China Auto Sector

Survival of the fittest: Pioneers in the NEV era

OUTPERFORM (Initiation)

We initiate coverage on China Auto sector with a fairly positive view despite its share outperformance in the past two years. We still see high growth potential for some automakers amid an industry evolving faster than ever before. Following such ongoing drastic changes, we prefer pioneers over followers, as pioneers have been creating new values for consumers, which is key to their stickiness in the future. Therefore, we prefer the leading NEV trio over traditional automakers.

- **Restocking, exports and macro key to China auto sales in 2022.** We project China's passenger-vehicle (PV) wholesale volume to rise 7.5% YoY in 2022, based on our moderate growth forecast for PV retail sales volume (+4% YoY), with inventory restocking and rising exports. We expect Chinese brands to continue gaining market share in 2022, aided by a plethora of competitive new models. We also project luxury retail sales volume to rise 12% YoY.
- **Sustainable growth for NEV amid market-driven sales and PHEV revival.** We project passenger new-energy vehicle (NEV) wholesale volume to rise 45% YoY to 4.8mn units in 2022, which implies a 21% penetration rate. We expect Chinese brands to take up 75% of NEV sales in China in 2022, especially with rising market share in the plug-in hybrid (PHEV) segment amid their improved hybrid technologies. Battery supply could cap NEV sales in 1H22.
- **Intelligent connectivity key to China's more sustainable NEV growth now.** In our view, autonomous driving (AD) and smart cockpit technologies are the most important new values realized in NEVs. Other than Tesla (TSLA US, NR), Chinese automakers are leading in the L2+ AD technologies and the most aggressive in launching new models with more powerful AI chips and LiDARs, in a bid to stand out. We analyze their roadmaps and R&D capabilities in detail in this report. We compile 34,000 online comments and 1,218 models on sale to compare consumer preference for smart NEVs and available AD functions.
- **Stock calls.** We prefer the leading NEV start-ups, Xpeng, NIO and Li Auto, over incumbent automakers on their determination to provide new values to consumers. We like Great Wall Motor the most among traditional OEMs given its leading position in tech transformation in our view. We put HOLD on BYD given its high valuation as we regard BYD in between NEV trio and incumbent OEMs. We think that Geely is still a follower in AD technologies.

Valuation Table

Name	Ticker	Rating	Mkt Cap (US$ mn)	TP (LC)	Up -side	P/E (x) FY22E	P/S (x) FY21E	P/S (x) FY22E	ROE (%) FY22E
Xpeng	XPEV US	BUY	41,432	80	65%	N/A	12.6	5.5	(7.3)
Xpeng	9868 HK	BUY	40,384	312	70%	N/A	12.3	5.4	(7.3)
NIO	NIO US	BUY	50,389	45	42%	N/A	9.0	5.2	(9.7)
Li Auto	LI US	BUY	31,760	48	56%	N/A	7.6	3.8	(2.0)
Li Auto	2015 HK	BUY	31,163	187	59%	N/A	7.4	3.7	(2.0)
Great Wall	2333 HK	BUY	30,449	36	40%	15.2	1.5	0.9	16.1
Great Wall	601633 CH	BUY	68,262	59	25%	34.1	3.3	2.1	16.1
GAC	2238 HK	BUY	10,909	11	28%	7.7	0.9	0.8	9.5
GAC	601238 CH	BUY	24,730	18	21%	17.5	2.1	1.8	9.5
BYD	1211 HK	HOLD	96,947	270	4%	82.3	3.1	2.3	7.6
BYD	002594 CH	HOLD	117,071	270	6%	99.4	3.7	2.8	7.6
Geely	175 HK	HOLD	25,705	21	5%	18.6	1.6	1.3	12.0

Source: Company data, Bloomberg, CMBIS estimates. Note: Market data as of 12 Jan 2022

China Auto Sector

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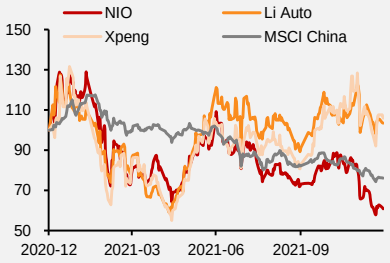
Source: Bloomberg



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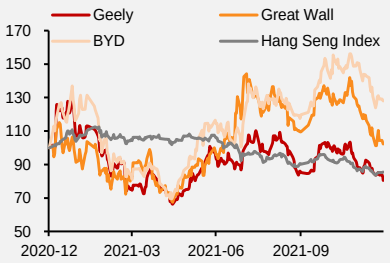

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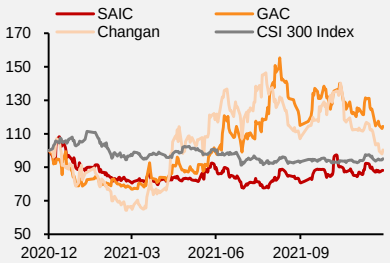
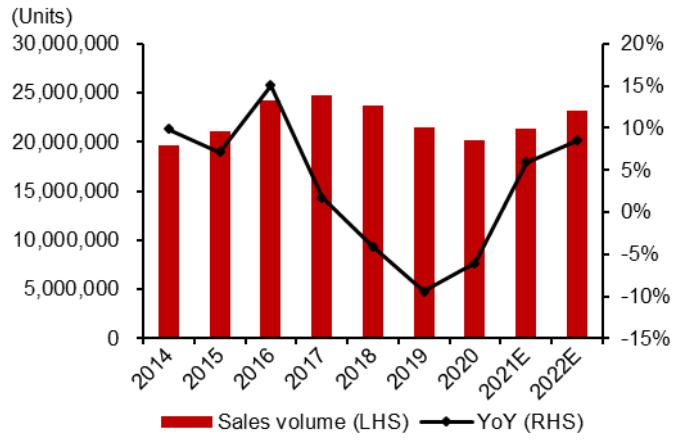


Source: Bloomberg

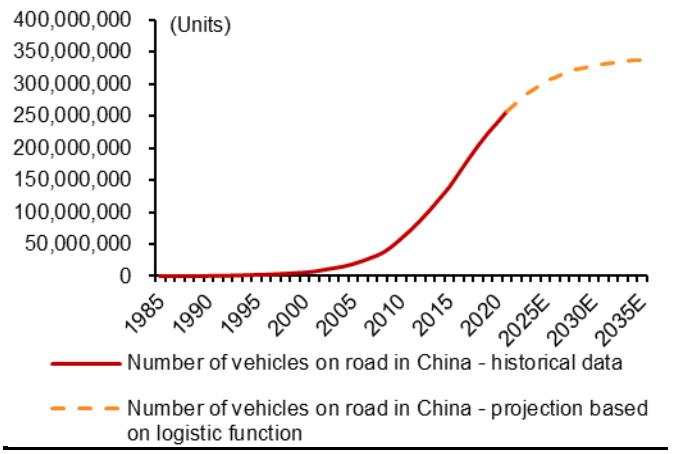
Focus Charts

Figure 1: China PV wholesale volume



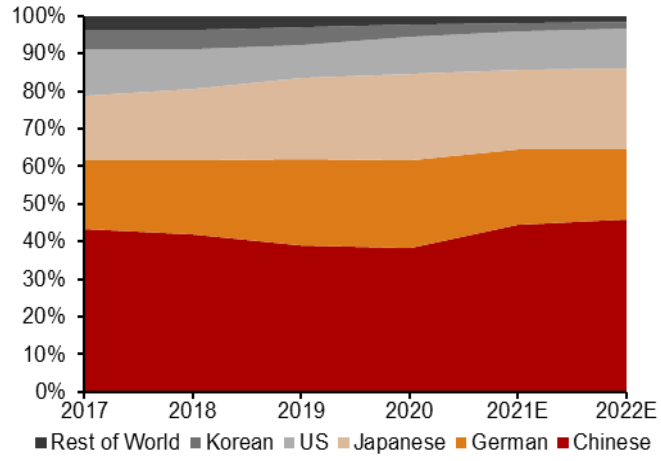
Source: CAAM, CMBIS estimates

Figure 2: Projection on number of vehicles on road



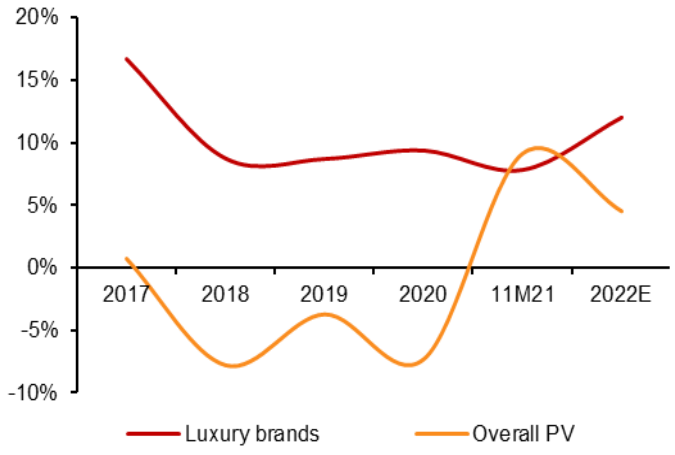
Source: CAAM, NBS, CMBIS estimates

Figure 3: PV market share by brand origin in China



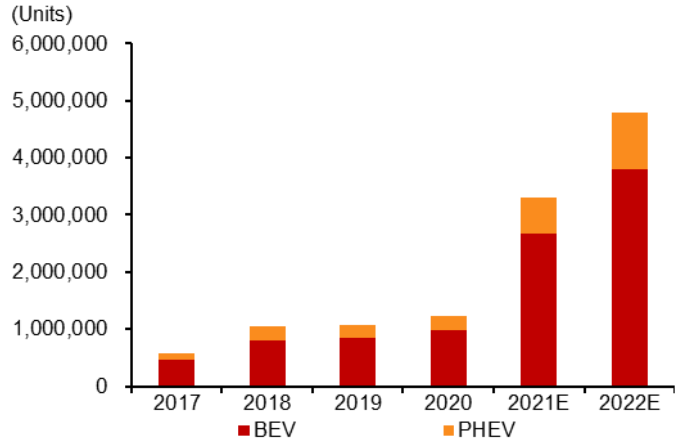
Source: CAAM, CMBIS estimates

Figure 4: Luxury-vehicle vs overall (YoY Growth)



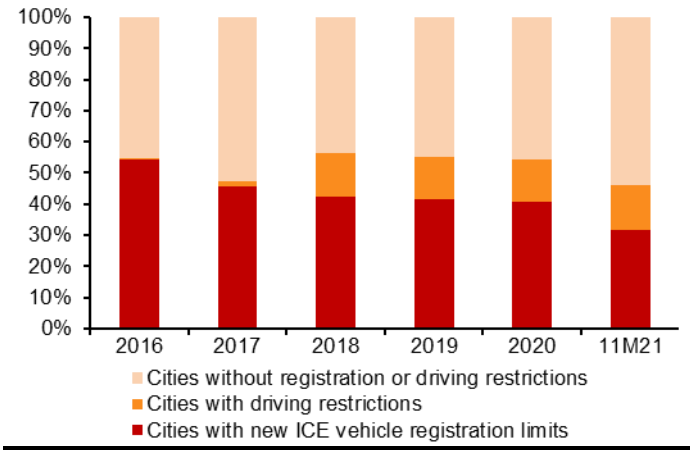
Source: CATARC, CMBIS estimates

Figure 5: NEV wholesales volume in China



Source: CAAM, CMBIS estimates

Figure 6: NEV market share by city type



Source: CATARC, CMBIS

Note: The 24 cities with driving restrictions mainly include Guiyang, Shijiazhuang, Wuhan, Zhengzhou, Xi'an, Chongqing, etc.

Figure 7: Key configurations for intelligent and connected vehicle (ICV) models on sale in China

Model	Tesla Model 3	NIO ES6	Li ONE	Xpeng P7	BYD Han EV	Zeekr 001	Wey Mocha
MSRP (RMB)	255,652-339,900	358,000-518,000	338,000	229,900-369,900	219,800-279,500	299,000-360,000	187,800-223,800
Wheelbase (mm)	2,875	2,900	2,935	2,998	2,920	3,005	2,915
0-100km/h Acceleration (s)	3.4	4.7	6.5	4.3	3.9	3.8	9.1
E/E Architecture	Layer 4	Layer 2.5	Layer 2	Layer 2.5	Layer 2.5	Layer 3	Layer 2
Cockpit Processor	Intel Atom A3950	Nvidia Tegra X1	Qualcomm Snapdragon 820A	Qualcomm Snapdragon 820A	Huawei Kirin 710A	Qualcomm Snapdragon 820A	Qualcomm Snapdragon 8155
Infotainment OS	Linux	Android	Android	Android	Android	Android	Android
Voice Interaction	★★★	★★★★	★★★★☆	★★★★★	★★★★	★★★★	★★★★
Overall Infotainment System Experience	★★★	★★★★	★★★★☆	★★★★★	★★★★	★★★★	★★★★☆
ADAS AI Processor	FSD	Mobileye EyeQ4	Horizon Journey 3	Nvidia Xavier	-	Mobileye EyeQ5	Mobileye EyeQ4
R&D Capabilities on AD	★★★★★	★★★★	★★★	★★★★☆	★★	★★	★★★
AD Level	L2.8	L2.6	L2.5	L2.9	L2	Not released yet	L2.5
Navigate on Autopilot	✔	✔	✔	✔	✘	Not released yet	✔
No. of AD Cameras	5	3	1	9	1	8	1
No. of Circular Cameras	3	4	4	4	4	4	4
No. of Other Cameras	1	1	-	1	1	3	-
No. of Millimeter-wave Radars	1	5	5	5	3	1	5
No. of Ultrasonic-wave Radars	12	12	12	12	12	12	12

Source: Company data, CMBIS estimates

Figure 8: ADAS hardware comparison for the upcoming ICV models in China in 2022

Model		NIO ET7	Xpeng P5	Xpeng G9	Weltmeister M7	Zhiji L7	Avatar 11	SL Jijialong
ADAS Computing Platform	No. of Processors	Nvidia Orin x 4	Nvidia Xavier	Nvidia Orin x 2	Nvidia Orin x 4	Nvidia Xavier	Huawei 810	Huawei 810
	Computing Power (TOPS)	1,016	30	508	1,016	30	400-800	400-800
LiDAR	No. of LiDARs	1	2	2	3	-	3	4
	Supplier	Innovusion	Livox	RoboSense	RoboSense	-	Huawei	Huawei
	Laser Beams (equivalence)	300-line	144-line	Est. 128-line	Est. 128-line	-	96-line	96-line
	Detection Distance (m)	250	150	150	150	-	150	150
Camera	No. of Cameras	11	12	12	11	11	13	11
	Megapixels (MP)	8MP x 7 3MP x 4	3MP x 12	8MP ≥ 8	8MP x 7	5MP x 7 2MP x 4	8MP x 13	8MP x 7
No. of Millimeter-wave Radars		5	5	5	5	5	6	5
No. of Ultrasonic Sensors		12	12	12	12	12	12	12
Sensor Fusion		Late fusion	Late fusion	Late fusion	Late fusion	Late fusion	Early fusion	Early fusion
ADAS Algorithm Supplier		-	-	-	Baidu Apollo	-	Huawei	Huawei / Momenta
Est. Total Costs of ADAS Hardware (RMB)		32,000	20,000	25,000	35,000	12,000	22,000	22,000
MSRP (RMB)		448,000-526,000	157,900-223,900	Est. above 300,000	Est. above 300,000	408,800 (Pre-sale)	Est. above 300,000	488,000 (Pre-sale)
Est. Launch Time		1Q22	4Q21	3Q22	2H22	1H22	3Q22	3Q22

Source: Company data, CMBIS

Contents

Investment Thesis

Industry 2022 outlook: Restocking, exports, Chinese brands, macro

We project China's PV wholesale volume to rise about 7.5% YoY to 23.1mn units in 2022, based on our 4% YoY growth forecast for PV retail sales volume, along with inventory restocking and rising exports. We expect Chinese brands to continue gaining market share to 45.9% in 2022, from 44.4% in the first 11 months of 2021 and 38.3% in 2020, on wholesale volume basis, aided by a plethora of competitive new models. We project luxury retail sales volume to rise by 12% YoY to about 4mn units in 2022.

While our moderate growth projection (+4% YoY) for retail sales volume in 2022 has reflected investors' concerns about macro economy, we are of the view that PV wholesale volume could be more resilient than that in 2018, as investors may underestimate vehicle exports. We use a single-factor logistic curve to forecast China's steady-state number of vehicles on the road to be about 22.7-24.4mn units, which could mean 2-3% CAGR for China's long-term PV sales volume.

China NEV outlook: Solid growth with market driven, PHEV revival

We project passenger NEV wholesale volume to rise about 45% YoY to 4.8mn units in 2022, which implies a 21% market share for NEVs. While other countries have been increasing government subsidies to push for electrification, China's NEV growth is more sustainable now with fewer subsidies and more sales from cities without internal-combustion engine (ICE) vehicles' registration or driving restrictions. Despite lithium and other battery raw-material processors' accelerated plans to expand capacity, battery supply could still cap NEV sales in 1H22, based on the data we have compiled.

Chinese automakers are likely to continue dominating in NEV sales in China in 2022, especially with rising market share in the PHEV segment amid their improved hybrid technologies. In this report, we explain the different hybrid technologies used by automakers from cost efficiency, fuel economy and ride comfort perspectives in detail.

Intelligent and connected vehicle (ICV): Jump-starter

While both mini battery electric vehicles (BEVs) and premium smart NEVs have been driving NEV sales in China, we believe new values/functions that NEVs can provide (vs ICE) is key to NEV sustainable growth. Intelligent connectivity (namely autonomous driving and smart cockpit technologies) is a decisive factor to lure current ICE-vehicle drivers and make China the most important NEV market in the world. While foreign brands have higher penetration rate in L2 functions for models on sale in China, Chinese automakers are leading in L2+ AD capabilities except for Tesla. We take a deep dive into each Chinese automaker's R&D capabilities and strategies based on our views and ranking for ICV models on sale. We also analyze the upcoming ICVs in detail, including more powerful AI chips, data fusion with LiDAR, additional costs for AD hardware, in a bid to better understand Chinese automakers' R&D capabilities for the state-of-the-art AD technologies and next-generation vehicle roadmap.

In our view, the automotive industry has been changing more drastically than ever before, which needs pioneers, not followers. We suggest that investors pick pioneers among automakers which are dedicated to satisfying consumers' rising needs and creating new values for vehicles, although consumers' needs could change from time to time. Therefore, we prefer leading NEV start-ups than traditional automakers, as most of the latter are reacting slowly to transform themselves into tech companies, in our view.

Our Pecking Order and Valuation Summary

We prefer pioneers over followers amid drastic industry change

We like NEV start-ups more than traditional automakers

Automotive industry has been evolving faster than ever before. While intelligent and connected NEV is a certain trend for most investors, how to stand out amid such a trend and who the winners will be are still uncertain. Following such ongoing drastic changes, we prefer pioneers in this industry over followers, even as decisive technologies could change over time. Therefore, we prefer leading NEV start-ups rather than traditional automakers and initiate Xpeng, NIO and Li Auto with BUY ratings.

In our view, **Xpeng** is leading in autonomous driving and smart cockpit technologies in China. **NIO** is leading in the brand influence with outstanding user-centric services in China. **Li Auto** is leading in satisfying a group of users' needs such as offering multi-functional family vehicle and easing range anxiety in China. While all such priorities are crucial for sustainable growth in our view, we rank autonomous driving and smart cockpit technologies the most important. Accordingly, we choose Xpeng as our top pick among the NEV start-ups.

