhou/CRRC/AVIC Jonhon/CRSC have 25%+ exposure to "New Infra" initiatives thanks to their exposure to robotics & automation, urban transit, and 5G base stations etc.

Source: Gao Hua Securities Research

Still revising down cap goods tracker expectations

We now **expect -10%/0%/+10%/+17% yoy growth in 1-4Q for our China cap goods tracker, or +4% yoy in 2020E (vs our prior forecast of +6%)**.

Exhibit 13: We revise down cap goods tracker growth expectation from +6% to +4% in 2020E

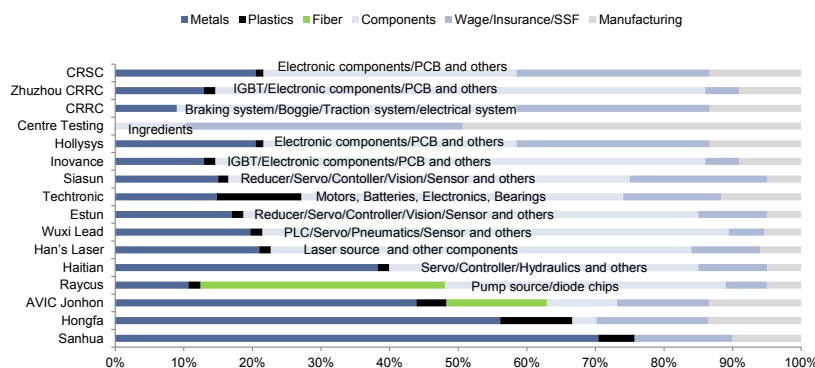


Source: Gao Hua Securities Research

Other key risks: supply chain disruption

Supply chain disruption due to the COVID-19 impact is difficult to assess. [Exhibit 14](#) summarizes the cost breakdown for our coverage with key components/products commonly procured from foreign suppliers. Should there be any sort of bottleneck in procurement, we may see disruption to production that is difficult to quantify.

Exhibit 14: Supply chain import exposure by country for each company in our coverage



Supply chain country exposure:

	US	Europe	Japan/Korea
CRSC	Chips		
Zhuzhou CRRC		IGBT	IGBT
CRRC		Braking system	
Centre Testing	Equipment		Equipment
Hollysys	Chips		
Inovance		IGBT	IGBT
Siasun			Reducer
Techtronic			Battery cell
Estun			Reducer
Wuxi Lead		FA components	FA components
Han's Laser	Fiber laser	Fiber laser	
Haitian			
Raycus	Diode chips		
AVIC Jonhon			
Hongfa			
Sanhua			

Source: Company data, Gao Hua Securities Research

Techtronic: D/G to Neutral on highest US/EU slowing risk

Since we initiated Techtronic at Buy on Dec 12, 2019, the stock has fallen 9.1% vs. MSCI China Index's +3.5% and our A-share coverage average of -6.8%. The underperformance likely reflects share price weakness in recent weeks given the concern on the spreading of COVID-19 globally and Techtronic's high overseas exposure.

We downgrade the stock to Neutral from Buy as Techtronic has the highest slowing export risk in our coverage given its 90%+ overseas revenue exposure. We now apply a 9% cut on 2020-22E EPS/TP considering its highest overseas sales exposure and the widespread of COVID-19 globally. We now factor in slower expansion in market share considering new product launches may potentially not grow as fast as expected given households/corporates becoming more prudent/constraint in expenditure. Our estimates are 13%-16% below Bloomberg consensus given the above. Our lowered 12m TP of HK\$62.8 (from HK\$69.0) is based on avg 2020E-21E EV/GCI vs CROCI/WACC at an unchanged 1.5x sector cash return multiple with 0% premium. Our revised TP implies 13% upside vs. 38% for our China offshore industrials coverage.

Upside risks:

- (1) Faster than expected control of virus outbreak in US/EU;
- (2) Market share gain greater than expected driven by new product launches. The company is planning a wave of new product launches in 2020E, incl: a) Whisper blowers in the outdoor equipment segment that reduce the noise of traditional blowers; and b) 10 products on the newly introduced MXFUEL platform (eg. cordless cut-off saw, circular saw, concrete breaker, light tower, battery and power supply, packouts). In 3 years, there is a planned 100 new products launch in the pipeline on the MXFUEL platform. We Note, as of 2019, the company has 485 tool offerings supported by 5 main platforms. Should the company achieved stronger than expected market share gain, it should be helpful to buffer some macro headwinds.

Downside risks:

- (1) Slower-than-expected product innovation. We believe the company's continuous margin expansion in the past has relied on its capability to generate new products that meet customer demand. Should product innovation becomes slower, or if the company fails to capture any changes in on-the-ground demand environment, this would lead to a slower market share expansion than our forecast.
- (2) Changes in international trade and tax policy. TTI enjoyed a significantly lower effective tax rate than its peers at 7% in 2018, vs 16% for SWK and 30% for Makita, due to the special offshore booking entity arrangements around the world. This arrangement is dependent upon tax regulations of various regions, including HK, Germany, Australia, etc. Should there be any change in international trade policies of these regions, our net profit forecasts may subject to change.
- (3) Further slowdown of FAI by US businesses/residential. Besides residential housing, TTI has a wide variety of exposure to industrial end markets including commercial

building, automobile, general industrials, etc. Our analysis indicates a positive correlation between US business/residential fixed investment and power tool industry players' revenues. Going forward, we believe TTI is likely to ride on the mix of US business/residential FAI. Should the macro economy slow down and worsen business investment confidence, we may see downside risk to growth of the power tool industry.