Great Wall Motor leads in incumbent automakers' tech transformation

In our view, electrification is to change the automotive industry more drastically than what many investors have expected, especially as software has been playing a much more important role than before. Incumbent automakers have to transform themselves into tech companies to withstand such changes. However, we are of the view that most traditional automakers still reacted slowly for the transformation in 2021 and some have already given up, as they are still relying heavily on partners for new technologies or business models.

It appears to us that **Great Wall Motor** is leading in the tech transformation, as it is determined to develop proprietary state-of-the-art technologies. Its parent company has incubated start-ups including Svolt, HAOMO.AI and FTXT Energy Technology for NEV batteries, autonomous driving and fuel-cell technologies, respectively. Svolt has showcased that Great Wall has the capabilities to turn a start-up into an industry-leading player in a short period of time. In addition, Great Wall now understands consumer needs much better than before and turns it into more profitable models and higher sales, aided by higher R&D efficiency, more cost-effective platform-based production and better marketing efforts. We initiate Great Wall with a BUY rating and choose it as our top pick among traditional automakers.

Despite **Geely**'s leading position in terms of sales volume and brand image among Chinese brands in the past few years, we think that Geely is still a follower in new technology development, as its NEV and AD strategies are still a bit unclear to us. We initiate Geely with a HOLD rating.

BYD has a natural advantage in the electrification with its NEV battery capabilities. It also has cost advantage in the PHEV technologies from its patents, which will be discussed in detail in the hybrid technology section in this report. However, it is probably ranked the lowest among major Chinese automakers in terms of AD development. We initiate BYD with a HOLD rating given its higher valuation than its traditional automaker peers.

In general, we are less optimistic about state-owned enterprises (SOEs), as their culture, incentive scheme for talent retention and track record may not be suitable for software development. Transforming from a traditional manufacturer to a tech company also needs culture changes. We initiate **GAC** with a BUY rating given its low valuation and catalyst for

Aion spin-off. We exclude other SOE automakers, such as Brilliance China Automotive (1114 HK, NR) and BAIC Motor (1958 HK, NR), from our current coverage as we believe their businesses are currently supported by joint ventures (JVs) with foreign brands and their homegrown brands are likely to be out of game in the future.

OEMs and parts suppliers could be more exciting than dealers in 2022

Although we are of the view that OEM-authorized dealers will not be completely gone in the future, investors' concerns about dealers' valuation will likely weigh in their share prices from time to time. Margin outlook for new-car sales could also deteriorate in 2022 if chip supply gradually recovers.

More new models with improving AD functions assisted by higher-performance AI chips and more comprehensive sensor systems are scheduled to go on sale in 2022, which could help investors better understand the R&D capability differences among automakers. **We expect investors' appetite for automaker selection to be further diverged.** Automakers are likely to remain as the most important players along the supply chain in 2022.

In our view, Chinese parts suppliers could benefit as more automakers develop proprietary software technologies. In the past, automakers' reliance on global tier-1 suppliers mainly came from the software solution provided by suppliers along with hardware. Now, as automakers upgrade their Electrical/Electronic Architecture (EEA) to domain based or even vehicle-computer based architectures, they are likely to develop software on their own because different functions are to be realized through one computer. Therefore, Chinese parts supplier may become advantageous if software is decoupled from hardware to make suppliers compete in hardware cost efficiency.

Changing valuation methodology amid evolving industry landscape

Valuation methodology has also been changing with the evolving automotive industry landscape. With high sales growth potential and stickier software revenue stream in the future, P/S becomes a preferred price multiple for automakers which are leading in new technologies, especially for those which have not generated positive net profits yet. Tesla has become a benchmark given its leading R&D capabilities in autonomous driving. Tesla currently trades at 15x FY22 P/S and 12x FY23 P/S on Bloomberg consensus. In the past two years, Tesla has been trading at a premium to Xpeng, NIO and Li Auto in terms of rolling forward 12-month P/S, except during Nov 2020-Feb 2021. From technology and global positioning perspectives, we believe Tesla should deserve a premium to Chinese NEV trio. However, if Tesla cannot solve the localization issue in China, the most important market for intelligent and connected new-energy vehicles in our view, Chinese automakers may catch up at least in China market.

Valuation for incumbent automakers has also benefited from such trend since 2H20. We still use P/E for incumbent automakers' valuation, as we are of the view that these automakers' transformation into tech companies are slow. However, we lift our target P/E multiples for those automakers compared with before, as the average valuation in the past 1.5 years has moved up significantly compared with long-term average prior to 2H20.

We use the sum-of-the-parts (SOTP) valuation for BYD, as it is engaged in many businesses. We value its automotive business in between NEV trio and incumbent automakers, as BYD is leading in NEVs but lagging in autonomous driving technologies compared with Great Wall and Geely. We have also changed our valuation method for GAC from the traditional P/E multiplier to SOTP, to factor in Aion's planned spin-off.

Figure 9-1: Valuation comparison sheet

Company	Ticker	Rating	Mkt Cap (US$ mn)	Price (LC)	TP (LC)	Up/Down -side	P/E (x) FY21E	P/E (x) FY22E	P/S (x) FY21E	P/S (x) FY22E	ROE (%) FY21E	ROE (%) FY22E
Xpeng	XPEV US	BUY	41,432	48.38	80.00	65.4%	N/A	N/A	12.6	5.5	(13.8)	(7.3)
Xpeng	9868 HK	BUY	40,384	183.80	312.00	69.7%	N/A	N/A	12.3	5.4	(13.8)	(7.3)
NIO	NIO US	BUY	50,389	31.68	45.00	42.0%	N/A	N/A	9.0	5.2	(32.3)	(9.7)
Li Auto	LI US	BUY	31,760	30.75	48.00	56.1%	N/A	N/A	7.6	3.8	(2.0)	(2.0)
Li Auto	2015 HK	BUY	31,163	117.60	187.20	59.2%	N/A	N/A	7.4	3.7	(2.0)	(2.0)
Tesla	TSLA US	NR	1,110,938	1,106.22	N/A	N/A	224.4	131.7	21.6	15.3	21.7	23.8
	Average								**11.7**	**6.5**	**(7.1)**	**(0.8)**
Great Wall	2333 HK	BUY	30,449	25.70	36.00	40.1%	26.3	15.2	1.5	0.9	10.7	16.1
Great Wall	601633 CH	BUY	68,262	47.05	59.00	25.4%	58.9	34.1	3.3	2.1	10.7	16.1
GAC	2238 HK	BUY	10,909	8.20	10.50	28.0%	9.6	7.7	0.9	0.8	8.3	9.5
GAC	601238 CH	BUY	24,730	15.18	18.40	21.2%	21.7	17.5	2.1	1.8	8.3	9.5
BYD	1211 HK	HOLD	96,947	259.60	270.00	4.0%	178.1	82.3	3.1	2.3	4.6	7.6
BYD	002594 CH	HOLD	117,071	256.00	270.00	5.5%	215.1	99.4	3.7	2.8	4.6	7.6
Geely	175 HK	HOLD	25,705	20.00	21.00	5.0%	27.9	18.6	1.6	1.3	8.9	12.0
	Average						**76.8**	**39.2**	**2.3**	**1.7**	**8.0**	**11.2**

Source: Company data, Bloomberg, CMBIS estimates

Figure 9-2: CMBI estimates vs consensus

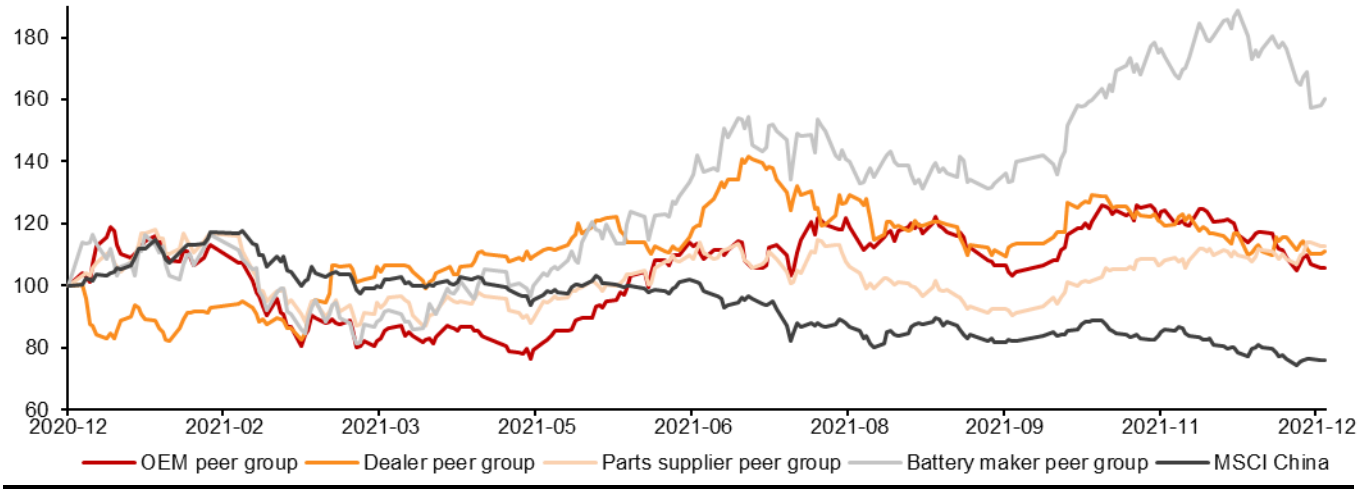
Company	RMB mn	CMBI FY21E	CMBI FY22E	CMBI FY23E	Consensus FY21E	Consensus FY22E	Consensus FY23E	Diff (%) FY21E	Diff (%) FY22E	Diff (%) FY23E
Xpeng	Revenue	20,956	47,851	73,634	20,005	39,020	62,985	4.8%	22.6%	16.9%
	Net profit	(5,356)	(3,026)	(876)	(5,536)	(4,819)	(2,193)	N/A	N/A	N/A
NIO	Revenue	35,768	63,325	100,007	35,907	62,989	97,931	-0.4%	0.5%	2.1%
	Net profit	(10,051)	(3,887)	(1,294)	(7,527)	(2,369)	1,688	N/A	N/A	N/A
Li Auto	Revenue	26,741	52,917	88,780	26,026	45,399	74,037	2.7%	16.6%	19.9%
	Net profit	(719)	(838)	(233)	(656)	(499)	2,624	N/A	N/A	N/A
Great Wall	Revenue	133,344	211,884	257,873	132,365	178,632	214,852	0.7%	18.6%	20.0%
	Net profit	7,374	12,753	15,536	7,637	11,413	14,873	-3.4%	11.7%	4.5%
GAC	Revenue	75,965	87,601	97,892	74,603	87,654	98,041	1.8%	-0.1%	-0.2%
	Net profit	7,247	9,021	10,029	7,060	9,549	11,404	2.6%	-5.5%	-12.1%
BYD	Revenue	200,327	264,217	299,234	218,472	289,318	355,508	-8.3%	-8.7%	-15.8%
	Net profit	3,465	7,499	10,276	4,140	6,902	9,719	-16.3%	8.6%	5.7%
Geely	Revenue	100,297	125,390	135,200	105,080	134,757	157,993	-4.6%	-7.0%	-14.4%
	Net profit	5,875	8,789	11,237	6,884	10,065	12,807	-14.7%	-12.7%	-12.3%

Source: Bloomberg, CMBIS estimates

Share Price Performance in 2021

We have created four market cap-weighted peer groups to review the share performance in 2021 for different players along the automotive supply chain. All the automotive peer groups (OEMs, dealers, parts suppliers and battery makers) outperformed the MSCI China by at least 40% in 2021, with the battery makers leading significantly among all the players. Despite different patterns throughout the year, the peer groups of OEMs, dealers and parts suppliers ended the year of 2021 with very similar annual returns of about 8-11%.

Figure 10: Share performance in 2021 for different automotive peer groups (normalized on 31 Dec 2020)



Source: Bloomberg, CMBIS

Notes: OEM peer group consists of BYD, NIO, Great Wall, SAIC Group (600104 CH, NR), Geely, Xpeng, Li Auto, GAC, Changan (000625 CH, NR), Dongfeng Motor Group (489 HK, NR), BAIC BluePark (600733 CH, NR), JAC (600418 CH, NR), Sokon (601127 CH, NR), and BAIC.
Dealer peer group consists of Zhongsheng (881 HK, NR), Meidong (1268 HK, NR) and Yongda (3669 HK, NR).
Parts supplier peer group consists of Inovance Technology (300124 CH, NR), Fuyao Glass (600660 CH, NR), HASCO (600741 CH, NR), Xingyu (601799 CH, NR), Desay SV Automotive (002920 CH, NR), Tuopu Group (601689 CH, NR), Minth (425 HK, NR), Ningbo Joyson (600699 CH, NR), and Nexteer (1316 HK, NR).
Battery maker peer group consists of CATL (300750 CH, NR), Eve (300014 CH, NR), Guoxuan High-Tech (002074 CH, NR), Farasis (688567 CH, NR) and Sunwoda (300207 CH, NR).

The dealer peer group underperformed all other groups at the beginning of 2021 amid investors' concerns of the potential dents on dealers from NEVs. It started to catch up with strong FY20 earnings announcements, improved gross margins on chip supply constraints and good M&A deals.

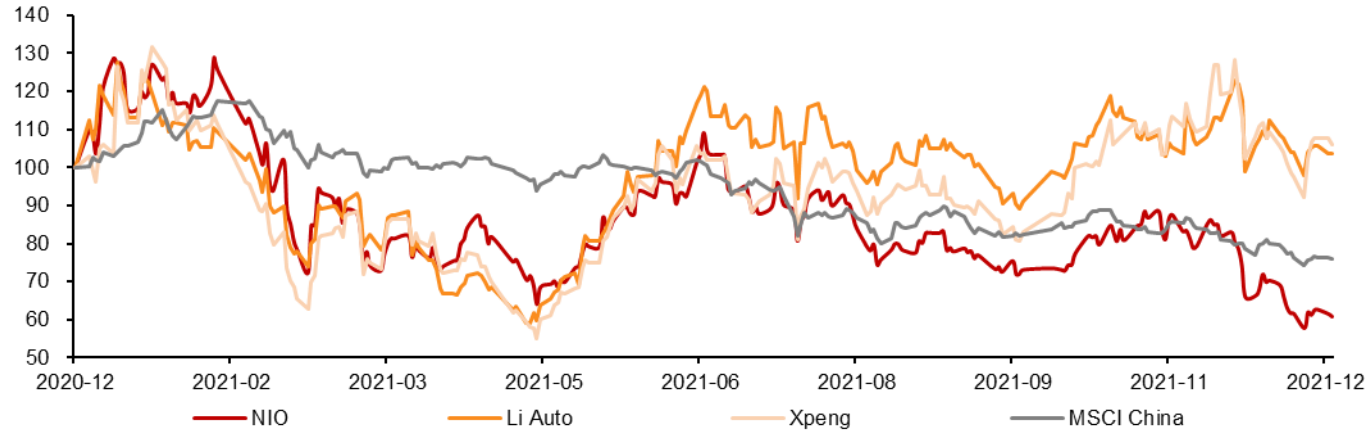
The OEM peer group had a good start of the year of 2021 amid the continued NEV re-rating. It started to underperform other automotive peer groups and the benchmark since Feb 2021, when investors began to worry about valuations and deteriorating margins on rising raw-material prices and chip shortage. The sentiment turned positive from May 2021 when investors started to anticipate chip supply recovery in 3Q21. Despite the volatility in between, the premieres of some exciting new models and MoM sales volume improvement were also the catalysts for individual automakers.

The parts suppliers were more resilient than OEMs amid chip shortage but lagged during OEMs' rebound. The parts supplier group started to catch up in 4Q21 as investors believe the inventory restocking would benefit parts suppliers more than other players.

Looking into individual automakers, the share prices of NEV trio were the most volatile among all the Chinese automakers. In 1H21, the share prices of NEV trio followed almost the same pattern and in fact, NIO outperformed slightly, as its sales volume in 1H21 was

the highest among the three. Sales volumes of Li Auto and Xpeng started to outpace NIO's since 3Q21, which has been reflected in the share prices in 2H21. The facelifted *Li ONE* and the new *Xpeng P5* have been well received by consumers, which should have also boosted the share prices. On the other hand, the supply chain disruption at NIO capped its sales deliveries in 2H21.

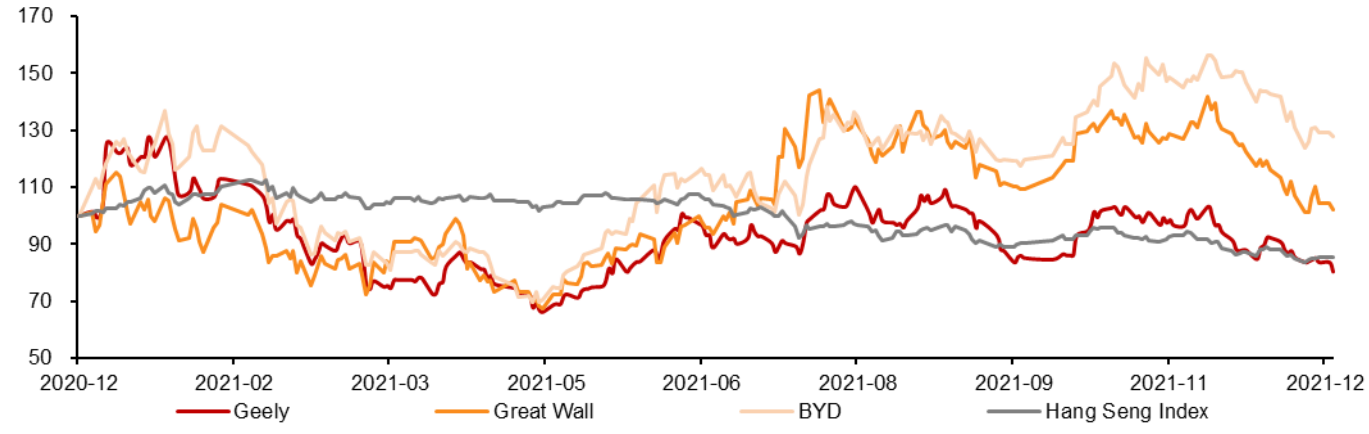
Figure 11: Share prices of NIO, Li Auto and Xpeng, vs MSCI China (normalized on 31 Dec 2021)



Source: Bloomberg, CMBIS

The share performance of three H-share non-SOE automakers started to diverge since 2021 Shanghai Auto Show in April. BYD was the best performer in 2021 among the three, aided by its DM-i PHEV models. Great Wall's share price was more volatile than BYD's amid a mixture of catalysts including rising expectation for the *Tank 300* sales volume, unstable monthly sales volumes capped by chip shortage and quarterly earnings surprise. Geely was the worst performer among the three, as its sales volume missed its sales target amid aging models and its unclear autonomous driving strategies.

Figure 12: Share prices of BYD, Great Wall and Geely, vs Hang Seng Index (normalized on 31 Dec 2021)

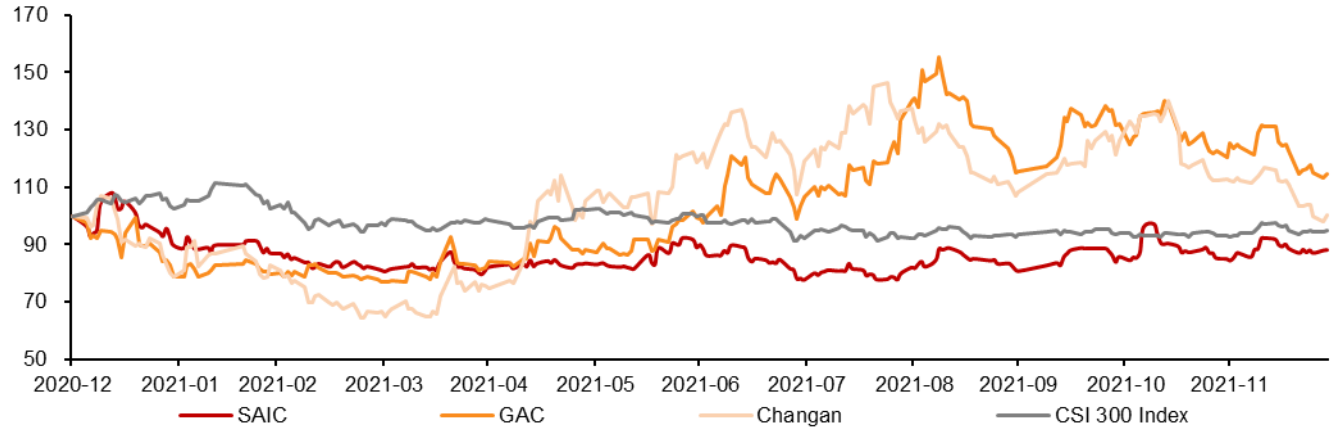


Source: Bloomberg, CMBIS

Looking at three A-share SOE automakers, SAIC kept underperforming CSI 300 Index almost throughout the entire 2021, as investors are still pessimistic about its JVs' business outlook. Japanese-brand dominated JVs at GAC were more resilient in 2021. More importantly, GAC's NEV brand Aion exceeded investors' expectation in terms of sales volume in 2021 and is on track to spin off to lift valuation. Changan's share price was the

most volatile among the three and ended up with outperforming the CSI 300 Index slightly on its continuous market share gain. Both GAC and Changan partner with Huawei in intelligent connectivity.

Figure 13: Share prices of A-share GAC, SAIC and Changan, vs CSI 300 Index (normalized on 31 Dec 2021)



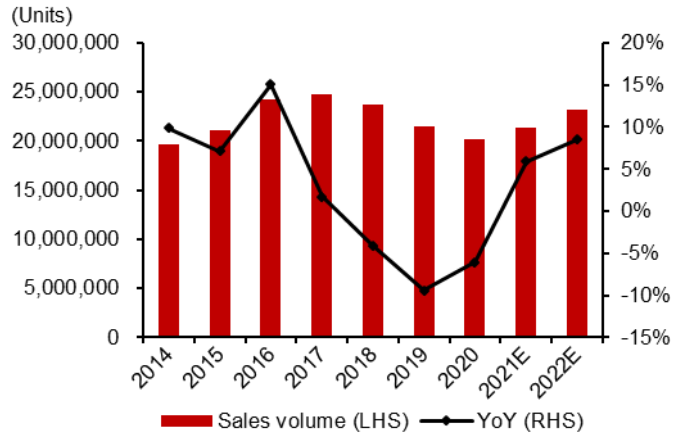
Source: Bloomberg, CMBIS

Industry 2022 Outlook: Chinese Brands, Macro, NEVs

Industry overview: Restocking, exports, new energy vehicles

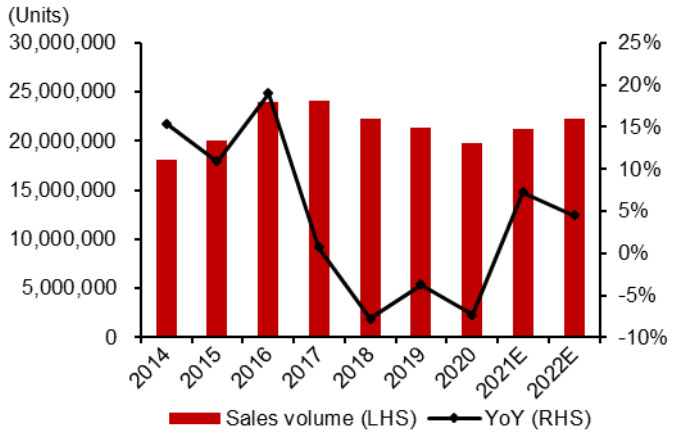
We project China's PV wholesale volume to rise about 7.5% YoY to 23.1mn units in 2022, partially driven by inventory restocking and rising exports. Our base-case forecast for China's PV retail sales volume (excluding minivans) in 2022 is about 22.04mn units, or 4% YoY increase, consistent with our long-term views about China's auto sales growth. We project the YoY growth for retail sales volume to be higher in 2H22 than in 1H22, whereas the growth for wholesale volume is more even throughout the year of 2022 as we expect inventory restocking in 1H22.

Figure 14: China PV wholesale volume



Source: CAAM, CMBIS estimates

Figure 15: China PV retail sales volume

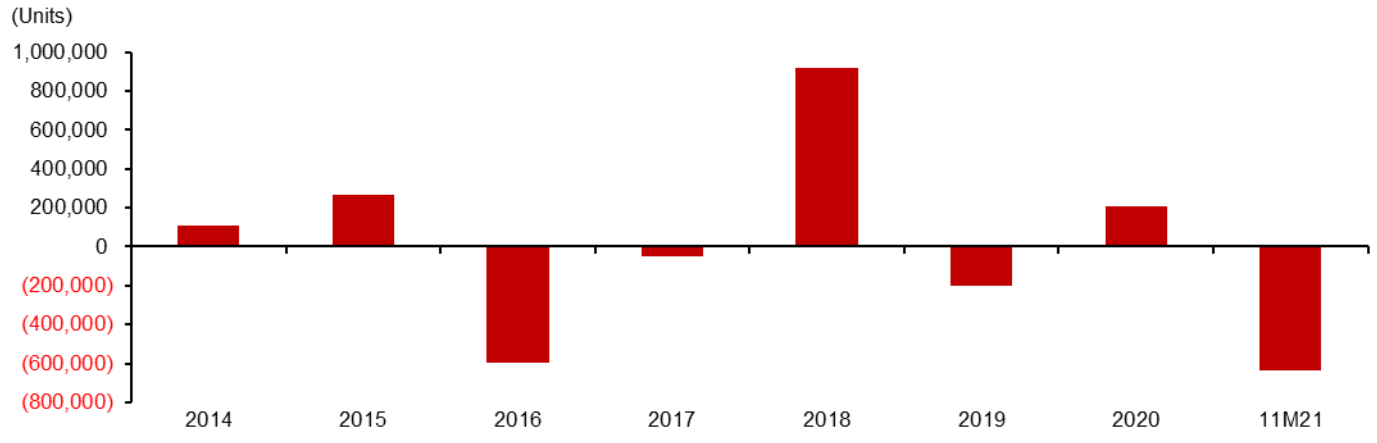


Source: CATARC, CMBIS estimates

Inventory restocking: Contributing 3ppts of the wholesale volume growth

Inventories at dealers fell by about 1.09mn units in the first nine months and 640,000 units in the first 11 months of 2021, based on our calculations. Both figures are the highest in history. China PV wholesale volume in 2021 is likely to be 570,000 units lower than our original forecast at the beginning of 2021, largely due to the chip shortage. We expect chip supply to recover gradually given an inventory addition of about 450,000 units in the past two months. We forecast an inventory restocking of 600,000 units in 2022.

Figure 16: Our calculated inventory changes at dealers

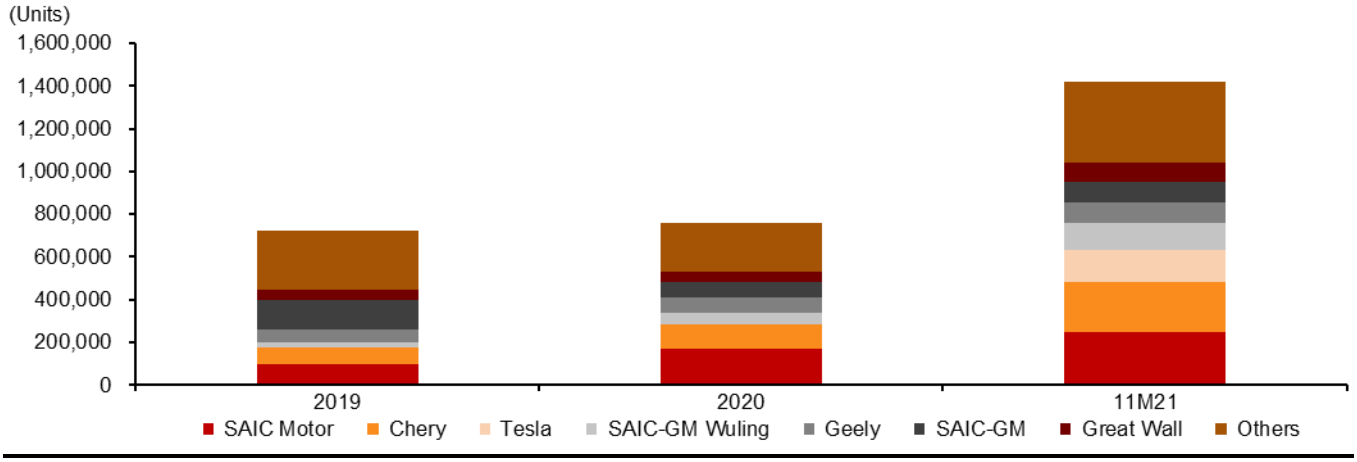


Source: CAAM, CATARC, CMBIS

Exports: Could be a positive surprise

In our view, some investors have probably underestimated the exports' contribution to China's PV wholesale volume. China PV export volume rose by 120% YoY in the first 11 months of 2021, accounting for 7.5% of the total wholesale volume, higher than our prior expectation. Excluding Tesla, the export volume still surged 97% YoY in the first 11 months of 2021. As the production timetable of its Berlin gigafactory is still up in the air, Tesla may continue to export from China in 2022. Nevertheless, China is becoming an NEV export hub for both local and foreign automakers. We project China's PV exports to rise about 5% YoY in 2022, assuming minimal exports from Tesla's Shanghai gigafactory. We are of the view that exports could be a positive surprise for China auto sales in 2022.

Figure 17: China PV export volume by OEM

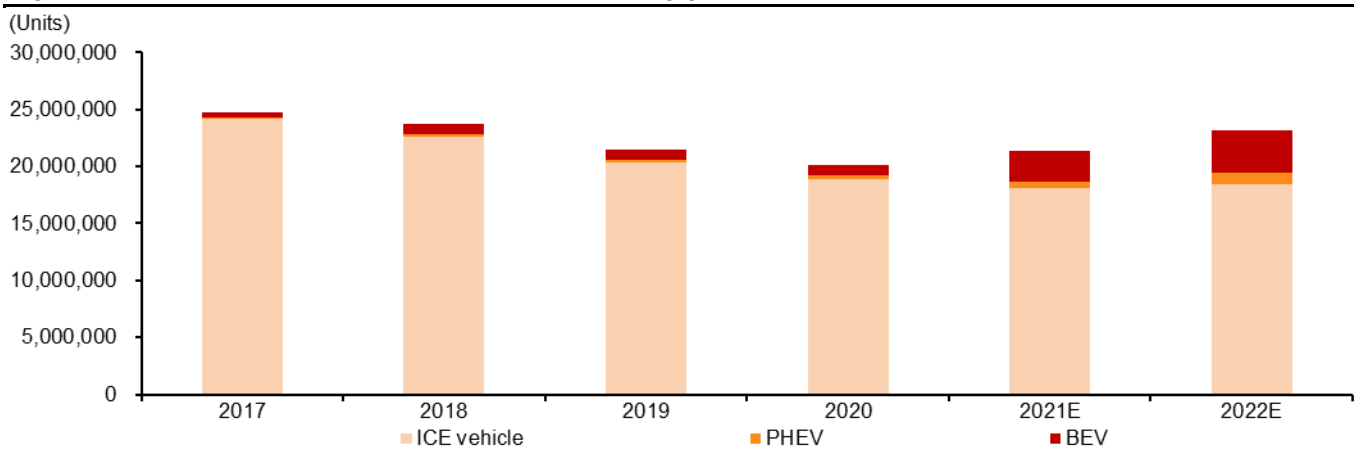


Source: CAAM, CMBIS

NEV: The growth driver

We project China's NEV wholesale volume to rise by about 45% YoY to 4.8mn units in 2022, details of which will be discussed in the next section. That implies 1% YoY increase for ICE vehicles (including non plug-in hybrid vehicles, or HEVs). In the first 11 months of 2021, wholesale volume for ICE vehicles fell about 2% YoY whereas NEV wholesale volume surged 126% YoY. Despite the gradual recovery of chip supply, we believe that NEV will still be the growth engine for China auto sales in 2022.

Figure 18: China PV wholesale volume breakdown by powertrain

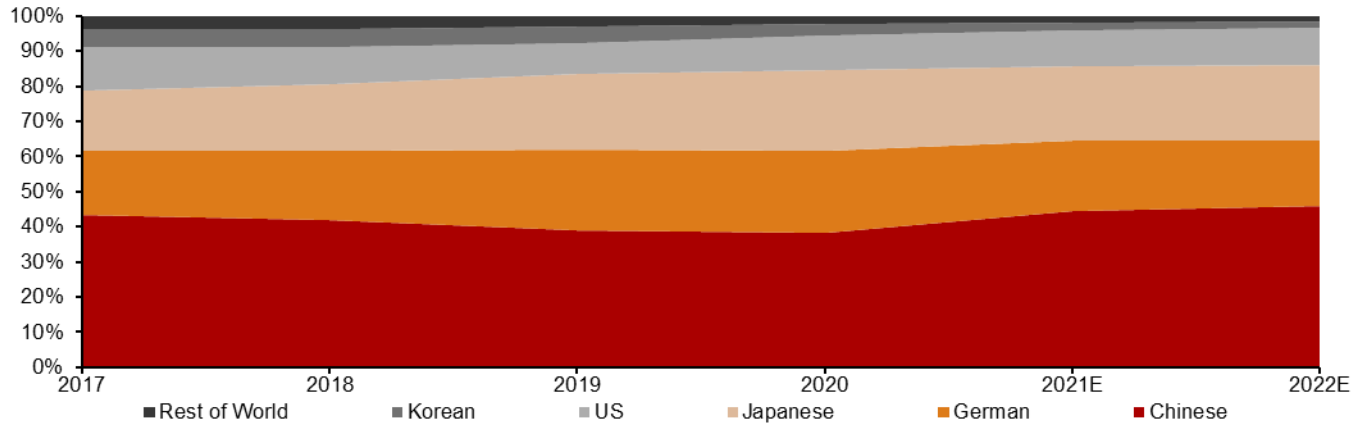


Source: CAAM, CMBIS estimates

Chinese-brand market share gain: Structural change from NEV boom

We expect Chinese brands to continue gaining market share in 2022 to 45.9% in 2022, from 44.4% in the first 11 months of 2021 and 38.3% in 2020, on wholesale volume basis. We had projected market share gain for Chinese brands in 2021 but still underestimated such gain largely aided by NEVs. Chinese brands would only account for about 39.3% market share in the first 11 months of 2021 excluding NEVs (vs 44.4% including NEVs).

Figure 19: PV market share by brand origin in China

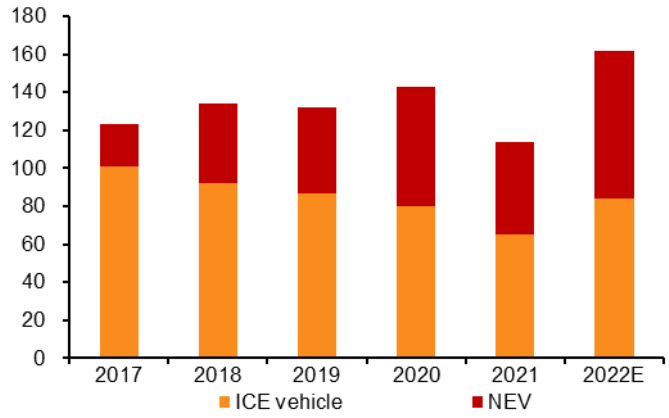


Source: CAAM, CMBIS estimates

Model pipeline: Foreign brands' electrification still lagging

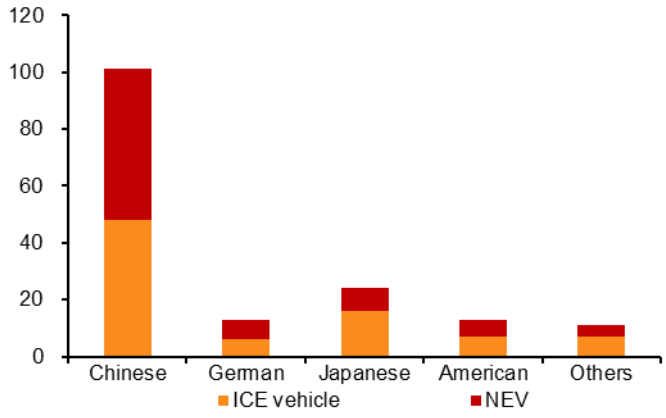
Based on the data we have compiled, there will be about 162 new model launches in 2022, the highest number in history. Chinese-brand new models account for about 62% of the total new model launches that we estimate, slightly higher than previous years. Despite their accelerating electrification plans on paper, NEV model rollouts at foreign automakers are still likely to be limited in 2022 (25 new NEV models vs 53 Chinese-brand new NEV models based on our estimates). Therefore, we expect Chinese brands to continue benefiting from new NEV models in 2022.

Figure 20: No. of new model launches in China



Source: Company data, CMBIS

Figure 21: No. of new models by brand origin in 2022



Source: Company data, CMBIS

Chinese brands: Going to younger generation and upmarket

Apart from the leading position in the electrification, Chinese brands, especially for higher-priced models, are gaining popularity among the younger generation. Back in 2017, Chinese automakers started to launch more premium brands, such as Lynk & Co and Wey,

in a bid to go upscale. The outcome did not meet investors' expectations. However, such attempts are paying back now.

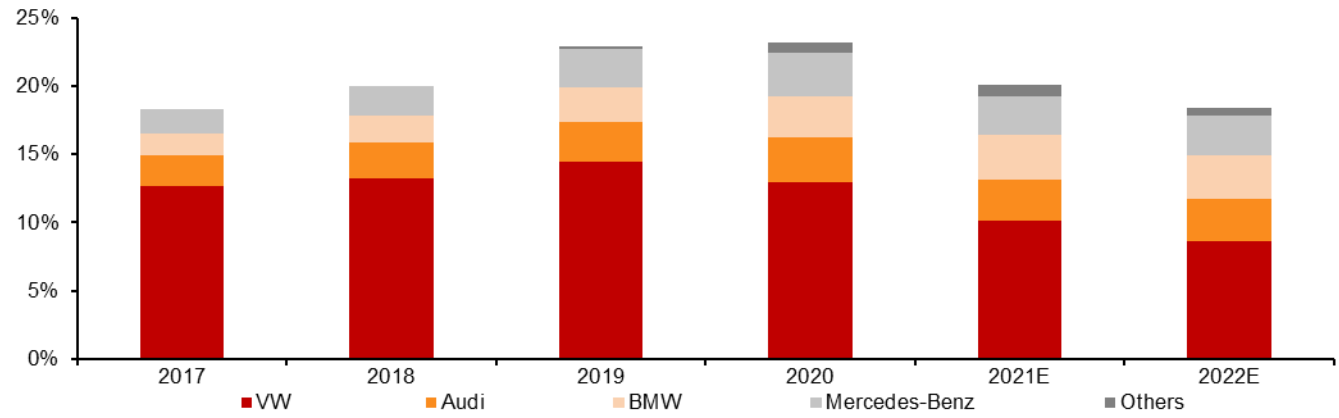
Based on our estimates, average selling price (ASP) for Great Wall Motor rose from less than RMB 83,000 in 2020 to about RMB 94,000 in 2021. ASP for Geely including Lynk & Co is likely to increase from about RMB 80,000 in 2020 to RMB 90,000 in 2021. The same also occurred to GAC's homegrown brands and BYD.