Exhibit 15: Techtronic company tout

0669.HK		12m Price Target: HK\$62.8		Price: HK\$55.4		Upside: 13.4%	
Neutral		GS Forecast					
			12/19	12/20E	12/21E	12/22E	
Market cap: HK\$112.0bn / \$14.4bn		Revenue (\$ mn) New	7,666.7	7,887.1	9,041.8	10,236.9	
Enterprise value: HK\$112.6bn / \$14.5bn		Revenue (\$ mn) Old	7,666.7	8,356.4	9,605.5	10,897.5	
3m ADTV :HK\$204.7mn/ \$26.3mn		EBITDA (\$ mn)	945.1	1,025.0	1,210.1	1,410.8	
Hong Kong		EPS (\$) New	0.34	0.34	0.42	0.51	
China Industrials		EPS (\$) Old	0.34	0.37	0.46	0.55	
		P/E (X)	20.8	23.3	18.8	15.6	
M&A Rank: 3		P/B (X)	3.8	3.8	3.4	3.0	
		Dividend yield (%)	1.9	1.7	2.1	2.5	
		CROCI (%)	--	--	--	--	
			12/19	6/20E	12/20E	6/21E	
		EPS (\$)	0.18	0.16	0.18	--	

Source: Company data, Goldman Sachs Research estimates, FactSet. Price as of 11 Mar 2020 close.

Lower TPs, our 2020E EPS forecasts now 12% lower than consensus

Exhibit 16: We revise our avg. 2020E-2021E-based target prices by -12% to +2%.

Company	Ticker	Rating	PCY	12m TP (New)	12m TP (Prior)	TP Chg%	EPS yoy %				EPS chg%				Sales Chg %			
							2019E	2020E	2021E	2022E	2019E	2020E	2021E	2022E	2019E	2020E	2021E	2022E
China Onshore Industrials																		
Han's Laser Technology	002008.SZ	Buy*	CNY	49.4	54.5	-9%	-62%	130%	45%	-6%	0%	-9%	-8%	-4%	0%	-4%	-4%	-3%
Hongfa Technology	600885.SS	Buy	CNY	40.5	41.7	-3%	1%	20%	23%	20%	0%	-4%	-3%	-2%	0%	-3%	-3%	-2%
Lead Intelligent	300450.SZ	Buy	CNY	50.1	50.5	-1%	0%	46%	88%	37%	0%	-1%	0%	0%	0%	-1%	0%	0%
AVIC Jonhon	002179.SZ	Buy	CNY	43.6	43.2	1%	12%	29%	25%	15%	0%	1%	1%	1%	0%	3%	2%	2%
Sanhua Intelligent Controls	002050.SZ	Neutral	CNY	21.8	23.2	-6%	10%	11%	24%	19%	0%	-6%	-6%	-3%	0%	-3%	-3%	-3%
Wuhan Raycus Fiber Laser Tech	300747.SZ	Neutral	CNY	88.9	101.0	-12%	-25%	6%	122%	55%	0%	-12%	-12%	-11%	0%	-8%	-13%	-12%
Estun Automation Co.	002747.SZ	Neutral	CNY	10.6	11.5	-8%	-7%	55%	131%	35%	0%	-7%	-11%	-8%	0%	-3%	-7%	-5%
Centre Testing Intl Group	300012.SZ	Neutral	CNY	14.1	14.2	-1%	76%	30%	33%	25%	0%	-2%	-1%	-1%	0%	0%	0%	0%
Shenzhen Inovance Technology Co.	300124.SZ	Neutral	CNY	27.1	27.8	-3%	-10%	23%	28%	17%	0%	-4%	-2%	-2%	0%	-2%	-2%	-2%
Siasun Robot&Automation Co.	300024.SZ	Sell	CNY	9.0	9.0	0%	-24%	11%	24%	20%	0%	0%	0%	0%	0%	0%	0%	0%
Median						-3%	-3%	26%	31%	20%	0%	-4%	-2%	-2%	0%	-2%	-2%	-2%
China Offshore Industrials																		
Techtronic Industries	0669.HK	Buy	HKD	62.8	69.0	-9%	11%	0%	24%	20%	0%	-9%	-9%	-9%	0%	-6%	-6%	-6%
China Railway Signal & Comm	3969.HK	Buy	HKD	5.6	5.5	2%	-7%	17%	4%	0%	1%	2%	2%	1%	1%	3%	2%	1%
Hollysys Automation Technologies Ltd.	HOLI	Buy	USD	18.0	18.2	-1%	16%	-6%	10%	20%	0%	-1%	-1%	0%	0%	-1%	-1%	0%
Zhuzhou CRRC Times Electric Co.	3898.HK	Buy	HKD	34.0	33.2	2%	-5%	15%	5%	5%	0%	3%	2%	2%	0%	3%	2%	2%
CRRC Corp.	1766.HK	Buy	HKD	6.3	6.2	2%	3%	11%	8%	3%	0%	1%	1%	0%	0%	5%	4%	4%
Haitian International Holdings	1882.HK	Sell	HKD	14.2	15.6	-9%	-10%	-5%	11%	10%	0%	-9%	-9%	-9%	0%	-5%	-5%	-5%
Median						0%	-1%	6%	9%	8%	0%	0%	0%	0%	0%	-1%	1%	1%

Note: TP methodologies for our coverage are unchanged; see 'Appendix' for details. Larger EPS cuts for Raycus/Estun/Haitian are attributed to a higher exposure to general industrials and therefore their weighted capex cut impact.