In the first 11 months of 2021, wholesale volume of Chinese brands rose 7% YoY, while medium and large vehicles (including cars, SUVs and MPVs) of Chinese brands rose by 31% YoY during the same period.

German brands: VW's dominance in China is likely to be over

Market share for German brands fell the most in 2021 among all foreign brands. Among German brands, VW's market share declined the most by 2.8ppts, from 12.9% in 2020 to 10.1% in the first 11 months of 2021, on wholesale volume basis. Despite improving chip supply, we project VW brand's market share to further narrow to 8.7% in 2022 amid its aging models, consumer preference shift and unsuccessful NEV strategy so far in China. Given foreign automakers' slow reaction in China (next ID. series BEVs are scheduled to be unveiled in 2023), we are of the view that the current ID. series BEV models on sale are unlikely to lift VW's sales in China.

Figure 22: German brands' market share in China (wholesale volume basis)



Source: CAAM, CMBIS estimates

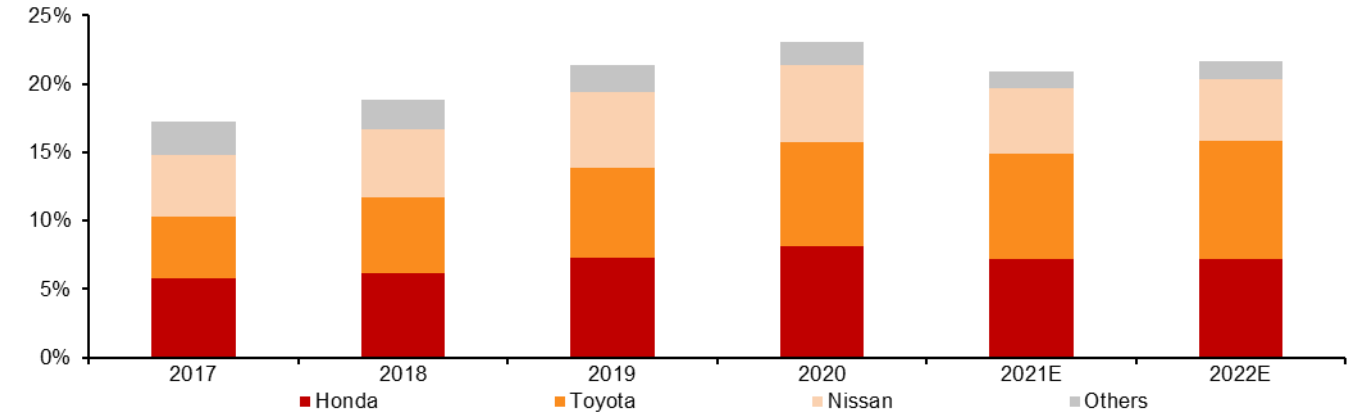
Japanese brands: Our pecking order is Toyota, Honda, Nissan

Japanese-brand market share also fell substantially in 2021, dragged down by Honda and Nissan. We did expect a market share shrink for Nissan on its management saga and we project a slight market share loss in 2022 despite the launch of the redesigned *Qashqai*. Honda's sales volume in China in 2021 was below our expectation, largely due to the chip shortage. We are of the view that Honda's demand could be more resilient than Nissan's given the new-generation *Civic/Integra* in 2021 and *XR-V/Vezel* in 2022. We project Honda's market share to be flat in 2022 versus 2021.

Toyota is probably best positioned among Japanese brands, in our view. We expect Toyota to gain market share in China in 2022, aided by a plethora of new models, including the *Sienna*, *Frontlander*, *Venza* and *bZ4X* in the GAC Toyota JV and equivalent models in the FAW Toyota JV. Based on the data we have compiled, Toyota has the largest number of new model launches in 2022 among all foreign brands.

We are still concerned about Japanese brands' long-term development in China given their unclear electrification strategies. During 2015-21, Peugeot Citroen, followed by Ford, Hyundai, Kia and Buick, were out of Chinese consumers' favor one by one. VW, Nissan and even Honda and Toyota could be next, as Chinese drivers are getting more demanding than ever.

Figure 23: Japanese brands' market share in China (wholesale volume basis)

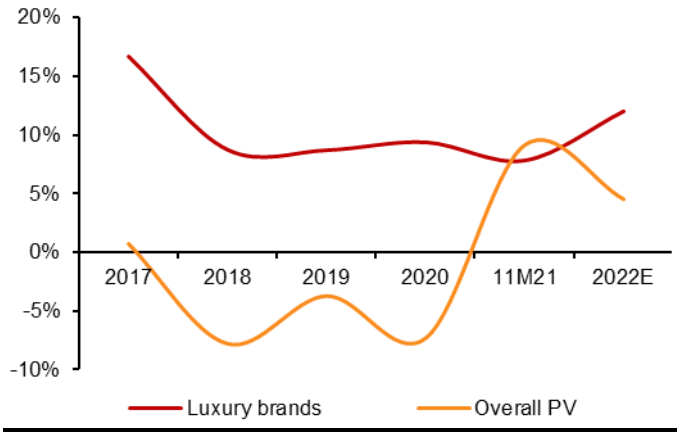


Source: CAAM, CMBIS estimates

Luxury car: Likely to return to normalcy after exceptional 2020-21

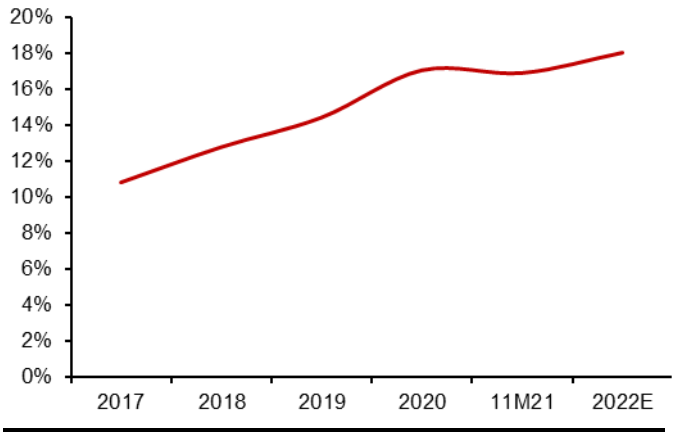
As more than 20% of luxury cars in China are still imported, we use retail sales volume to reflect such demand more precisely. In 2020, luxury brands in China outpaced the overall market by 16.7ppts (+9.4% YoY vs -7.3% YoY) in terms of retail sales volume, the largest outperformance since 2013. In the first 11 months of 2021, luxury brands underperformed by 1.3ppts (+7.8% YoY vs +9.1% YoY). Excluding Tesla, luxury retail sales volume would only increase by 4% YoY in the first 11 months. In our view, such volatility was ultimately caused by COVID-19 and we expect it to wind down gradually in 2022. We project luxury retail sales volume to rise by 12% YoY to about 4mn units in 2022 (vs +4% YoY for the overall retail sales volume growth). That would imply a market share of 18% for luxury cars in 2022.

Figure 24: Luxury-vehicle vs overall (YoY Growth)



Source: CATARC, CMBIS estimates

Figure 25: Luxury-vehicle market share in China



Source: CATARC, CMBIS estimates

BMW: *X5* localization may help BMW retain the luxury crown

BMW is very likely to take the luxury-car sales crown from Mercedes-Benz in 2021, the first time in history, with its better model cycle and supply chain management. Despite rising competition from Mercedes-Benz in 2021, we expect BMW to retain the crown with the localization of the *X5*.

We expect wholesale volume at BMW-Brilliance to rise by about 9% to 739,000 units in 2022, aided by the locally-produced *X5* and the export of the *iX3*. We project BMW-Brilliance's NEV wholesale volume to rise to 96,000 units in 2022, the highest among the German 'Big Three'.

Mercedes-Benz: New C-Class and GLC

We project the wholesale volume of Beijing Benz to rise by 19% YoY to about 670,000 units in 2021 amid the low comparison base. The key to lifting Beijing Benz's sales could be the new-generation *C-Class* launched in Aug 2021. The new *GLC* and *EQE* are also scheduled to be unveiled in 2022. Despite its accelerated electrification plan with the rollouts of the locally-produced *EQA* and *EQB* in Nov 2021, we have not seen Mercedes-Benz's NEV competitiveness in China.

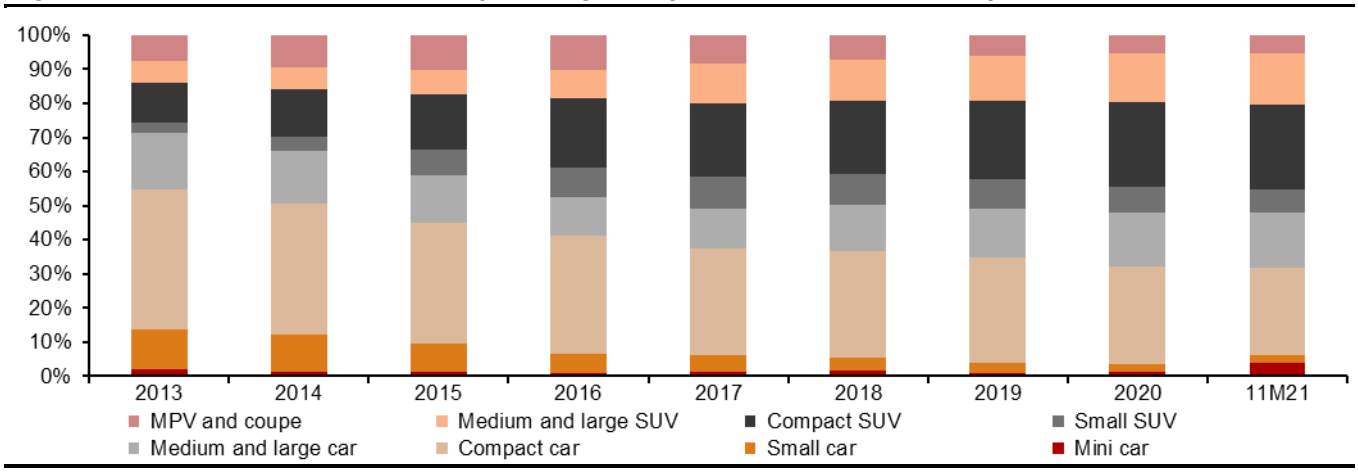
Lexus and Porsche: Supply-driven brands

Both 100%-imported luxury brands experienced severe supply constraints in China in 2021. Retail sales volume of Lexus fell about 3% YoY in the first 11 months of 2021, the worst since at least 2008. Porsche is likely to suffer low single-digit sales volume growth in both 2020 and 2021, which never occurred in history. Predicting sales volumes of Lexus and Porsche could be more difficult as imports result in a longer reaction time to market changes and both brands are more dependent on the supply side. Nevertheless, we project both brands to be line with or even outperform the overall luxury growth in China in 2022, assuming minimal supply constraints.

Subsegment shift: Functionality, larger space, more female drivers

Apart from brand preference, vehicle type preference has also changed substantially in the past four years in China. Chinese consumers have been shifting from low-end MPVs and cars to SUVs (SUV market share: 43% in 2017 vs 47% in the first 11 months of 2021), upgrading from small and compact vehicles to medium and large vehicles (medium and large car + SUV market share: 24% in 2017 vs 31% in the first 11 months of 2021). Meanwhile, mini BEV cars, led by the *Wuling Hongguang Mini*, are also gaining popularity.

Figure 26: China's PV market share by subsegment (retail sales volume basis)



Source: CATARC, CMBIS

Mini BEVs: Likely to continue rising in 2022

Market share of mini cars (retail sales volume basis) fell from the peak of 5% in 2010 to less than 1% in 2016 and now back to 4% in the first 11 months of 2021. All the mini cars sold in 2021 were BEVs and the *Wuling Hongguang Mini* accounted for 48% of the total mini cars. The revival of mini cars driven by mini BEVs is resulted from rising demand for a second car in the family for ultra-short commute, especially for female drivers, as well as automakers' needs for NEV credits. We expect sales volume for mini BEVs to continue rising in the next few years for two reasons:

1) Mini BEVs are still value for money before NEVs become more affordable, which is similar to the ICE mini cars prior to 2010.

2) Traditional automakers have been rolling out more mini BEVs for NEV credits.

Figure 27: Retail sales volume of top-selling mini BEVs in China

Model	2019	2020	11M21
Wuling Hongguang Mini BEV		115,544	344,142
Chery eQ1 BEV	31,085	35,630	66,894
ORA R1 BEV	23,745	44,671	59,832
Benben E-Star BEV	27	9,750	53,875
Roewe Clever BEV		10,511	43,501
Leap T03 BEV		6,569	33,365
SOL E10X BEV			24,318
ORA R2 BEV		6,578	16,712
Letin Mengo BEV			10,091
Baojun E100 BEV	24,116	24,504	9,871
Others	74,736	41,637	53,283
Total	**153,709**	**295,394**	**715,884**

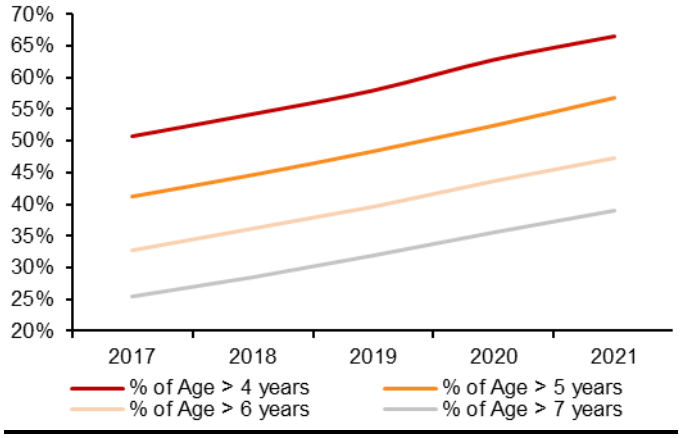
Source: CATARC, CMBIS

More legroom: SUVs and larger SUVs

After an SUV boom during 2010-17, SUV market share continued to rise gradually from 43% in 2017 to 47% in the first 11 months of 2021, on retail sales volume basis. Within the SUV segment, we still see Chinese consumers' desire for more space: market share of small SUVs fell from 10% in 2017 to 7% in the first 11 months of 2011, whereas compact-SUV market share rose from 21% to 25% during the same period, and market share of medium and large SUVs rose from 12% to 15%.

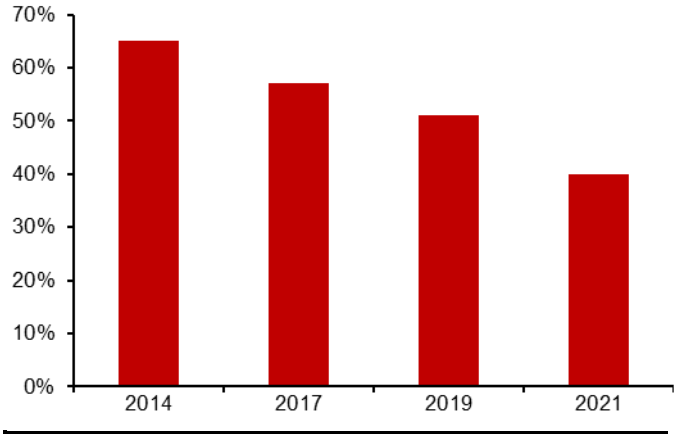
We are of the view that rising replacement demand will drive SUV's market share even higher, especially for medium- and large-sized SUVs. Based on our estimates, about 57% of PVs on the road in China were older than five years as of the end of 2021, 16ppts higher than 41% at the end of 2017. The first-time buyer ratio, based on our estimates, could drop to less than a quarter in 2025, from 40% in 2021 and slightly less than 60% in 2017. Therefore, we believe more Chinese consumers would desire for more spatial, functional and premium vehicles for family use.

Figure 28: China's number of vehicle in use by age



Source: NBS, CATARC, CMBIS estimates

Figure 29: China's first-time buyer ratio for PVs



Source: CPCA, CMBIS

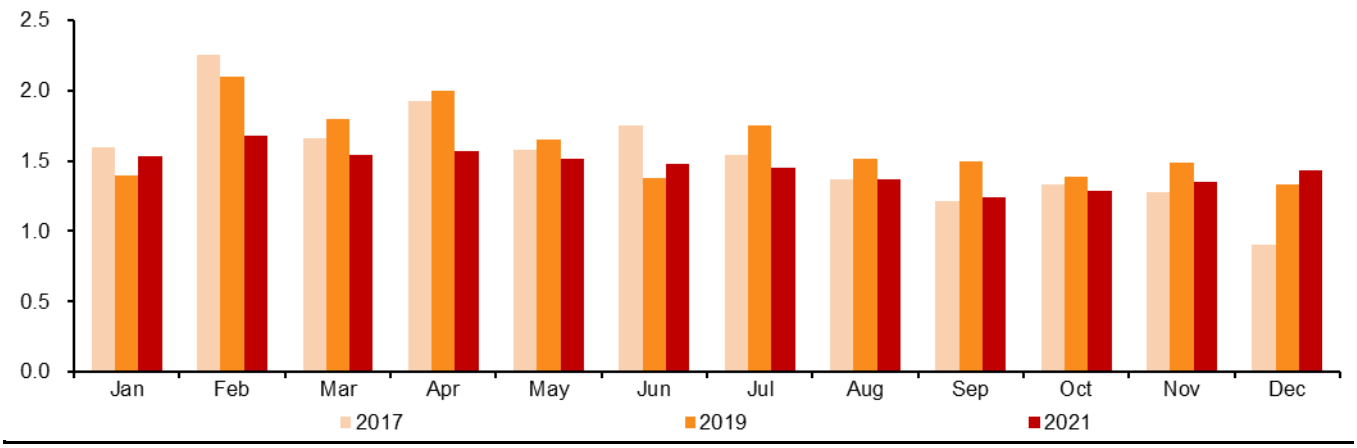
Potential industry risks in 2022: A replica of 2018?

At the beginning of 2021, we told investors that we think 2021 could be a replica of 2019 for China auto industry, in terms of sales volatility from external noises. It turned out that chip shortage and raw-material price hike became important factors for China's auto industry in 2021, similar to the roles that China V-VI emission-standard transition and speculation on stimulus measures played in 2019. Now, we ask the same question to ourselves: what could 2022 be like?

The start of 2022 could be similar to that of 2018, from the perspectives of discounts and inventories at dealers. Industrywide PV wholesale volume in 1H18 rose 5% YoY with an inventory restocking of about 0.9mn units during the same period. Wholesale volume started to plunge in 3Q18 and the decline widened to 15% YoY in 4Q18. Retail sales volume fell earlier than wholesale, starting from Mar 2018, and the decline widened to 21% YoY in 4Q18. The sales decline lasted until mid-2020.

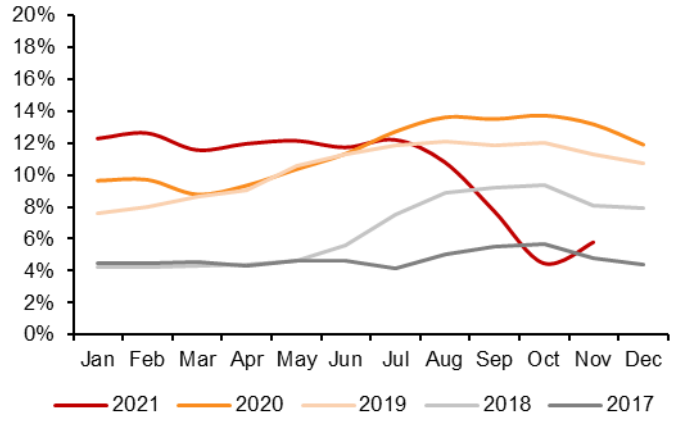
As the chip supply starts to recover gradually, we are concerned whether automakers would restock inventories at dealers at a right pace. Therefore, we would suggest that investors pay even more attention to retail sales volume/inventories and discounts in 2022.

Figure 30: China's inventory months for PVs at dealers in 2017, 2019 and 2021



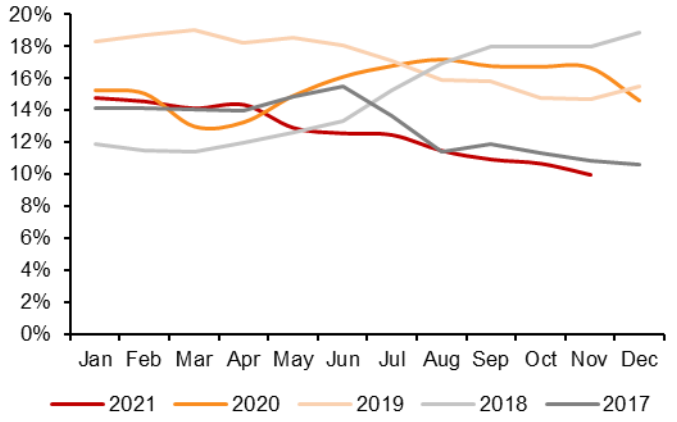
Source: CADA, CMBIS

Figure 31: Beijing Benz discounts at dealers



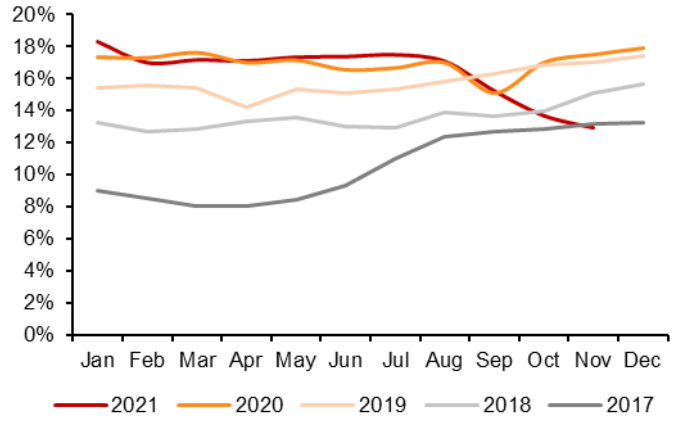
Source: ThinkerCar, CMBIS

Figure 32: BMW Brilliance discounts at dealers



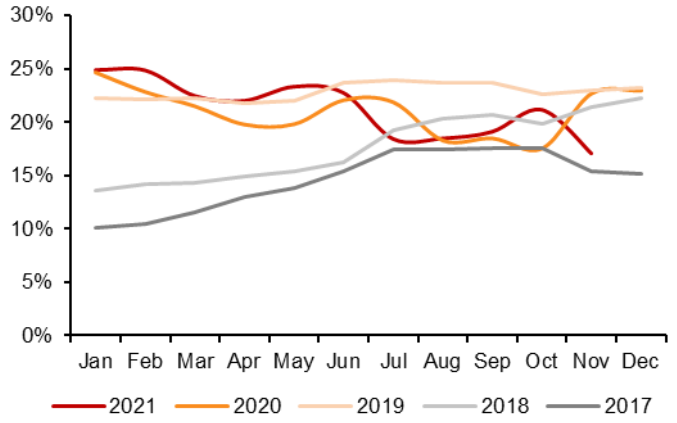
Source: ThinkerCar, CMBIS

Figure 33: SAIC VW discounts at dealers



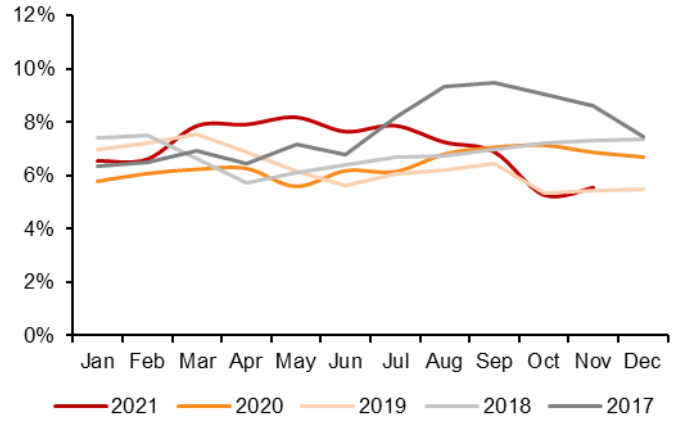
Source: ThinkerCar, CMBIS

Figure 34: Buick discounts at dealers



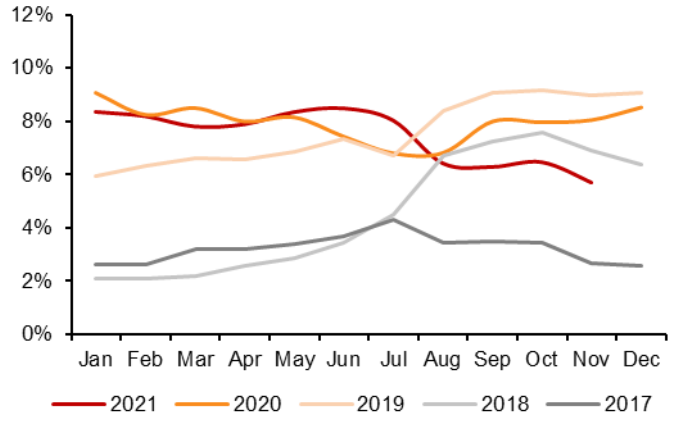
Source: ThinkerCar, CMBIS

Figure 35: GAC Toyota discounts at dealers



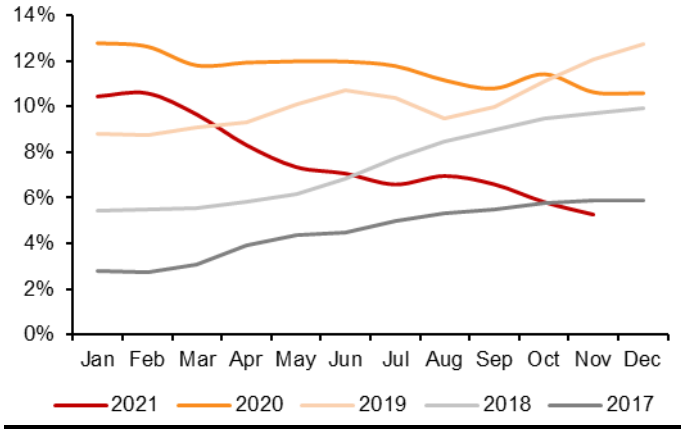
Source: ThinkerCar, CMBIS

Figure 36: Dongfeng Honda discounts at dealers



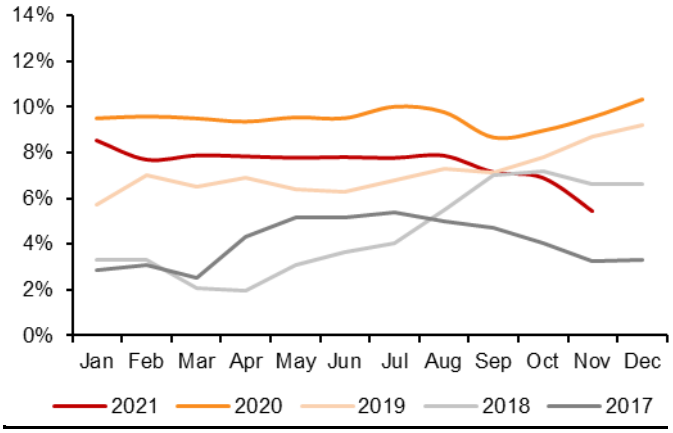
Source: ThinkerCar, CMBIS

Figure 37: Geely discounts at dealers



Source: ThinkerCar, CMBIS

Figure 38: Great Wall discounts at dealers



Source: ThinkerCar, CMBIS

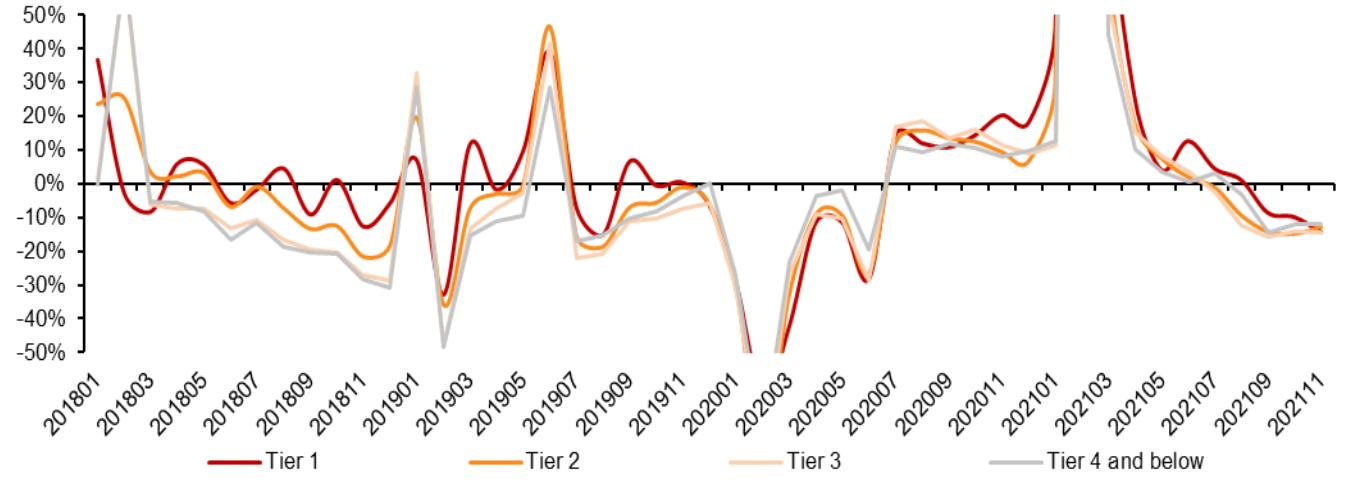
Sales collapse in 2H18: P2P, auto finance, shantytown redevelopment slowdown

When we take a closer look at the possible reasons for the sales plunge in 2H18, it is about macroeconomic condition changes.

1) It coincided with the peer-to-peer (P2P) financing collapse, which we believe could be a trigger for China's first auto sales decline (2018-20) in two decades.

2) The tightened auto finance for consumers in lower tier cities, followed by the P2P collapse, could be a more determining factor for the auto sales decline in 2018-19. Retail sales volume in tier-4 and lower cities fell 23% in 2H18 (vs -17% YoY nationwide) and dropped 5% in 1H19 (vs +2% YoY nationwide).

Figure 39: China retail sales volume YoY growth by city tier



Source: CATARC, CMBIS

3) The slowdown of China's shantytown redevelopment projects from 2019 also dented consumers' wealth effect in rural areas.

Economic factor still most important

Looking into 2022, we believe that China's economic condition is still the most important single factor to auto sales. We project a moderate (+4% YoY) growth for China's retail sales volume and 8% YoY growth for wholesale volume in 2022 aided by inventory restocking

and exports, although we cannot rule out negative surprise resulted from macroeconomic pressure, especially amid worsening wealth effect from China's crackdown on housing speculation.

On the other hand, we are of the view that auto wholesale volume in 2022 could be a bit more resilient than 2018 for the following reasons:

1) Exports play a more important role now than 2018.

2) More solid demand in tier-1 and -2 cities with more choices of NEVs which are not capped by new-vehicle license plates.

Our forecast for China's long-term auto demand

While short-term auto sales volatility is more difficult to predict, long-term demand forecast could probably provide a better picture for some investors. Many analyses only compare vehicle density in developed countries with that in China to conclude that there is still huge growth for China. However, such analyses can hardly quantify long-term demand, as vehicle density varies in different countries, depending on a variety of factors including population density, GDP per capita, infrastructure, public transportation and desire for car ownership.

Single-factor model: We assume No. of PVs on the road follows logistic function

For simplicity, we use a single-factor model to forecast China's steady-state number of PVs on the road, as we believe the number of vehicles on the road is probably the most stable variable in the auto industry. In addition, we believe that the pattern of the number of vehicles on the road is very similar to that of population growth which is commonly forecast by logistic function (named by Pierre Francois Verhulst, an 'S' shape or sigmoid curve with exponential growth at the initial stage followed by slower growth). The equation is as below:

$$m = \frac{K}{1 + e^{-r \times (t - t_0)}}$$

Where:

K = the curve's maximum value, the steady-state number of PVs, in our case;

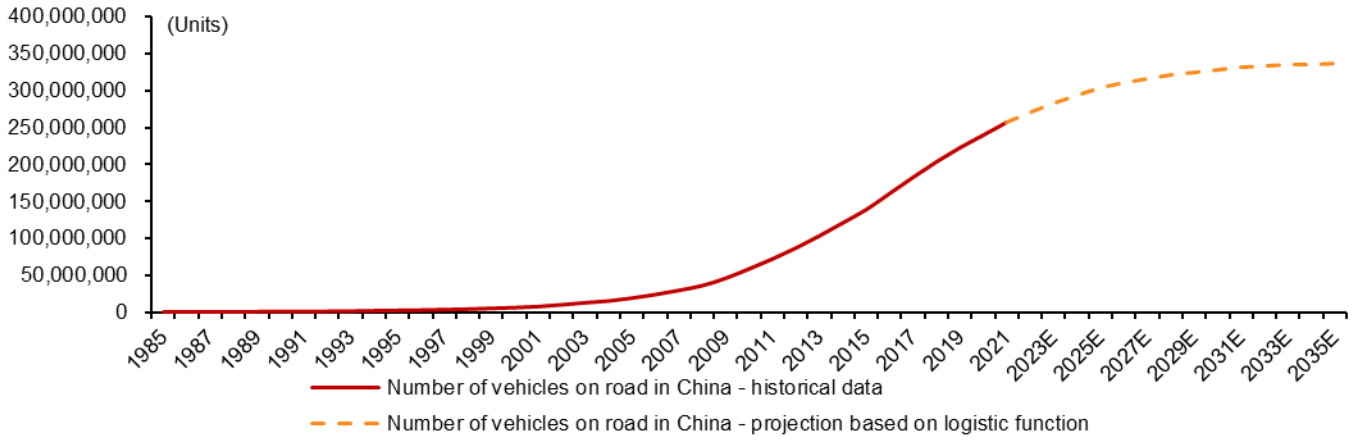
r = the steepness of the curve;

t_0 = the t-value of the sigmoid's mid-point;

e = the natural logarithm base

We have compiled the number of PVs on the road in China during 1985-2021 (2021 data is our estimates) and we plot these data points (as *m* in the equation) with corresponding years (as *t* in the equation) in the following chart. We use MATLAB to solve the equation based on these historical data points. Accordingly, we solve the parameters in the equation as *K* = 341mn, t_0 = 2,016.4 and *r* = 0.25, based on the best-fit curve.

Figure 40: Projection on number of vehicles on road in China based on logistic function



Source: CAAM, NBS, CMBIS estimates

Robustness of the model: It works fairly well for mature markets

We use the same model to test its robustness for the data in the developed countries including the US and Japan. The model works well for the historical data in Japan but slightly worse for the US data during the Great Depression and subprime mortgage crisis periods. Nevertheless, single-factor model has inevitable limitations by not capturing other important dynamics, such as GDP per capita, road length and condition, desire for car ownership etc.

China's steady-state replacement demand: 22.7-24.4mn based on our model

Based on our model, China's steady-state number of PVs on the road is about 341mn, or 243 PVs per 1,000 people assuming a total population size of 1.4bn. We can also derive China's vehicle lifespan (before the scrappage) is about 14-15 years, based on this model and cumulative retail sales volume in the past years. That means the annual depreciation/scrappage rate is about 6.7-7.1%.

We can then calculate the annual replacement demand at the steady state in China is to be around 22.7-24.4mn units (341mn x 6.7% or 341mn x 7.1%).

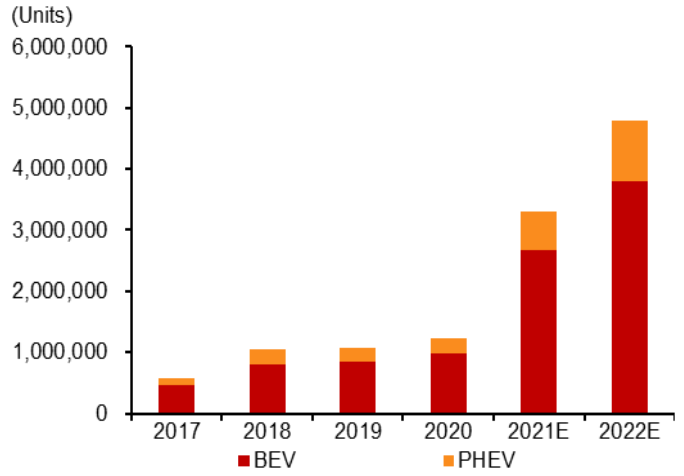
We project China's long-term PV sales volume CAGR to be 2-3%

If we assume our model is precise enough, an annual replacement demand of 22.7-24.4mn units could be a benchmark for China's long-term auto demand with discretionary car purchases under different economic conditions (positive when economy is good and negative when economy is bad). Therefore, we roughly project China's long-term PV sales volume CAGR to be around 2-3%. As the long-term growth is not exciting, along with increasing importance of software in the industry, divergence between different automakers will be greater and greater in the next few years, in our view.

China NEV 2022 Outlook: Inflection Point, PHEV's Revival

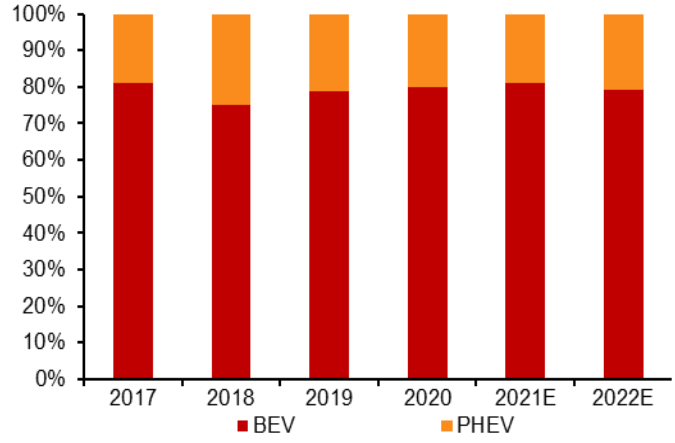
We project passenger NEV wholesale volume to rise about 45% YoY to 4.8mn units in 2022, which implies a 21% market share for NEVs, up from 15% in 2021. We expect PHEV sales volume to rise 61% YoY to 1mn units and widen its market share to 21% in 2022, aided by a plethora of attractive new models and the price parity to ICE vehicles amid purchase-tax waiver and subsidies. It appears to us that the inflection point for NEVs comes a bit earlier than we had expected. We are of the view that intelligent connectivity will become increasingly important in the next few years to lure Chinese consumers who drive ICE vehicles now.