Source: Gao Hua Securities Research

Exhibit 17: Our 2020E EPS are now 12% below consensus

Company	Ticker	Rating	RCY	EPS (Gse)					EPS (Consensus)			Diff vs consensus %	
				2019E	2020E	2021E	2022E	20-21E yoy	2020E	2021E	20-21E yoy	2020E	2021E
China onshore													
Han's Laser	002008.SZ	Buy*	CNY	0.62	1.43	2.07	1.95	45%	1.49	1.77	19%	-4%	17%
Hongfa Technology	600885.SS	Buy	CNY	0.95	1.14	1.40	1.69	23%	1.21	1.47	21%	-6%	-5%
Wuxi Lead	300450.SZ	Buy	CNY	0.85	1.24	2.32	3.18	88%	1.48	1.92	30%	-17%	21%
AVIC Jonhon	002179.SZ	Buy	CNY	1.04	1.34	1.68	1.93	25%	1.33	1.63	23%	1%	3%
Sanhua Intelligent Controls	002050.SZ	Neutral	CNY	0.51	0.57	0.71	0.84	24%	0.70	0.67	-4%	-18%	6%
Wuhan Raycus	300747.SZ	Neutral	CNY	1.70	1.77	3.94	6.12	122%	2.96	3.97	34%	-40%	-1%
Estun Automation	002747.SZ	Neutral	CNY	0.11	0.18	0.41	0.55	131%	0.18	0.25	39%	-2%	n.m.
Centre Testing	300012.SZ	Neutral	CNY	0.29	0.37	0.49	0.62	33%	0.35	0.45	29%	6%	10%
Shenzhen Inovance	300124.SZ	Neutral	CNY	0.63	0.77	0.98	1.15	28%	0.84	1.05	25%	-8%	-6%
Siasun Robot	300024.SZ	Sell	CNY	0.22	0.24	0.30	0.36	24%	0.40	0.51	28%	-39%	-41%
Median								31%			27%	-12%	4%
China offshore													
Techtronic	0669.HK	Neutral	HKD	0.34	0.34	0.42	0.51	24%	0.40	0.48	20%	-16%	-13%
CRSC	3969.HK	Buy	HKD	0.37	0.44	0.46	0.46	4%	0.43	0.48	11%	1%	-5%
Zhuzhou CRRC	3898.HK	Buy	HKD	2.11	2.42	2.53	2.66	5%	2.54	2.81	11%	-5%	-10%
Hollysys	HOLI	Buy	USD	2.06	1.94	2.13	2.56	10%	2.52	2.55	1%	-23%	-16%
CRRC	1766.HK	Buy	HKD	0.40	0.45	0.48	0.50	8%	0.50	0.55	10%	-10%	-12%
Haitian	1882.HK	Sell	HKD	1.08	1.03	1.14	1.26	11%	1.30	1.54	18%	-21%	-26%
Median								8%			14%	-12%	-11%

*On Conviction List

Source: Wind/Bloomberg, Gao Hua Securities Research.

Exhibit 18: Comp sheet of our coverage

Company	Ticker	PCY	Last closing price	12m-Target price	Upside/(downside)	Rating	Mkt Cap (US\$bn)	P/E				P/B				EV/EBITDA				ROE															
								2019E	2020E	2021E	2022E	2019E	2020E	2021E	2022E	2019E	2020E	2021E	2022E	2019E	2020E	2021E	2022E												
Factory Automation/Capital goods																																			
Han's Laser	002008.SZ	CNY	34.2	49.4	44%	Buy*	5.2	55.2x	24.0x	16.5x	17.6x	4.1x	3.6x	3.0x	2.6x	60.4x	22.5x	15.6x	15.3x	7%	16%	20%	16%												
Wuxi Lead Intelligent	300450.SZ	CNY	48.4	50.1	4%	Buy	6.1	57.0x	39.1x	20.8x	15.2x	10.6x	8.7x	6.5x	4.8x	49.1x	37.2x	18.2x	12.5x	20%	24%	36%	37%												
Raycus	300747.SZ	CNY	98.0	88.9	-9%	Neutral	2.7	58.3x	55.3x	24.9x	16.0x	8.1x	7.2x	5.8x	4.4x	50.7x	41.1x	17.7x	11.3x	15%	14%	25%	31%												
Estun Automation	002747.SZ	CNY	11.7	10.6	-9%	Neutral	1.4	102.7x	86.3x	28.7x	21.2x	6.8x	5.6x	5.2x	4.8x	65.1x	43.2x	23.5x	18.3x	5%	8%	18%	22%												
Shenzhen Inovance	300124.SZ	CNY	27.9	27.1	-3%	Neutral	6.7	44.4x	36.2x	28.4x	24.2x	6.0x	5.5x	4.8x	4.3x	48.5x	36.7x	28.7x	24.0x	14%	15%	17%	18%												
Haitian Intl.	1882.HK	HKD	14.2	14.2	0%	Sell	2.9	11.7x	12.3x	11.1x	10.1x	1.5x	1.4x	1.3x	1.2x	8.4x	8.8x	7.8x	7.0x	14%	12%	12%	12%												
Siasun Robot	300024.SZ	CNY	15.6	9.0	-42%	Sell	3.5	71.4x	64.1x	51.8x	43.0x	3.7x	3.5x	3.3x	3.1x	78.9x	79.1x	70.9x	64.2x	5%	6%	7%	7%												
Median					-3%		3.5	57.0x	39.1x	24.9x	17.6x	5.8x	5.5x	4.8x	4.3x	50.7x	37.2x	18.2x	15.3x	14%	14%	18%	18%												
Diversified Industrials																																			
AVIC Jonhon	002179.SZ	CNY	37.8	43.6	15%	Buy	5.6	36.2x	28.2x	22.5x	19.5x	5.6x	4.7x	3.9x	3.3x	26.6x	21.6x	17.4x	15.0x	15%	16%	17%	16%												
Techtronic	0669.HK	HKD	55.4	62.8	13%	Buy->Neutral	13.0	21.0x	21.1x	17.0x	14.1x	3.8x	3.5x	3.1x	2.7x	13.9x	12.8x	10.6x	8.7x	19%	17%	19%	20%												
Hongfa Technology	600885.SS	CNY	33.2	40.5	22%	Buy	3.6	34.9x	29.2x	23.7x	19.7x	5.0x	4.5x	4.0x	3.5x	17.0x	14.9x	12.4x	10.5x	11%	11%	12%	12%												
Sanhua Intelligent Co	002050.SZ	CNY	20.7	21.8	5%	Neutral	8.2	40.3x	36.2x	29.2x	24.5x	6.0x	5.3x	4.7x	4.2x	29.2x	25.7x	20.7x	17.3x	15%	15%	17%	18%												
Median					14%		5.6	35.6x	28.7x	23.1x	19.6x	5.3x	4.6x	3.9x	3.4x	21.8x	18.3x	14.9x	12.8x	15%	16%	17%	17%												
Business Service																																			
Center Testing	300012.SZ	CNY	16.0	14.1	-12%	Neutral	3.8	55.8x	43.0x	32.3x	25.9x	8.5x	7.4x	6.2x	5.2x	31.4x	23.7x	18.2x	14.5x	16%	18%	20%	21%												
Median					-12%		3.8	55.8x	43.0x	32.3x	25.9x	8.5x	7.4x	6.2x	5.2x	31.4x	23.7x	18.2x	14.5x	16%	18%	20%	21%												
Railway equipment																																			
China Railway Signal	3969.HK	HKD	3.6	5.6	57%	Buy	4.0	8.6x	7.3x	7.0x	7.0x	0.8x	0.8x	0.7x	0.7x	3.5x	2.6x	2.4x	2.0x	11%	10%	10%	9%												
Hollysys	HOLI	USD	13.2	18.0	36%	Buy	0.8	6.4x	6.8x	6.2x	5.2x	0.9x	0.8x	0.7x	0.6x	6.5x	3.2x	2.3x	1.5x	14%	12%	12%	13%												
CRRC Corp.	601766.SS	CNY	6.5	7.7	18%	Buy	26.9	16.1x	14.5x	13.4x	13.1x	1.4x	1.3x	1.2x	1.1x	12.2x	10.6x	9.9x	9.7x	8%	8%	8%	8%												
Zhuzhou CRRC	3898.HK	HKD	24.2	34.0	41%	Buy	3.7	10.2x	8.9x	8.5x	8.1x	1.2x	1.1x	1.0x	0.9x	7.5x	5.6x	4.9x	4.3x	12%	12%	12%	11%												
CRRC Corp.	1766.HK	HKD	4.4	6.3	43%	Buy	16.3	9.7x	8.7x	8.1x	7.9x	0.8x	0.8x	0.7x	0.7x	7.9x	7.0x	6.4x	6.2x	8%	8%	8%	8%												
China Railway Signal	688009.SS	CNY	7.0	6.4	-8%	Neutral	10.6	19.2x	16.3x	15.6x	15.6x	1.8x	1.7x	1.6x	1.5x	11.6x	9.4x	8.9x	8.6x	10%	10%	10%	9%												
Median					38%		7.3	10.0x	8.8x	8.3x	8.0x	1.0x	0.9x	0.8x	0.8x	7.7x	6.3x	5.7x	5.3x	11%	10%	10%	9%												

*On Conviction List

Source: Company data, Wind, Gao Hua Securities Research

Exhibit 19: Valuation and risks summary

Company	Ticker	Target price	Last Close Price	Upside/Downside	TP methodology	Risks
Buy						
Han's Laser*	002008.SZ	49.4	34.2	44%	2020E-21E avg EV/GCI vs. CROCI/WACC (cash return multiple 2.3X)	Downside risks: (1) Weaker-than-expected margins; (2) Intensified competition in laser system integration market; (3) Coronavirus widespread into larger scale and heavier than expected drag to macro economy.
CRSC(H)	3969.HK	5.6	3.6	57%	2020E-21E avg EV/GCI vs. CROCI/WACC at 1.0X	Downside risks: (1) worse-than-expected working capital and cash collection from China State Railway Group and local governments; (2) slower-than-expected railway and subway construction; (3) lower-than-expected revenue growth from new businesses such as rail power supply and electrification, smart city etc; (4) slower-than-expected market share gain due to superior technology or product quality.
CRRC (H/A)	1766.HK 601766.SS	6.3 7.7	4.6 6.7	36% 16%	(H) 2020E-21E avg EV/GCI vs. CROCI/WACC at 1.0X with 0% premium/ (A) with 50% premium	Downside risks: (1) Lower-than-expected MU/locomotive tendering; (2) Lower-than-expected margins.
Hollysys Automation	HOLI	18.0	13.2	36%	2020E-21E avg EV/GCI vs. CROCI/WACC at a cash-return multiple of 1.0X with 0% premium	Downside risks: (1) Slower-than-expected progress made for factory automation and subway signaling product; (2) Negative overseas geographical and political risks impact on M&E business.
Zhuzhou CRRC	3898.HK	34.0	24.2	41%	2020E-21E avg EV/GCI vs. CROCI/WACC at 1.0X	Downside risks: (1) Higher/lower-than-expected MU/locomotive tendering; (2) Higher/lower-than-expected margins.
Hongfa	600885.SS	40.5	33.2	22%	2020E-21E avg EV/GCI vs. CROCI/WACC at a cash return multiple 2.3X with 10% discount	Downside risks: (1) US tariffs could present a risk given Hongfa has US sales exposure of c.5% of 2017 (Gse), with second derivative risk from Chinese industrial/capital equipment/washing machine products that are exported to the US; (2) FX risk: further CNY appreciation (40% global ex-China revenues in 2017); (3) Smart meter tendering especially from weaker-than-expected replacement demand.
AVIC Jonhon	002179.SZ	43.6	37.8	15%	2020E-21E avg EV/GCI vs. CROCI/WACC at a cash return multiple 2.3X with 0% premium	Downside risks: (1) Slower-than-expected A&D spending; (2) Intensified competition with China domestic/global connector makers in its newly entry end-markets such as EV/5G.
Lead Intelligent	300450.SZ	50.1	48.4	4%	2020E-21E avg EV/GCI vs. CROCI/WACC at a cash return multiple 2.3X with 0% premium	Downside risks: (1) Significant pullback of EV development in China and globally; (2) Technology disruption from all-solid state batteries; (3) Order cancellation/cash collection and working capital pressure; (4) US trade policy risk
Neutral						
Techtronic	0669.HK	62.8	55.4	13%	2020E-21E avg EV/GCI vs. CROCI/WACC at a cash-return multiple of 1.0X with 0% premium	Upside risks: (1) Faster than expected recovery in US business/residential FAI; (2) market share gain greater than expected driven by new product launches; Downside risks: (1) Slower product innovation; (2) Changes in international trade/tax policy; (3) US-China tariff impacts; and (4) Further slowdown of US businesses/residential FAI.
Sanhua	002050.SZ	21.8	20.7	5%	2020E-21E avg EV/GCI vs. CROCI/WACC at a cash return multiple 2.3X with 0% premium	Upside risks: (1) Stronger-than-expected air-conditioner & auto demand; (2) Faster-than-expected EV penetration; Downside risks: (1) home appliance cycle downturn; (2) EV business not growing as expected as competition intensifies; (3) US tariffs could present a risk given that Sanhua has US sales exposure of c.5% as of 2019 (GSe), with second-derivative risk from some Chinese industrial/capital equipment/washing machine products that are exported to the US; (4) FX risk: USD/CNY appreciation – given 49% global ex-China revenues in 2019 for Sanhua.
Inovance	300124.SZ	27.1	27.9	-3%	2020E-21E avg EV/GCI vs. CROCI/WACC at a cash return multiple 2.3X with 0% premium	Upside/downside risks: (1) stronger/weaker-than-expected margin trend; (2) stronger/weaker-than-expected recovery of the China capex cycle; (3) if the EV volume ramp-up comes faster/slower than expected and its EV business can be earlier than/cannot reach breakeven by 2021E, this would add additional upside/downside risk to our estimates.
CRSC (A)	688009.SS	6.4	7.0	-8%	2020E-21E avg EV/GCI vs. CROCI/WACC at 1.0X with 50% premium	Key upside/downside risks: (1) better-/worse-than-expected working capital and cash collection from China State Railway Group and local governments; (2) better-/slower-than-expected railway and subway construction; (3) better-/lower-than-expected revenue growth from new businesses such as rail power supply and electrification, smart city etc; (4) Better-/slower-than-expected market share gain due to superior technology or product quality.
Raycus	300747.SZ	88.9	98.0	-9%	We assign 85% of the valuation based on 2020E-21E avg EV/GCI vs. CROCI/WACC (cash return multiple 2.3X with 0% premium) and 15% of the valuation based on +1STD of global laser companies' historical P/E as we rated the company's M&A score of 2	Upside risks: (1) Faster-than-expected laser system growth; (2) Faster-than-expected high power product development; (3) Easing pricing pressure; Downside risks: (1) Prolonged Coronavirus halts regular production and logistics; (2) Slower-than-expected laser system growth; (3) Slower-than-expected product development.
Centre Testing	300012.SZ	14.1	16.0	-12%	2020E-21E avg EV/GCI vs. CROCI/WACC at a cash return multiple 2.3X with 0% premium	Upside risks: (1) Stronger-than-expected food & consumer goods clients penetration; (2) environment business self-examination finishes sooner than expected; (3) new testing demand arises, leading to output per employee higher than expected. Downside risks: (1) Any damage to its credibility; (2) failure to react to new regulations and laws; (3) failure to improve lab utilization rate due to competition; (4) potential provision/impairment due to acquisitive growth.
Sell						
Haitian International	1882.HK	14.2	14.2	0%	2020E-21E avg EV/GCI vs. CROCI/WACC at a cash-return multiple of 1.0X with 0% premium	Upside risks: Sooner than expected recovery in China manufacturing capex;
Siasun	300024.SZ	9.0	15.6	-42%	2020E-21E avg EV/GCI vs. CROCI/WACC (cash return multiple 2.3X with 20% premium)	Upside risks: (1) Faster-than-expected warehouse automation penetrating into e-commerce customers; (2) Better-than-expected robotics market share gain; (3) Better-than-expected margin/cash flow.