Figure 41: NEV wholesales volume in China



Source: CAAM, CMBIS estimates

Figure 42: BEV and PHEV's market share in China

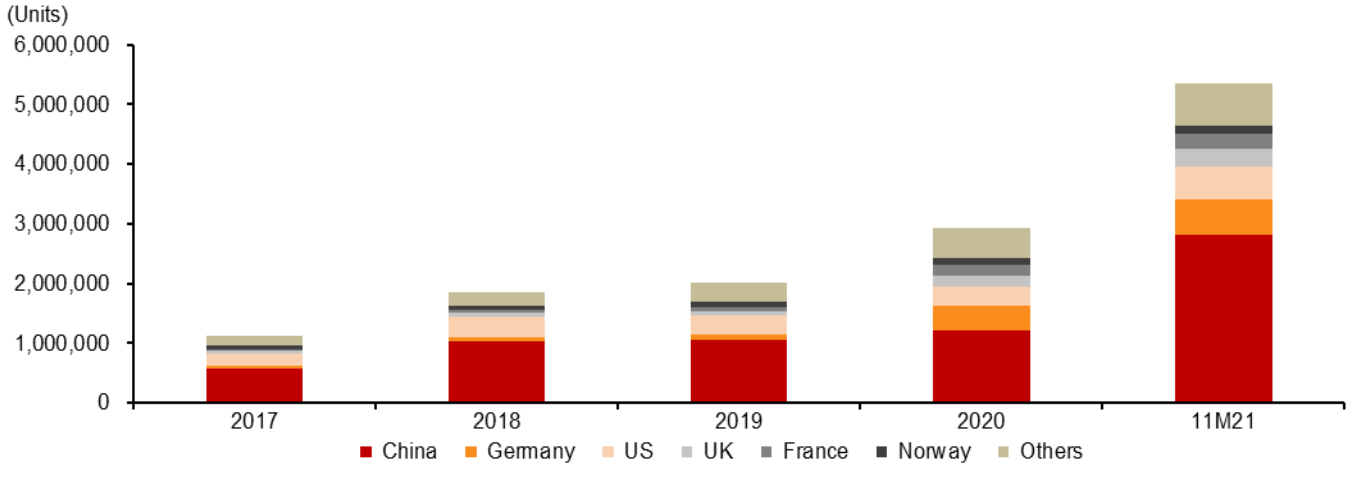


Source: CAAM, CMBIS estimates

Global NEV in a nutshell: The future is in China

In the first 11 months of 2021, global NEV (BEV, PHEV and fuel-cell electric vehicle (FCEV) only) sales volume rose by about 123% YoY to 5.4mn units, according to Marklines. China accounted for about 53% of the total NEVs sold globally, surpassing Europe's 34% market share. China's 180% YoY growth is also the highest among top 15 countries in terms of NEV sales volume.

Figure 43: NEV sales volume by country



Source: Marklines, CMBIS

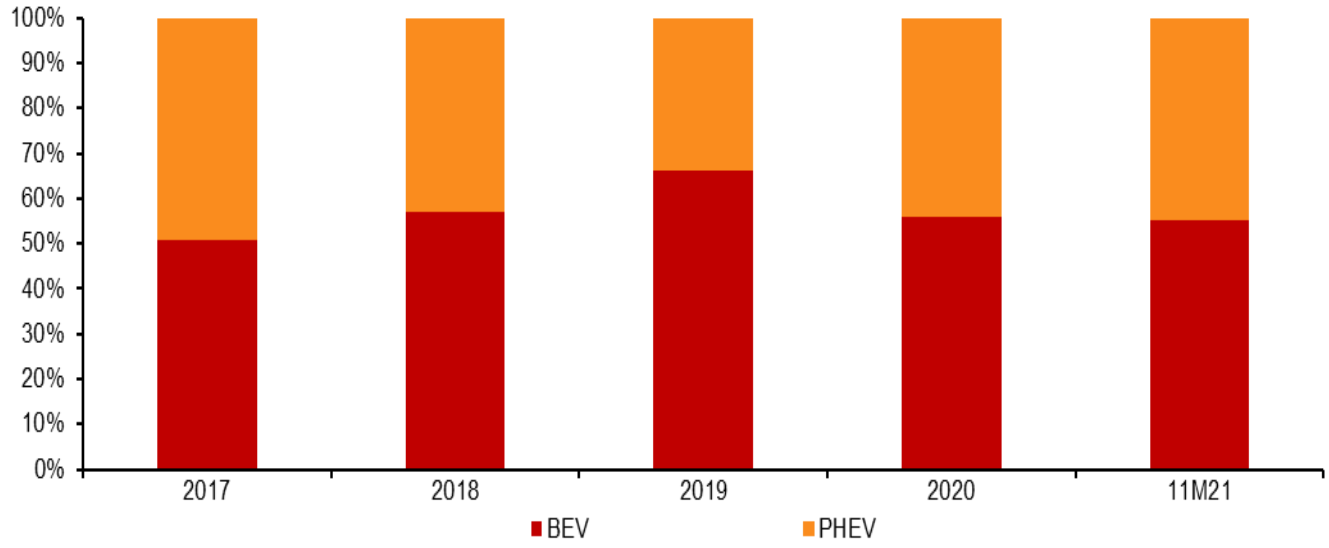
Europe: Good numbers on the surface do not tell the underlying story

Despite rapid NEV sales growth in the past two years, we are of the view that the NEV market in Europe is more policy-driven and technological lagging than China. NEV sales volume surged about 75% YoY in Europe to 1.8mn units for the first 11 months of 2021, lower than 135% YoY growth in 2020. Germany accounts for about 1/3 of the total NEVs sold in Europe.

1) Highest PHEV market share in the world: Temporary solution?

Unlike other markets, PHEVs account for almost half of the NEV sales in Europe (44% in 2020, 45% in the first 11 months of 2021). It appears to us that automakers in Europe were forced to launch PHEVs modified from ICE models in a bid to meet much more stringent fuel economy since 2020, as European automakers are in fact lagging in hybrid technology. In addition, the latest electrification roadmap announced by German automakers were all about BEVs, but not PHEVs.

Figure 44: Market share of BEV and PHEV in Europe



Source: Marklines, CMBIS

2) More generous subsidies

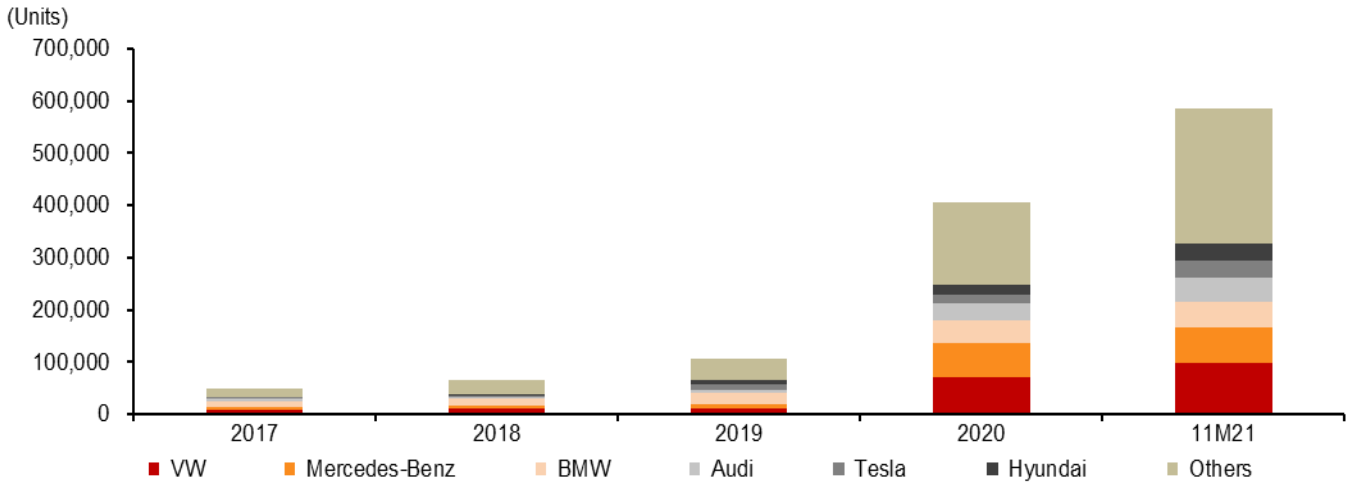
Unlike China, European countries lifted subsidies for NEVs since 2020 to push electrification. Subsidies in most European countries are about 1.5-2.5x of China now, making China the most competitive market for NEVs in the world.

3) German automakers' mindset to sell NEVs

The different industry landscape in Europe and China makes European EV models less popular in China. In Germany, VW led the BEV sales volume (almost 64,000 units) in the first 11 months of 2021 helped by the *ID.3* and *Up!* (two models combined accounted for 79% of its total BEV sales). In China, VW was in the 10th position of the BEV market, selling almost the same amount as it did in Germany during the first 11 months of 2021. VW's mindset to sell its ID. Series BEVs in China is to provide the same driving experience as ICE cars, whereas Chinese automakers' BEV approach is to provide new values which cannot be realized in ICE cars.

In our view, the current NEV development in Europe could be similar to China during 2017-18 before 2H19 when NEV sales plunged amid significant subsidy cuts. We cannot rule out such possibility for Europe before it enters a more sustainable growth era, in our view.

Figure 45: NEV sales volume by brand in Germany

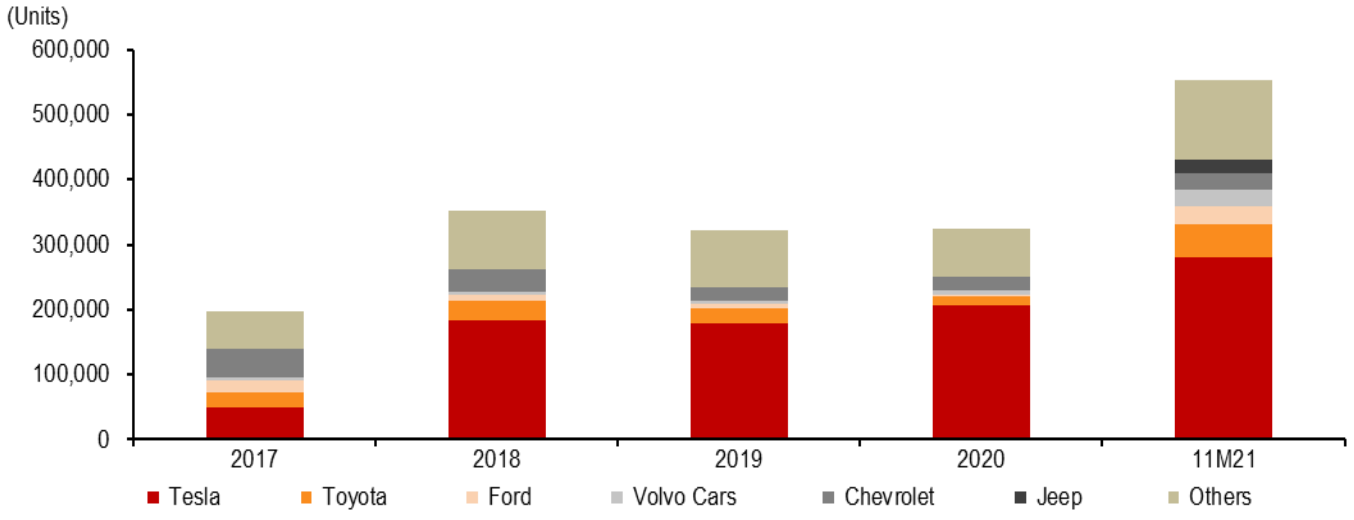


Source: Marklines, CMBIS

US: Dominated by Tesla

NEV sales in the US almost doubled during the first 11 months of 2021, the fastest growth rate since 2013. Despite that, the US share in the global NEV market narrowed to 10%, the lowest in history. Tesla's market share narrowed from 63% in 2020 to 51% in the first 11 months of 2021, as BEVs at Ford (F US, NR), Volvo Cars (VOLCARB SS, NR) and Volkswagen (VOW GR, NR) as well as PHEVs took away some of Tesla's market share. We expect high NEV sales growth to continue under the Biden Administration. In addition, the country has also laid out a blueprint for 2021-30 to the secure the entire NEV supply chain with a principle of 'America First'.

Figure 46: NEV sales volume by brand in the US



Source: Marklines, CMBIS

Battery supply constraints still exist in 2022

Lithium and other battery raw-material processors have been accelerating their plans to expand capacity to meet rapidly growing demand for batteries. Based on the data we have compiled, most of the new capacity for lithium starts in 2H22, which could lift NEV battery prices and cap NEV sales in 1H22. One of the reasons for our 45% YoY growth for NEV sales volume in China in 2022 is based on the supply outlook.

Demand for lithium batteries in 2022

We estimate NEV battery demand of 300GWh in 2021 (6mn units with 50kWh per vehicle) and we assume NEV batteries to account for about 57% of the total lithium batteries sold (54% in 2020), the total lithium battery demand would then be around 530GWh. If we assume global NEV sales volume to increase by 50% YoY to about 9mn units in 2022 and demand for non-NEV lithium batteries (mainly for energy storage and consumer electronics) to rise 40% YoY in 2022, there would be 780GWh lithium batteries needed in 2022, or additional 250GWh lithium batteries needed.

Supply for lithium carbonate equivalent (LCE) in 2022

Lithium, as one of the most important raw materials for lithium batteries, is processed from hard rock or salt lakes. Based on the data we have compiled, 2022 could be a tricky year for lithium supply, as the higher-than-expected lithium demand since 2H20 has accelerated processors' plans to expand capacity or reopen projects. However, lithium supply for 1H22 could still be tightened given new capacity starts to be available from 2H22-2023 such as Cauchari-Olaroz in Argentina, Atacama in Chile, Lijiagou in China and Mt Finniss in Australia. We estimate the additional LCE production to be around 120,000-150,000 metric tons in 2022, which is equivalent to 200-300GWh lithium batteries, barely matching our estimated demand.

Supply for other raw materials of lithium battery in 2022

Lithium supply is not the end of the story for battery's supply side. Raw materials for anode, electrolyte, separator and copper foil could also be potential constraints for battery supply. The supply chain becomes more vulnerable post pandemic, which makes the NEV battery supply riskier than before.

From policy-driven to market-driven

At the beginning of 2021, we also told investors that we believe that China's EV market has passed the trough of disillusionment on the Gartner hype cycle. We think a few data points in 2021 could verify that.

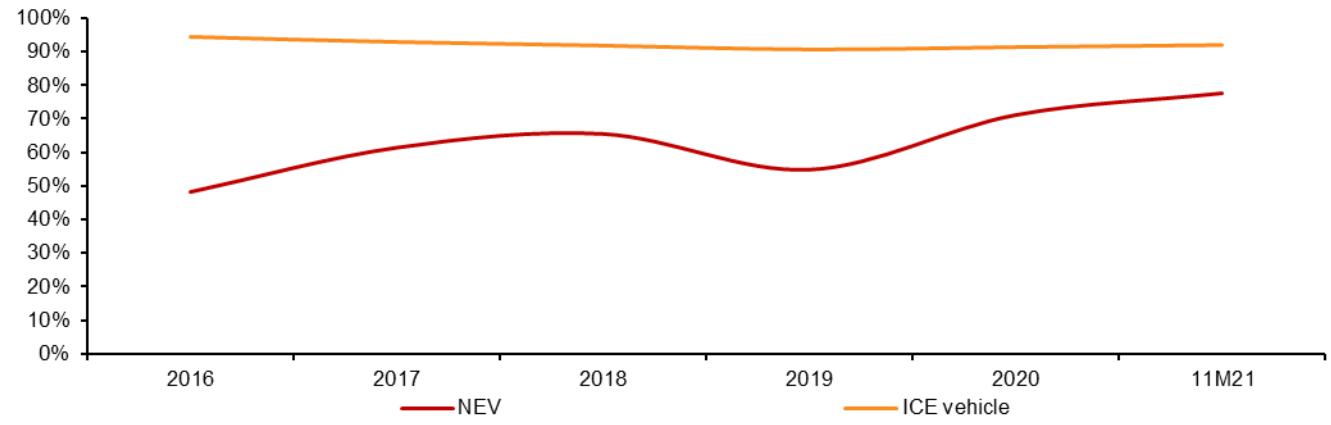
1) Much more NEV model choices within a year

There were about 286 BEV models and 83 PHEV (including extended range electric vehicle (EREV)) models on sale with retail sales volume greater than 1,000 units during the first 11 months of 2021, more than tripled the numbers in 2020. We estimate there will be another 78 new NEV model rollouts in 2022.

2) More NEVs sold to individual consumers

The proportion of NEVs sold to individual customers has increased from 55% in 2019 to 78% in the first 11 months of 2021, based on insurance data. Although the numbers may not precisely reflect the ride-hailing fleets as some drivers may purchase for individual use first to get higher subsidies and change to ride-hailing vehicles later, the difference between these two numbers is already self-explanatory.

Figure 47: The proportion of NEVs sold to individual customers vs that of ICE vehicles in China



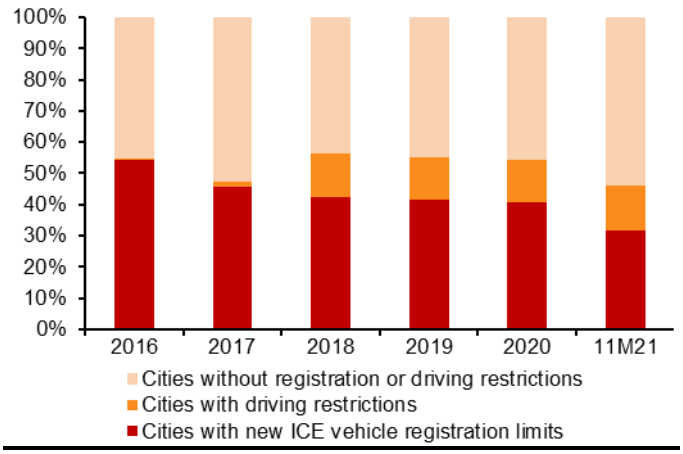
Source: CATARC, CMBIS

3) More sales from cities without restrictions for ICE vehicles

There are six cities (Beijing, Shanghai, Guangzhou, Shenzhen, Tianjin, Hangzhou) and one province (Hainan) in China with new ICE vehicle registration limits. Only about 32% of NEVs were sold in these regions during the first 11 months of 2021, down from 42% in 2019.

There are also another 24 cities in China that ICE vehicles cannot be driven on certain days or during certain period of the day or within certain area of the city, based on the information we have compiled. About 54% of NEVs were sold in the cities with no license or driving restrictions during the first 11 months of 2021, up from 45% in 2019.

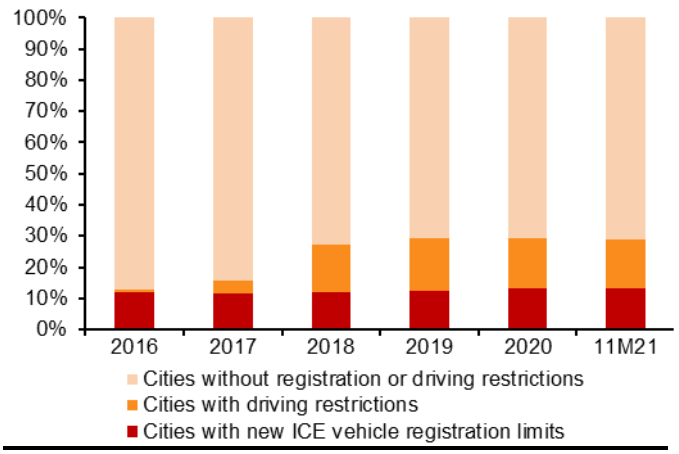
Figure 48: NEV market share by city type



Source: CATARC, CMBIS

Note: The 24 cities with driving restrictions mainly include Guiyang, Shijiazhuang, Wuhan, Zhengzhou, Xi'an, Chongqing and etc.