Notes: TP are on a 12 month time frame.

Source: Gao Hua Securities Research

Disclosure Appendix

Reg AC

I, Jacqueline Du, hereby certify that all of the views expressed in this report accurately reflect my personal views about the subject company or companies and its or their securities. I also certify that no part of my compensation was, is or will be, directly or indirectly, related to the specific recommendations or views expressed in this report.

GS Factor Profile

The Goldman Sachs Factor Profile provides investment context for a stock by comparing key attributes to the market (i.e. our coverage universe) and its sector peers. The four key attributes depicted are: Growth, Financial Returns, Multiple (e.g. valuation) and Integrated (a composite of Growth, Financial Returns and Multiple). Growth, Financial Returns and Multiple are calculated by using normalized ranks for specific metrics for each stock. The normalized ranks for the metrics are then averaged and converted into percentiles for the relevant attribute. The precise calculation of each metric may vary depending on the fiscal year, industry and region, but the standard approach is as follows:

Growth is based on a stock's forward-looking sales growth, EBITDA growth and EPS growth (for financial stocks, only EPS and sales growth), with a higher percentile indicating a higher growth company. **Financial Returns** is based on a stock's forward-looking ROE, ROCE and CROCI (for financial stocks, only ROE), with a higher percentile indicating a company with higher financial returns. **Multiple** is based on a stock's forward-looking P/E, P/B, price/dividend (P/D), EV/EBITDA, EV/FCF and EV/Debt Adjusted Cash Flow (DACF) (for financial stocks, only P/E, P/B and P/D), with a higher percentile indicating a stock trading at a higher multiple. The **Integrated** percentile is calculated as the average of the Growth percentile, Financial Returns percentile and (100% - Multiple percentile).

Financial Returns and Multiple use the Goldman Sachs analyst forecasts at the fiscal year-end at least three quarters in the future. Growth uses inputs for the fiscal year at least seven quarters in the future compared with the year at least three quarters in the future (on a per-share basis for all metrics).

For a more detailed description of how we calculate the GS Factor Profile, please contact your GS representative.

M&A Rank

Across our global coverage, we examine stocks using an M&A framework, considering both qualitative factors and quantitative factors (which may vary across sectors and regions) to incorporate the potential that certain companies could be acquired. We then assign a M&A rank as a means of scoring companies under our rated coverage from 1 to 3, with 1 representing high (30%-50%) probability of the company becoming an acquisition target, 2 representing medium (15%-30%) probability and 3 representing low (0%-15%) probability. For companies ranked 1 or 2, in line with our standard departmental guidelines we incorporate an M&A component into our target price. M&A rank of 3 is considered immaterial and therefore does not factor into our price target, and may or may not be discussed in research.

Quantum

Quantum is Goldman Sachs' proprietary database providing access to detailed financial statement histories, forecasts and ratios. It can be used for in-depth analysis of a single company, or to make comparisons between companies in different sectors and markets.

Disclosures

Coverage group(s) of stocks by primary analyst(s)

Jacqueline Du: A-share Industrials, China Industrials.

A-share Industrials: AVIC Jonhon, Centre Testing Intl Group, China Railway Signal & Comm (A), CRRC Corp. (A), Estun Automation Co., Han's Laser Technology, Hongfa Technology, Lead Intelligent, Sanhua Intelligent Controls, Shenzhen Inovance Technology Co., Siasun Robot&Automation Co., Wuhan Raycus Fiber Laser Tech.

China Industrials: China Railway Signal & Comm (H), CRRC Corp. (H), Haitian International Holdings, Hollysys Automation Technologies Ltd., Techtronic Industries, Zhuzhou CRRC Times Electric Co..

Company-specific regulatory disclosures

Compendium report: please see disclosures at <https://www.gs.com/research/hedge.html>. Disclosures applicable to the companies included in this compendium can be found in the latest relevant published research

Distribution of ratings/investment banking relationships

Goldman Sachs Investment Research global Equity coverage universe

	Rating Distribution			Investment Banking Relationships		
	Buy	Hold	Sell	Buy	Hold	Sell
Global	44%	40%	16%	63%	57%	51%

As of January 1, 2020, Goldman Sachs Global Investment Research had investment ratings on 3,054 equity securities. Goldman Sachs assigns stocks as Buys and Sells on various regional Investment Lists; stocks not so assigned are deemed Neutral. Such assignments equate to Buy, Hold and Sell for the purposes of the above disclosure required by the FINRA Rules. See 'Ratings, Coverage groups and related definitions' below. The Investment Banking Relationships chart reflects the percentage of subject companies within each rating category for whom Goldman Sachs has provided investment banking services within the previous twelve months.

Price target and rating history chart(s)

Compendium report: please see disclosures at <https://www.gs.com/research/hedge.html>. Disclosures applicable to the companies included in this compendium can be found in the latest relevant published research

Regulatory disclosures

Disclosures required by United States laws and regulations

See company-specific regulatory disclosures above for any of the following disclosures required as to companies referred to in this report: manager or co-manager in a pending transaction; 1% or other ownership; compensation for certain services; types of client relationships; managed/co-managed public offerings in prior periods; directorships; for equity securities, market making and/or specialist role. Goldman Sachs trades or may trade as a principal in debt securities (or in related derivatives) of issuers discussed in this report.

The following are additional required disclosures: **Ownership and material conflicts of interest:** Goldman Sachs policy prohibits its analysts, professionals reporting to analysts and members of their households from owning securities of any company in the analyst's area of coverage.

Analyst compensation: Analysts are paid in part based on the profitability of Goldman Sachs, which includes investment banking revenues. **Analyst as officer or director:** Goldman Sachs policy generally prohibits its analysts, persons reporting to analysts or members of their households from serving as an officer, director or advisor of any company in the analyst's area of coverage. **Non-U.S. Analysts:** Non-U.S. analysts may not be associated persons of Goldman Sachs & Co. LLC and therefore may not be subject to FINRA Rule 2241 or FINRA Rule 2242 restrictions on communications with subject company, public appearances and trading securities held by the analysts.

Distribution of ratings: See the distribution of ratings disclosure above. **Price chart:** See the price chart, with changes of ratings and price targets in prior periods, above, or, if electronic format or if with respect to multiple companies which are the subject of this report, on the Goldman Sachs website at <https://www.gs.com/research/hedge.html>.

Additional disclosures required under the laws and regulations of jurisdictions other than the United States