Figure 49: ICE market share by city type



Source: CATARC, CMBIS

NEV size preference: Small or large, that is not a question

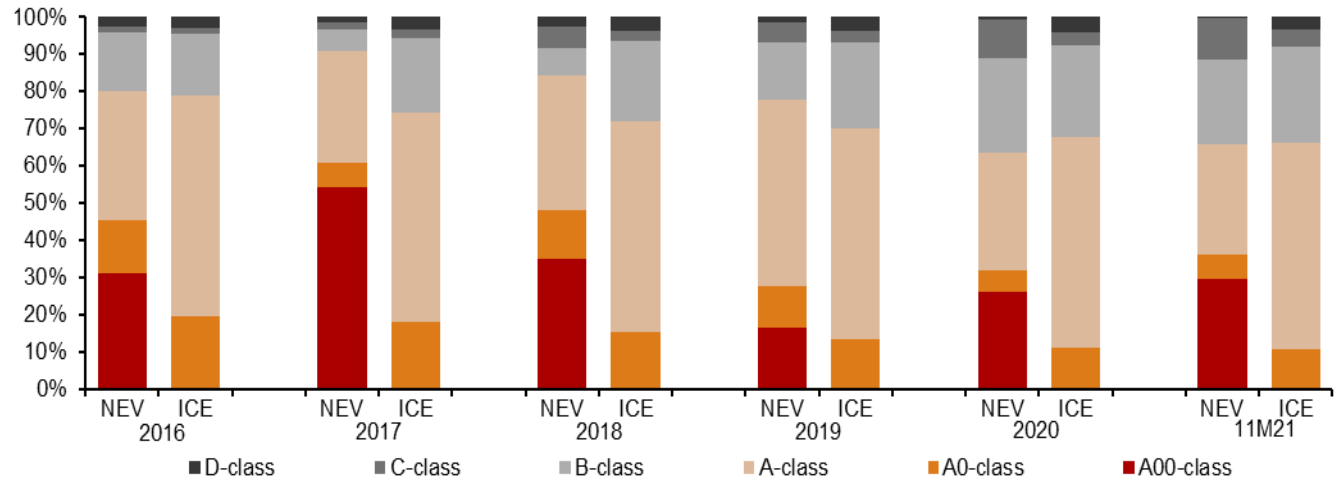
As noted in the previous paragraphs, the popularity of mini BEVs in China lifted the mini car market share, which reflects the different consumer preference in the NEV and ICE segments. For simplicity, we only compare the vehicle size by grouping them into A00-class (mini car), A0-class (small car, SUV and MPV), A-class (compact car, SUV and MPV), B-class (medium-size car, SUV and MPV), C-class (medium-to-large size car, SUV and MPV) and D-class (large-size car, SUV and MPV).

In the first 11 months of 2021, A00-class NEVs accounted for 29% of the total NEV retail sales volume, the second largest group right after A-class (30%), whereas there was no single A00-class ICE vehicle sold during the same period. A-class vehicles dominate the ICE market with a 56% market share in the first 11 months of 2021.

B- and C-class NEV vehicles combined took up about 34% of the total NEV retail sales volume in China during the first 11 months of 2021, higher than 30% of the market share for the same-sized ICE vehicles. Tesla, NIO, Xpeng, Li Auto and BYD's *Han* are the main contributors to B- and C-class NEVs. Most of these vehicles showcased superior battery technologies, intelligent connectivity or services. While NEV prices may decline over the time, demand for B- and C-class NEVs could remain solid in China, which is consistent with the Chinese consumers' rising demand for larger space and more functionalities.

In our view, solid demand for both mini and large NEVs is not controversial, as more NEV purchases are from replacement or for a second vehicle in the family than ICE cars. Mini BEV is a value-for-money option for ultra-short commute in additional to a family vehicle. Larger NEVs, along with intelligent connectivity and superior services, also satisfy tech-savvy individuals' or families' needs in China for space and functionalities at the same time.

Figure 50: Chinese consumers have different vehicle-size preference for ICE and NEV



Source: CATARC, CMBIS

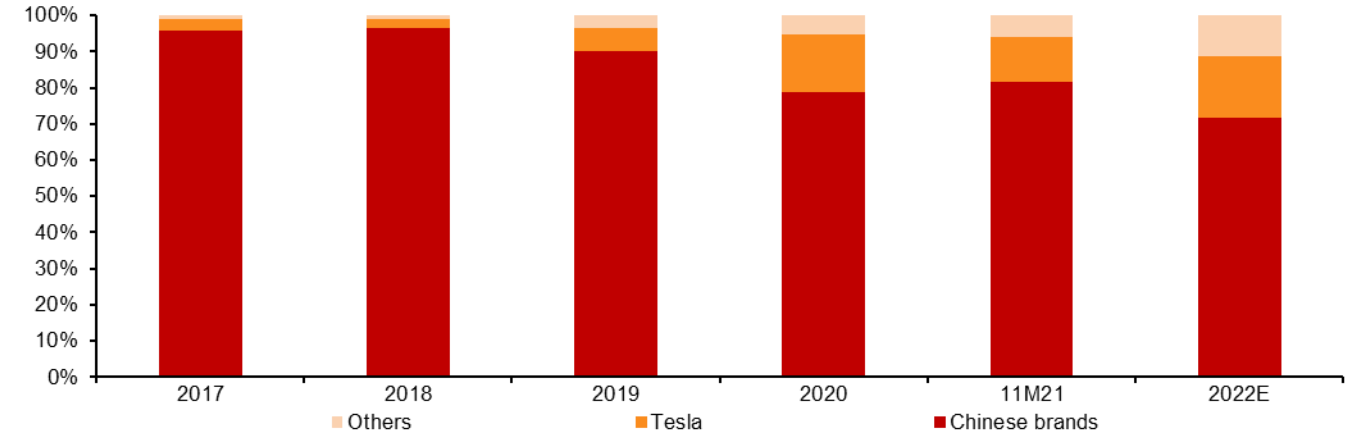
Chinese brands' reign in NEV continues in 2022

Unlike the ICE market where Chinese brands only account for about 1/3 of the total retail sales volume, Chinese automakers dominate in both BEV and PHEV segments. We expect such dominance to continue in 2022, given Chinese automakers' better understanding of Chinese consumers' preference, improving brand image from leading technologies in intelligent connectivity and more aggressive NEV model pipeline.

BEV segment: Chinese players + Tesla

In the first 11 months of 2021, Chinese brands accounted for 81% of the total BEV retail sales volume, up from 79% in 2020. Chinese brands used to take up more than 90% of the BEV market before Tesla's local production in Shanghai, but such market share, driven by low-end models and ride-hailing fleets, was more vulnerable.

Figure 51: Market share of Chinese brands, Tesla and others in the BEV segment in China



Source: CATARC, CMBIS

Although we may see Chinese-brand market share to drop gradually in the long term, we believe that Tesla is still the only player who may challenge Chinese dominance in 2022 from the model pipeline that we have compiled. We project foreign-brand BEV wholesale volume to rise 58% YoY to 1.08mn units in 2022, taking up 29% of China's total BEV market, aided by Tesla and exports such as the *BMW iX3*. We forecast Tesla to account for 62% of the total foreign-branded BEV wholesale volume in 2022.

Figure 52: Foreign-branded BEV model pipeline in China in 2022

OEM	Brand	Brand Origin	Model	Segment	Est. Launch Time
Brilliance-BMW	BMW	Germany	3 Series BEV	Car	2022
Beijing-Benz	Mercedes-Benz	Germany	EQA	Car	2021-11
Beijing-Benz	Mercedes-Benz	Germany	EQB	Car	2021-11
Beijing-Benz	Mercedes-Benz	Germany	EQE	Car	2022
Smart Auto	Smart	Germany	Smart EV	Car	2022
FAW-VW	Audi	Germany	Q4 e-tron	SUV	2022
SAIC-VW	Audi	Germany	Q5 e-tron	SUV	2022
SAIC-VW	Skoda	Czech	ENYAQ	SUV	2022
Volvo Asia-Pacific	Volvo	Sweden	Volvo XC90	SUV	2022
Volvo Asia-Pacific	Polestar	Sweden	Polestar 3	SUV	2022
GAC-Toyota	Toyota	Japan	bZ4X	SUV	2022
FAW-Toyota	Toyota	Japan	bZ4X equivalent	SUV	2022
GAC-Mitsubishi	Mitsubishi	Japan	Airtrek	SUV	1Q22
GAC-Honda	Honda	Japan	A+ SUV	SUV	2022
Dongfeng-Honda	Honda	Japan	New SUV	SUV	2022
Dongfeng-Nissan	Nissan	Japan	Ariya	SUV	2022
Dongfeng-Infiniti	Infiniti	Japan	Qs Inspiration (Concept)	Car	2022
SAIC-GM	Buick	US	LYRIQ equivalent	SUV	2022
SAIC-GM	Buick	US	New SUV	SUV	2022
SAIC-GM	Cadillac	US	LYRIQ	SUV	1H22
SAIC-GM	Cadillac	US	Celestiq	Car	2H22
SAIC-GM	Chevrolet	US	Orlando BEV	Car	2022
SAIC-GM	Chevrolet	US	LYRIQ equivalent	SUV	2022
Yueda-Kia	Kia	Korea	Kia EV6	Car	2022

Source: Company data, CMBIS estimates

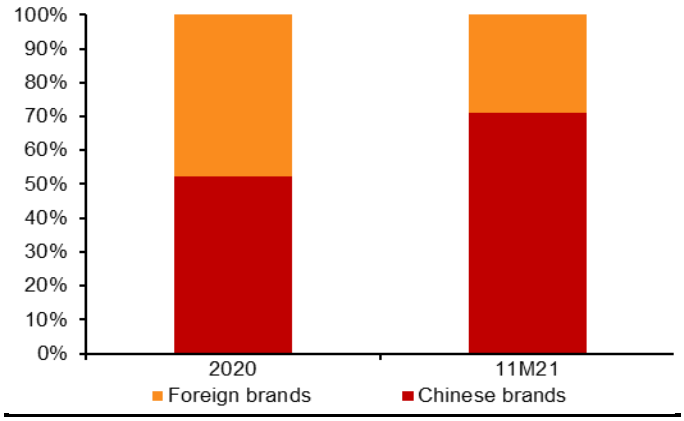
PHEV segment: Chinese automakers refocus on PHEV amid improving hybrid technologies and the success of BYD and Li Auto

PHEVs (including EREVs) accounted for 19% of China's total NEV retail sales volume in the first 11 months of 2021, flat from 2020 and down from 26% in 2018. More interestingly, Chinese brands took up 71% of the total PHEV retail sales volume in the first 11 months of 2021, up from 52% in 2020, which exceeded our expectation. The *Li ONE EREV* and BYD's

DM-i models were main contributors for the Chinese market share increase. That underscores two changing factors in our view:

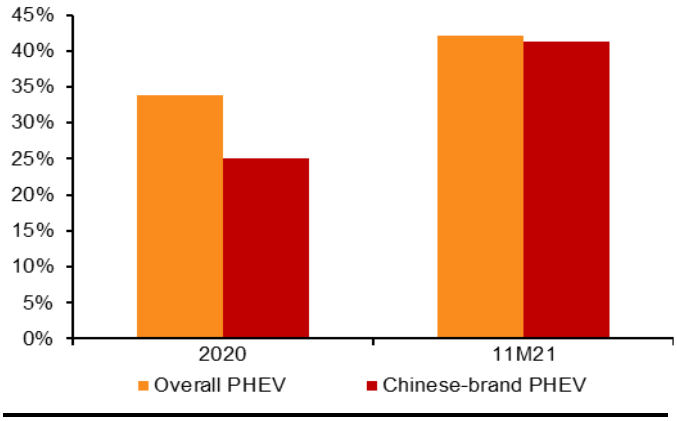
1) The PHEV sales growth has been shifting from policy-driven to market-driven. Only 34% of PHEVs were sold in the cities with no license or driving restrictions in 2020 and only 25% of Chinese-brand PHEVs were sold in these regions during the same period. These two ratios rose significantly to 42% and 41%, respectively, in the first 11 months of 2021. More Chinese drivers start to choose PHEV because of its better fuel efficiency and purchase price parity to ICE models, rather than its convenience to get a license plate in some cities.

Figure 53: PHEV's market share by brand origin in China



Source: CATARC, CMBIS

Figure 54: % of PHEVs sold in the cities with no license or driving restrictions in China



Source: CATARC, CMBIS

2) Chinese automakers' hybrid technologies have been improving significantly to lure consumers, details of which will be discussed in the next topic. More importantly, it appears to us that more Chinese automakers are unveiling competitive PHEV models in 2H21-2022, following the success of the *Li ONE EREV* and BYD's DM-i models.

We have listed major PHEV model pipeline for 2022 in the following table. The number of new PHEVs should double that in 2021 and be the highest in history. Almost all the new models are from Chinese automakers. Both Great Wall and Geely set aggressive sales target for their PHEVs in 2022. We project PHEV wholesale volume to rise by about 61% YoY to 1 mn units in 2022, with Chinese brands taking up 87% of the PHEV market share (from 71% in 2021).

Figure 55: Major PHEV model pipeline for 2022 in China

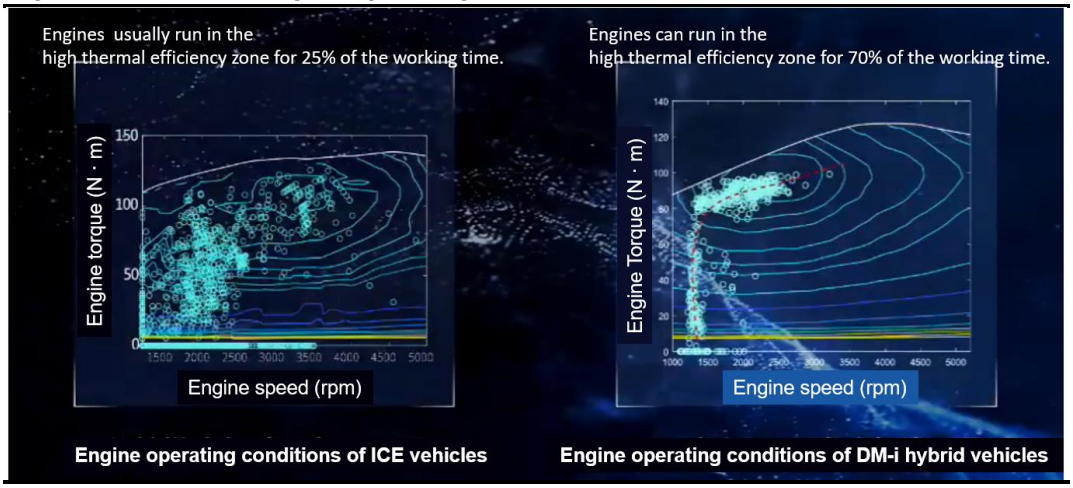
OEM	Brand	Brand Origin	Model	Segment	Est. Launch Time
Li Auto	Lixiang	China	X01 EREV	SUV	2022
Geely	Geely	China	Boyue PHEV	SUV	2022
Geely	Geely	China	Xingyue L PHEV	SUV	2022
Geely	Geely	China	Xingrui PHEV	Car	2022
Geely	Lynk & Co	China	Lynk & Co 09 PHEV	SUV	2021-10
Great Wall	Wey	China	Mocha PHEV	SUV	2022
Great Wall	Wey	China	Latte PHEV	SUV	2022
Great Wall	Wey	China	Macchiato PHEV	SUV	2021-11
BYD	BYD	China	BYD Song Pro DM-i	SUV	2021-12
BYD	BYD	China	BYD Han DM-i	Car	1Q22
BYD	BYD	China	BYD Song Max DM-i	MPV	2H22
BYD	BYD	China	BYD Destroyer 05 DM	Car	1H22
BYD	BYD	China	BYD Cruiser 05 DM	SUV	2H22
BYD	BYD	China	BYD Cruiser 07 DM	SUV	2H22
BYD	BYD	China	BYD Landing Ship 07 DM	MPV	2H22
Changan	Changan	China	Changan UNI-K PHEV	SUV	2021-12
Hozon	Neta	China	Neta S EREV	Car	2H22
Dongfeng	Forthing	China	Forthing M7 EREV	MPV	2022
Chery	Exeed	China	TX PHEV	SUV	2022
Chery	Cowin	China	GX11 PHEV	Car	2022
Chery	Cowin	China	FX13 PHEV	MPV	2022
Chery	Chery	China	Tiggo 8 Plus PHEV	SUV	2022
GAC Motor	Trumpchi	China	Empow PHEV	Car	2021-12
GAC-Honda	Honda	Japan	Breeze PHEV	SUV	2021-10

Source: Company data, CMBIS estimates

Hybrid technology comparison: Who's the best?

In our view, PHEV is regaining popularity among Chinese consumers because of Chinese automakers' improving hybrid technologies for lower cost, better fuel efficiency and greater driving experience. Unlike the previous PHEVs in China that were developed mainly for government subsidies, Chinese automakers now have much better understanding of hybrid architecture and have developed dedicated engines for better thermal efficiency in their own hybrid systems and sometimes dedicated gearboxes for better fuel efficiency and greater driving experience.

Figure 56: Different engine operating conditions for ICE vehicle and BYD DM-i



Source: BYD, CMBIS

In our view, the design of a fuel-efficient hybrid system needs to satisfy the following criteria:

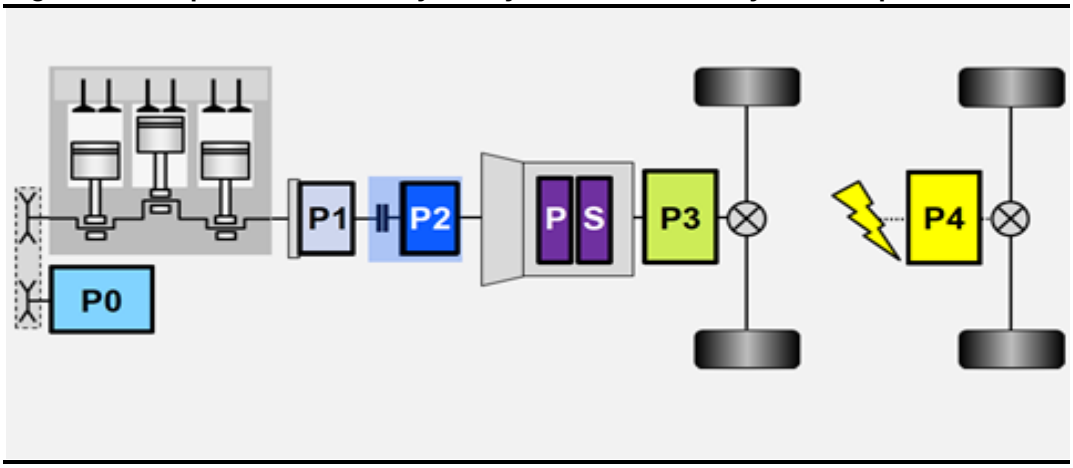
(1) Make engine and electric-motor work in the high-efficiency area as frequently as possible.

(2) Make mechanical structure as simple as possible to reduce energy loss in transmission.

(3) Improve energy recuperation efficiency.

We will discuss these factors in detail when we compare different architectures of hybrid systems below. Before that, we briefly explain the different positions that e-motors are placed along the driveline.

Figure 57: Simplified sketch of hybrid systems classified by e-motor position



Source: Automotive Manufacturing Solutions

P0: The e-motor is attached to the engine with a belt drive. Such architecture is mostly used in the 48-volt mild hybrid (MHEV) system, as it requires minimal changes from the original ICE drivetrain structure.

P1: The e-motor is attached to the engine without a belt drive, which increases energy efficiency compared with P0. Honda Motor (7267 JP, NR) used the P1 architecture in its 1st generation hybrid system IMA (Integrated Motor Assist).

P2: The e-motor is side attached to the transmission, connected through a belt, or integrated in the transmission. The difference between P1 and P2 is that there is a clutch between P2 and the engine (shown in the sketch above).

P3: The e-motor is positioned on the output shaft of the transmission, whereas the P2 e-motor is on the input shaft of the transmission.

P4: The e-motor is mounted on the rear axle drive if the engine is connected to the front wheels or the other way round. The P4 structure enables four-wheel drive compared with P3.

If you analogize the energy flow in the system as an electric circuit, it could probably help you understand the P0-4 better.