The following disclosures are those required by the jurisdiction indicated, except to the extent already made above pursuant to United States laws and regulations. **Australia:** Goldman Sachs Australia Pty Ltd and its affiliates are not authorised deposit-taking institutions (as that term is defined in the Banking Act 1959 (Cth)) in Australia and do not provide banking services, nor carry on a banking business, in Australia. This research, and any access to it, is intended only for "wholesale clients" within the meaning of the Australian Corporations Act, unless otherwise agreed by Goldman Sachs. In producing research reports, members of the Global Investment Research Division of Goldman Sachs Australia may attend site visits and other meetings hosted by the companies and other entities which are the subject of its research reports. In some instances the costs of such site visits or meetings may be met in part or in whole by the issuers concerned if Goldman Sachs Australia considers it is appropriate and reasonable in the specific circumstances relating to the site visit or meeting. To the extent that the contents of this document contains any financial product advice, it is general advice only and has been prepared by Goldman Sachs without taking into account a client's objectives, financial situation or needs. A client should, before acting on any such advice, consider the appropriateness of the advice having regard to the client's own objectives, financial situation and needs. A copy of certain Goldman Sachs Australia and New Zealand disclosure of interests and a copy of Goldman Sachs' Australian Sell-Side Research Independence Policy Statement are available at: <https://www.goldmansachs.com/disclosures/australia-new-zealand/index.html>. **Brazil:** Disclosure information in relation to CVM Instruction 598 is available at <https://www.gs.com/worldwide/brazil/area/gir/index.html>. Where applicable, the Brazil-registered analyst primarily responsible for the content of this research report, as defined in Article 20 of CVM Instruction 598, is the first author named at the beginning of this report, unless indicated otherwise at the end of the text. **Canada:** Goldman Sachs Canada Inc. is an affiliate of The Goldman Sachs Group Inc. and therefore is included in the company specific disclosures relating to Goldman Sachs (as defined above). Goldman Sachs Canada Inc. has approved of, and agreed to take responsibility for, this research report in Canada if and to the extent that Goldman Sachs Canada Inc. disseminates this research report to its clients. **Hong Kong:** Further information on the securities of covered companies referred to in this research may be obtained on request from Goldman Sachs (Asia) L.L.C. **India:** Further information on the subject company or companies referred to in this research may be obtained from Goldman Sachs (India) Securities Private Limited, Research Analyst - SEBI Registration Number INH000001493, 951-A, Rational House, Appasaheb Marathe Marg, Prabhadevi, Mumbai 400 025, India, Corporate Identity Number U74140MH2006FTC160634, Phone +91 22 6616 9000, Fax +91 22 6616 9001. Goldman Sachs may beneficially own 1% or more of the securities (as such term is defined in clause 2 (h) the Indian Securities Contracts (Regulation) Act, 1956) of the subject company or companies referred to in this research report. **Japan:** See below. **Korea:** This research, and any access to it, is intended only for "professional investors" within the meaning of the Financial Services and Capital Markets Act, unless otherwise agreed by Goldman Sachs. Further information on the subject company or companies referred to in this research may be obtained from Goldman Sachs (Asia) L.L.C., Seoul Branch. **New Zealand:** Goldman Sachs New Zealand Limited and its affiliates are neither "registered banks" nor "deposit takers" (as defined in the Reserve Bank of New Zealand Act 1989) in New Zealand. This research, and any access to it, is intended for "wholesale clients" (as defined in the Financial Advisers Act 2008) unless otherwise agreed by Goldman Sachs. A copy of certain Goldman Sachs Australia and New Zealand disclosure of interests is available at: <https://www.goldmansachs.com/disclosures/australia-new-zealand/index.html>. **Russia:** Research reports distributed in the Russian Federation are not advertising as defined in the Russian legislation, but are information and analysis not having product promotion as their main purpose and do not provide appraisal within the meaning of the Russian legislation on appraisal activity. Research reports do not constitute a personalized investment recommendation as defined in Russian laws and regulations, are not addressed to a specific client, and are prepared without analyzing the financial circumstances, investment profiles or risk profiles of clients. Goldman Sachs assumes no responsibility for any investment decisions that may be taken by a client or any other person based on this research report. **Singapore:** Further information on the covered companies referred to in this research may be obtained from Goldman Sachs (Singapore) Pte. (Company Number: 198602165W). **Taiwan:** This material is for reference only and must not be reprinted without permission. Investors should carefully consider their own investment risk. Investment results are the responsibility of the individual investor. **United Kingdom:** Persons who would be categorized as retail clients in the United Kingdom, as such term is defined in the rules of the Financial Conduct Authority, should read this research in conjunction with prior Goldman Sachs research on the covered companies referred to herein and should refer to the risk warnings that have been sent to them by Goldman Sachs International. A copy of these risk warnings, and a glossary of certain financial terms used in this report, are available from Goldman Sachs International on request.

European Union: Disclosure information in relation to Article 6 (2) of the European Commission Delegated Regulation (EU) (2016/958) supplementing Regulation (EU) No 596/2014 of the European Parliament and of the Council with regard to regulatory technical standards for the technical arrangements for objective presentation of investment recommendations or other information recommending or suggesting an investment strategy and for disclosure of particular interests or indications of conflicts of interest is available at <https://www.gs.com/disclosures/europeanpolicy.html> which states the European Policy for Managing Conflicts of Interest in Connection with Investment Research.

Japan: Goldman Sachs Japan Co., Ltd. is a Financial Instrument Dealer registered with the Kanto Financial Bureau under registration number Kinsho 69, and a member of Japan Securities Dealers Association, Financial Futures Association of Japan and Type II Financial Instruments Firms Association. Sales and purchase of equities are subject to commission pre-determined with clients plus consumption tax. See company-specific disclosures as to any applicable disclosures required by Japanese stock exchanges, the Japanese Securities Dealers Association or the Japanese Securities Finance Company.

Ratings, coverage groups and related definitions

Buy (B), Neutral (N), Sell (S) -Analysts recommend stocks as Buys or Sells for inclusion on various regional Investment Lists. Being assigned a Buy or Sell on an Investment List is determined by a stock's total return potential relative to its coverage. Any stock not assigned as a Buy or a Sell on an Investment List with an active rating (i.e., a stock that is not Rating Suspended, Not Rated, Coverage Suspended or Not Covered), is deemed Neutral. Each region's Investment Review Committee manages Regional Conviction lists, which represent investment recommendations focused on the size of

the total return potential and/or the likelihood of the realization of the return across their respective areas of coverage. The addition or removal of stocks from such Conviction lists do not represent a change in the analysts' investment rating for such stocks.

Total return potential represents the upside or downside differential between the current share price and the price target, including all paid or anticipated dividends, expected during the time horizon associated with the price target. Price targets are required for all covered stocks. The total return potential, price target and associated time horizon are stated in each report adding or reiterating an Investment List membership.

Coverage groups: A list of all stocks in each coverage group is available by primary analyst, stock and coverage group at <https://www.gs.com/research/hedge.html>.

Not Rated (NR). The investment rating and target price have been removed pursuant to Goldman Sachs policy when Goldman Sachs is acting in an advisory capacity in a merger or strategic transaction involving this company and in certain other circumstances. **Rating Suspended (RS).** Goldman Sachs Research has suspended the investment rating and price target for this stock, because there is not a sufficient fundamental basis for determining, or there are legal, regulatory or policy constraints around publishing, an investment rating or target. The previous investment rating and price target, if any, are no longer in effect for this stock and should not be relied upon. **Coverage Suspended (CS).** Goldman Sachs has suspended coverage of this company. **Not Covered (NC).** Goldman Sachs does not cover this company. **Not Available or Not Applicable (NA).** The information is not available for display or is not applicable. **Not Meaningful (NM).** The information is not meaningful and is therefore excluded.

Global product; distributing entities

The Global Investment Research Division of Goldman Sachs produces and distributes research products for clients of Goldman Sachs on a global basis. Analysts based in Goldman Sachs offices around the world produce research on industries and companies, and research on macroeconomics, currencies, commodities and portfolio strategy. This research is disseminated in Australia by Goldman Sachs Australia Pty Ltd (ABN 21 006 797 897); in Brazil by Goldman Sachs do Brasil Corretora de Títulos e Valores Mobiliários S.A.; Ombudsman Goldman Sachs Brasil: 0800 727 5764 and / or ouvidoriagoldmansachs@gs.com. Available Weekdays (except holidays), from 9am to 6pm. Ouvidoria Goldman Sachs Brasil: 0800 727 5764 e/ou ouvidoriagoldmansachs@gs.com. Horário de funcionamento: segunda-feira à sexta-feira (exceto feriados), das 9h às 18h; in Canada by either Goldman Sachs Canada Inc. or Goldman Sachs & Co. LLC; in Hong Kong by Goldman Sachs (Asia) L.L.C.; in India by Goldman Sachs (India) Securities Private Ltd.; in Japan by Goldman Sachs Japan Co., Ltd.; in the Republic of Korea by Goldman Sachs (Asia) L.L.C., Seoul Branch; in New Zealand by Goldman Sachs New Zealand Limited; in Russia by OOO Goldman Sachs; in Singapore by Goldman Sachs (Singapore) Pte. (Company Number: 198602165W); and in the United States of America by Goldman Sachs & Co. LLC. Goldman Sachs International has approved this research in connection with its distribution in the United Kingdom and European Union.

European Union: Goldman Sachs International authorised by the Prudential Regulation Authority and regulated by the Financial Conduct Authority and the Prudential Regulation Authority, has approved this research in connection with its distribution in the European Union and United Kingdom.

General disclosures

This research is for our clients only. Other than disclosures relating to Goldman Sachs, this research is based on current public information that we consider reliable, but we do not represent it is accurate or complete, and it should not be relied on as such. The information, opinions, estimates and forecasts contained herein are as of the date hereof and are subject to change without prior notification. We seek to update our research as appropriate, but various regulations may prevent us from doing so. Other than certain industry reports published on a periodic basis, the large majority of reports are published at irregular intervals as appropriate in the analyst's judgment.

Goldman Sachs conducts a global full-service, integrated investment banking, investment management, and brokerage business. We have investment banking and other business relationships with a substantial percentage of the companies covered by our Global Investment Research Division. Goldman Sachs & Co. LLC, the United States broker dealer, is a member of SIPC (<https://www.sipc.org>).

Our salespeople, traders, and other professionals may provide oral or written market commentary or trading strategies to our clients and principal trading desks that reflect opinions that are contrary to the opinions expressed in this research. Our asset management area, principal trading desks and investing businesses may make investment decisions that are inconsistent with the recommendations or views expressed in this research.

The analysts named in this report may have from time to time discussed with our clients, including Goldman Sachs salespersons and traders, or may discuss in this report, trading strategies that reference catalysts or events that may have a near-term impact on the market price of the equity securities discussed in this report, which impact may be directionally counter to the analyst's published price target expectations for such stocks. Any such trading strategies are distinct from and do not affect the analyst's fundamental equity rating for such stocks, which rating reflects a stock's return potential relative to its coverage group as described herein.

We and our affiliates, officers, directors, and employees, excluding equity and credit analysts, will from time to time have long or short positions in, act as principal in, and buy or sell, the securities or derivatives, if any, referred to in this research.

The views attributed to third party presenters at Goldman Sachs arranged conferences, including individuals from other parts of Goldman Sachs, do not necessarily reflect those of Global Investment Research and are not an official view of Goldman Sachs.

Any third party referenced herein, including any salespeople, traders and other professionals or members of their household, may have positions in the products mentioned that are inconsistent with the views expressed by analysts named in this report.

This research is not an offer to sell or the solicitation of an offer to buy any security in any jurisdiction where such an offer or solicitation would be illegal. It does not constitute a personal recommendation or take into account the particular investment objectives, financial situations, or needs of individual clients. Clients should consider whether any advice or recommendation in this research is suitable for their particular circumstances and, if appropriate, seek professional advice, including tax advice. The price and value of investments referred to in this research and the income from them may fluctuate. Past performance is not a guide to future performance, future returns are not guaranteed, and a loss of original capital may occur. Fluctuations in exchange rates could have adverse effects on the value or price of, or income derived from, certain investments.

Certain transactions, including those involving futures, options, and other derivatives, give rise to substantial risk and are not suitable for all investors. Investors should review current options and futures disclosure documents which are available from Goldman Sachs sales representatives or at <https://www.theocc.com/about/publications/character-risks.jsp> and https://www.fiadocumentation.org/fia/regulatory-disclosures_1/fia-uniform-futures-and-options-on-futures-risk-disclosures-booklet-pdf-version-2018. Transaction costs may be significant in option strategies calling for multiple purchase and sales of options such as spreads. Supporting documentation will be supplied upon request.

Differing Levels of Service provided by Global Investment Research: The level and types of services provided to you by the Global Investment Research division of GS may vary as compared to that provided to internal and other external clients of GS, depending on various factors including your individual preferences as to the frequency and manner of receiving communication, your risk profile and investment focus and perspective (e.g., marketwide, sector specific, long term, short term), the size and scope of your overall client relationship with GS, and legal and regulatory constraints. As an example, certain clients may request to receive notifications when research on specific securities is published, and certain clients may request

that specific data underlying analysts' fundamental analysis available on our internal client websites be delivered to them electronically through data feeds or otherwise. No change to an analyst's fundamental research views (e.g., ratings, price targets, or material changes to earnings estimates for equity securities), will be communicated to any client prior to inclusion of such information in a research report broadly disseminated through electronic publication to our internal client websites or through other means, as necessary, to all clients who are entitled to receive such reports.

All research reports are disseminated and available to all clients simultaneously through electronic publication to our internal client websites. Not all research content is redistributed to our clients or available to third-party aggregators, nor is Goldman Sachs responsible for the redistribution of our research by third party aggregators. For research, models or other data related to one or more securities, markets or asset classes (including related services) that may be available to you, please contact your GS representative or go to <https://research.gs.com>.

Disclosure information is also available at <https://www.gs.com/research/hedge.html> or from Research Compliance, 200 West Street, New York, NY 10282.

© 2020 Goldman Sachs.

No part of this material may be (i) copied, photocopied or duplicated in any form by any means or (ii) redistributed without the prior written consent of The Goldman Sachs Group, Inc.