We have listed the different hybrid systems adopted by major automakers in China below, along with our ratings on their cost efficiency, fuel economy and ride comfort. We take a deep dive to explain the rationale, through which we hope to provide some clues for the sales volume outlook and margin range of different PHEV models.

Figure 58: Comparison of hybrid systems adopted by major automakers in China

OEM	PHEV Platform	Hybrid Architecture	Typical Model	Gearbox	Thermal Efficiency of Dedicated Engine	Our Ratings		
						Cost Efficiency	Fuel Economy	Ride Comfort
VW	GTE	P2	Magotan GTE	6 DCT	No dedicated engine	5.0	3.0	3.0
FAW	/	P2	Hongqi H7 PHEV	7 DCT	No dedicated engine	5.0	3.0	3.0
Changan	iDD	P2	UNI-K PHEV	6 DCT	40%	5.0	3.5	3.0
SAIC	EDU 2.0	P2.5	MG 6 PHEV	6 + 4 integrated AMT	No dedicated engine	5.0	4.0	3.5
Toyota	THS III	Power Split	Levin PHEV	Single PS planetary gearset	40%	4.5	4.5	5.0
GM	Voltec	Power Split	Velite 6 PHEV	Dual PS planetary gearset	No dedicated engine	4.0	4.5	5.0
Honda	i-MMD	P1 + P3	Breeze PHEV	Reducer	40.60%	4.5	5.0	5.0
BYD	DM-i	P1 + P3	Qin Plus DM-i	Reducer	43.04%	4.5	5.0	5.0
GAC	GMC 2.0 / THS IV	P1 + P3 + DHT/ PS	Model in 2022 / GS8	Multi-shift AT / Single PS planetary gearset	42.1% / 41%	3.5 / 4.5	5.0 / 5.0	4.5 / 5.0
Geely	Hi•X (GHS 2.0)	P1 + P3 + DHT	Xingyue L PHEV	3 AT	43.32%	3.5	5.0	4.5
Great Wall	Lemon DHT	P1 + P3 + DHT	Macchiato PHEV	2 AMT	Est. ~40%	4.0	4.5	4.0
Li Auto	EREV	P1 + P3[note]	Li ONE EREV	Reducer	33%	4.5	4.0	4.5
BAIC	Mofang DHT	P1 + P3	Not SOP yet	Not released yet	Not released yet	/	/	/
Dongfeng	Mach MHD	P1 + P3	To be launched in 2022	Not released yet	41.07%	/	/	/
Wuling	Lingqing DHT	P1 + P4	Not SOP yet	Reducer	40.10%	4.0	3.5	4.0
Chery	Kunpeng DHT	P2 + P2.5	Tiggo 8 Plus Kunpeng e+	3 DCT	41%	3.5	4.0	3.5

Source: Company data, CMBIS estimates

Note: The Li ONE EREV has three e-motors for four-wheel drive, which provides better driving experience with additional costs (one more e-motor as P4). Unlike other P1 + P3 listed in the table, the Li ONE cannot be driven directly by engine (EREV in nature is series circuit).

1) Why is P1 + P3 the most commonly used by automakers?

The P1 + P3 architecture is probably the most reasonable hybrid system when combining fuel economy, cost efficiency, power torque and ride comfort.

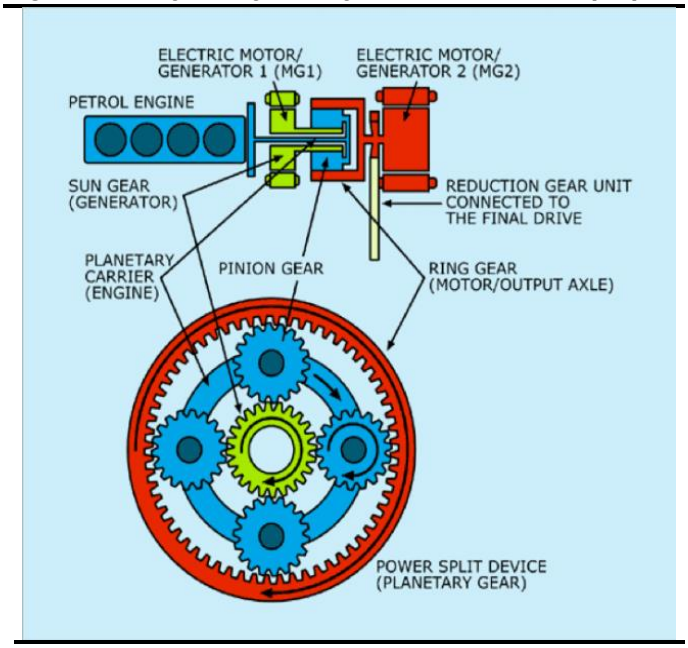
Compared with the **single-motor system**, P1 + P3 could make engines work under the most efficient condition in different driving scenarios. When the vehicle is driven only by e-motor, single-motor system should work as efficiently as P1 + P3. However, the battery cannot be recharged under such condition in the single-motor system, as the engine is disconnected. When the system runs out of battery, the engine has to be used to drive the vehicle and recharge the battery in the single-motor system and therefore, the engine may not work under the most efficient condition when the vehicle's speed is low. In the P1 + P3 architecture, when the vehicle is only driven by the P3 e-motor, the engine is still connected with the P1 e-motor for recharging and works under the most efficient condition.

The **Power Split** (two e-motors with a planetary gearset), or PS system, works almost as efficiently as P1 + P3 with similar costs when batteries are small (HEV vehicles). P1 + P3 could be more efficient than the PS system for PHEVs because larger batteries enable electric driving mode during most of the time. For example, the engine provides propulsion to the wheels only when the vehicle's speed is greater than about 65km/h for Honda's i-MMD system. The PS system is always connected with the planetary gearset, which lowers fuel efficiency a bit. Moreover, Toyota (7203 JP, NR)'s patents for the PS system just expired in 2017 in the US and Europe and are still valid in China until 2023. To bypass Toyota's patents, GM's (GM US, NR) Voltec hybrid system added another planetary gearset with additional costs.

The **P1 + P4** architecture is very similar to P1 + P3, except that one e-motor (P4) is mounted on the rear axle drive for four-wheel drive capabilities. However, such architecture is less integrated than P1 + P3 and has longer wiring harness, resulting in higher costs and lower fuel efficiency, respectively.

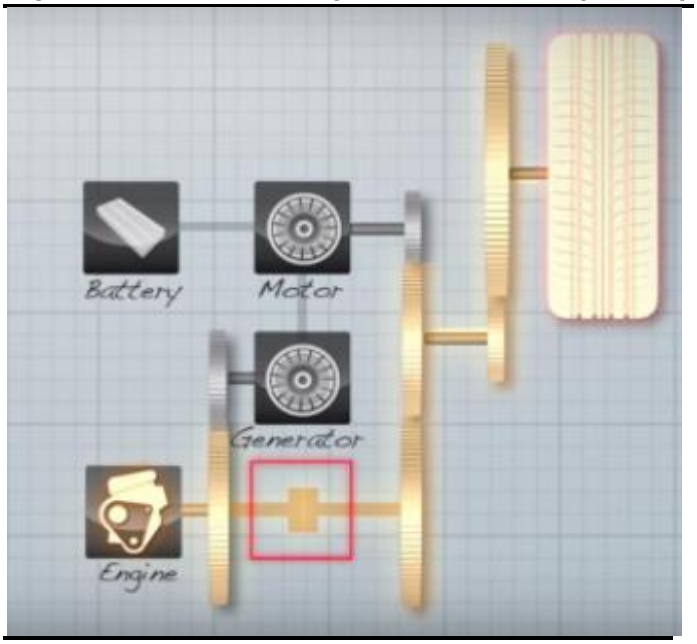
The **P2 + P2.5** architecture adopted by Chery's Kunpeng hybrid system is a bit more complex compared with P1 + P3, in our view, which could lead to some unexpected failure. In addition, the NVH could be worse for P2 + P2.5 during electromechanical coupling, as no e-motor is on the engine side.

Figure 59: Toyota Hybrid System architecture (PS)



Source: Toyota

Figure 60: Honda i-MMD system architecture (P1 + P3)



Source: Honda

2) Why do BYD and Honda have higher overall scores than Great Wall and Geely, given all of them use P1 + P3?

The major difference lies in the gearbox side, which is related to patents. Paice Corporation, a leading hybrid technology company, filed a lot of patents related to hybrid technologies, including the P1 + P3 architecture, in many countries excluding China, probably because China's automobile market was still immature at that time. BYD filed such patents in 2007, as its first-generation DM technology used the P1 + P3 architecture on its *F3DM* model. Honda signed the patent waiver with BYD for its adoption of the P1 + P3 architecture in China. In order to bypass BYD's patents, other automakers such as Geely and Great Wall, have to introduce a gearbox to replace the reducer, which increases costs and dents NVH

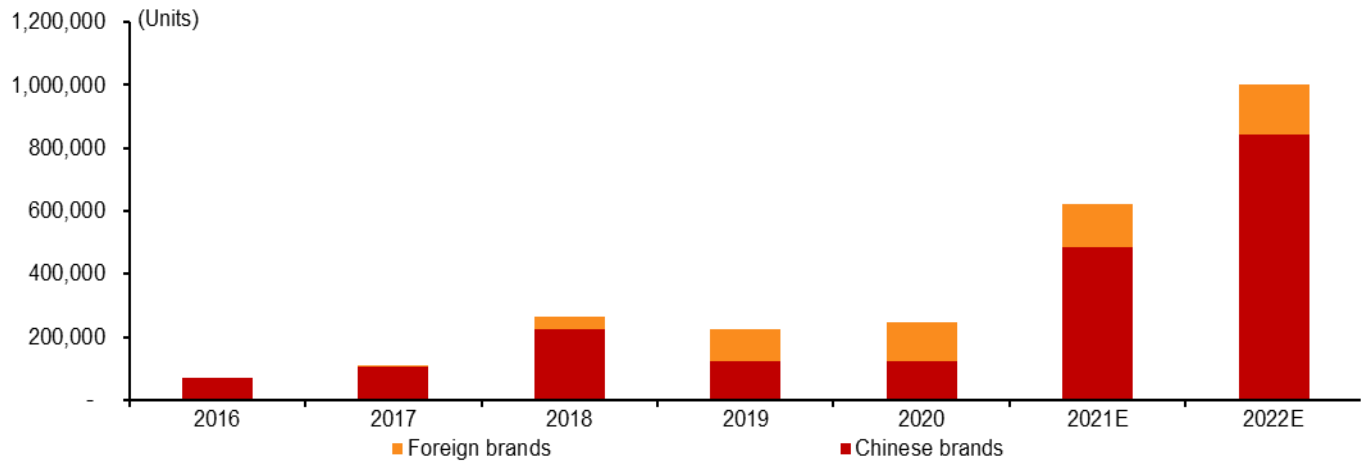
a bit. Engines start to provide propulsion to the wheels at a lower vehicle's speed than BYD and Honda, which requires a more complex electronic-control software solution in order to achieve the same fuel efficiency. On the other hand, the transmission system in Geely's and Great Wall's PHEVs could provide better power torque.

The difference of scores given by us to Geely and Great Wall is mainly due to different gearboxes used. Note that the scores are given by us based on our understanding of the technological differences between hybrid systems. The actual performance is also dependent on other factors, such as automakers' overall cost control and manufacturing capabilities, as well as pricing strategies.

3) Toyota's Power Split (PS) system dominates in the HEV market. Can it still lead in the PHEV market using the same system?

As noted in the paragraphs related to the 1st question, the P1 + P3 architecture could be a bit more efficient than Toyota's PS system in PHEVs. We believe the competition could be more intensified in the PHEV market. Unlike the failure of Geely's GHS1.0 (which used the P2.5 architecture), we believe Chinese automakers now are more competitive in the hybrid technologies than before. In addition, Chinese automakers react much faster to cope with China's evolving auto market, as noted in the previous table that Chinese-brand PHEVs dominate the upcoming model pipeline. That is why we project PHEV wholesale volume growth to outpace BEV in 2022 and Chinese brands to further gain PHEV market share in 2022. Sales volume outlook for different automakers' PHEVs is more complicated than the scores given by us to compare technological differences.

Figure 61: PHEV wholesale volume by brand origin in China



Source: CAAM, CMBIS estimates

NEV wholesale volume in 2022: Who's gaining market share?

With BEV and PHEV (including EREV) combined, we project Chinese brands to take up 75% of the total NEV wholesale volume in 2022, unchanged from 2021, as we expect Chinese-brand PHEVs' market share gain to offset a slight market share loss in the BEV segment. We list our forecasts in the table for major automakers' NEV wholesale volumes in China in 2022.

Figure 62: Our forecast of major OEMs' NEV sales volumes and market share in China

OEM	Est. 2021 NEV Market Share	Est. 2022 NEV Market Share	2022 NEV Sales Forecasts (units)	Major NEV models
Chinese Automakers				
NIO	2.8%	3.4%	165,000	ES8, ES6, EC6, ET7, ET5
Li Auto	2.7%	3.8%	180,000	Li ONE, X01
Xpeng	2.8%	4.6%	220,000	G3, P7, P5, G9
Geely	2.5%	5.8%	280,000	Xingyue L PHEV, Geometry EX3, Zeekr 001
Great Wall	3.7%	6.1%	295,000	ORA Black Cat, Good Cat, Ballet Cat, Wey Latte PHEV
BYD	18.0%	18.4%	882,000	Qin DM-i, Song DM-i, Han, Dolphin, Seal, D1
GAC Motor	3.8%	3.4%	162,000	Aion S, Aion Y
Changan	2.8%	3.1%	151,000	Benben EV, Eado EV, Oushang EV
SAIC PV	4.8%	3.9%	189,000	MG eHS, MG ZS EV, Roewe ei6, Rising ER6, Zhiji L7
SAIC-GM Wuling	13.5%	9.4%	449,000	Hongguang Mini, Wuling Nano, Baojun KiWi
Foreign Automakers				
Tesla	13.6%	13.5%	650,000	Model 3, Model Y
SAIC-GM	0.7%	0.6%	29,500	Velite 6 PHEV, Velite 6 BEV, Menlo BEV
SAIC-VW	1.9%	2.8%	134,000	ID.4 X, ID.6 X, ID.3
FAW-VW	2.0%	2.0%	98,000	ID.4 CROZZ, ID.6 CROZZ
BMW-Brilliance	2.1%	1.9%	91,000	iX3, 5-Series PHEV, 3-Series BEV
Beijing-Benz	0.2%	0.3%	14,000	EQC, EQA, EQB, EQE
GAC-Toyota	0.3%	0.5%	24,000	Wildlander PHEV, bZ4X BEV
GAC-Honda	0.1%	0.3%	16,000	Breeze PHEV, e:NP1
Dongfeng-Honda	0.5%	0.5%	25,000	CR-V PHEV, e:NP1 Equivalent

Source: CAAM, Company data, CMBIS estimates

NEV trio (NIO, Li Auto and Xpeng): All to gain market share

All three NEV start-ups ended 2021 with sales volumes of 90,000+ units and Xpeng enjoyed the highest YoY growth. We expect Xpeng to continue outpacing in the sales volume growth in 2022, aided by the new *P5* sedan. With the launch of the *ET7*, NIO continues to enjoy the highest average selling price (ASP) among the three.

Great Wall, Geely and BYD: Competing in PHEVs and mini BEVs

In 2021, BYD sold the most PHEVs in China among all automakers, aided by its DM-i (based on its 4th generation DM technology) models. We expect such leading position to continue in 2022 with 38% market share in the PHEV market, but with more competition from peers such as Great Wall and Geely. We are of the view that BYD has cost advantage by using the reducer in the P1 + P3 architecture, whereas Geely and Great Wall may be advantageous in manufacturing cost control.

In 2021, Great Wall sold the most mini BEVs among the three with its *Cat* series models. Now Geely and BYD have been launching such models (the *Geometry EX3* for Geely and the *Dolphin* BEV for BYD) to grab mini BEV market share.

We expect Geely's NEV wholesale volume to grow the most in YoY term in 2022, aided by the Zeekr 001, Hi•X PHEVs and mini BEVs, chasing Great Wall and BYD. We project BYD's NEV market share to be largely unchanged in 2022 from 2021.

GAC, SAIC and Changan: NEV credits and ride-hailing play more important roles

Homegrown brands at SAIC Motor, including Roewe, MG and Rising, took up the highest NEV market share among the three in the first 11 months of 2021. Its Rising brand, along with the upcoming Zhiji, helps SAIC to go upscale, which may dent its market share previously driven by mini BEVs and the ride-hailing *Ei5* in the short term.

Only about half of NEVs at GAC Motor were sold to individuals the first 11 months of 2021, according to insurance data, the highest among the three. We also expect GAC Motor's NEV market share to narrow slightly in 2022 amid unexciting model pipeline.

Changan has been aggressive in rolling out BEVs, partially to meet China's tightening 'dual-credit' requirement. In 2020, about half of Changan's NEV retail sales volume was from the *Eado* BEV and more than half of Changan's NEVs were sold as ride-hailing fleets. This had been changed drastically in 2021 because of the *Benben E-Star* mini BEV. Now Changan has the highest portion of NEVs sold to individuals among the three. We expect Changan to gain market share in 2022, although we project NEV wholesale volumes of the homegrown brands at SAIC and GAC still outpace Changan in 2022.

SAIC-GM-Wuling: Heightened competition in the mini BEVs

The *Wuling Hongguang Mini* surpassed the *Tesla Model 3* to top the BEV wholesale volume in 2021. Following the success of the *Wuling Hongguang Mini*, SAIC-GM-Wuling also launched the *Baojun Kiwi* and *Wuling Nano* BEVs, which are much less successful so far. It appears to us that the *Wuling Hongguang Mini*'s sales volume may be peaking, especially given a lot more mini BEVs are on sale now. We project SAIC-GM-Wuling's NEV wholesale volume to be largely flat YoY in 2022.

Tesla: Rapid growth to continue despite headwinds

Despite the protest at 2021 Shanghai Auto Show and China's tightening regulations for its parking in sensitive areas, Tesla's wholesale volume in China reached 400,000 units in the first 11 months of 2021, due in part to its exports of about 152,000 units. While the production timeline for its Berlin gigafactory is still unsettled, we still expect Tesla's wholesale volume to rise about 40% YoY to 650,000 units in 2022, given its superior cost control capabilities to further lower retail prices. At the end of 2019 after a visit to Tesla China's suppliers, we told investors that Tesla's sales volume in China in the next three years (2020-22) should be largely capped by production capacity rather than demand. We think this could still be valid for 2022.

German marques: Lagging in the NEV market

We expect SAIC-VW to gain market share in the NEV segment with the ID. series models. However, compared with VW's huge success in the ICE vehicle segment in China, we are of the view that the ID. series models so far are less competitive than some Chinese-brand BEV models. We expect BMW to sell the most NEVs among the German luxury brands, aided by the exports of the BMW *iX3*.

Japanese automakers: Not very determined in the BEV roadmap

In Dec 2021, Toyota announced a dramatic scale-up of its BEV plans by unveiling 16 new BEV models. Yet, it seems to be still struggling between battery and hydrogen, in our view. We have not seen any competitive edge from Japanese automakers' new BEV models. In our forecasts, all Japanese-brand BEV wholesale volumes combined are to only account for 2% of China's NEV market in 2022.

Intelligent and Connected Vehicle (ICV): Jump-starter

In mid-2020, we changed our previous cautious views on China's NEV development, as we believe that Chinese consumers' stickiness of NEVs should come from new functions realized in NEVs (namely autonomous driving and smart cockpit), but not from batteries as a different powertrain. In other words, we are of the view that it should be intelligent connectivity that drives electrification but not the other way round. Accordingly, automakers' proprietary software capabilities could be key to leading in the next-generation vehicles, which has been widely accepted by investors now.

Everything goes to software/hardware ratio in the next-generation car

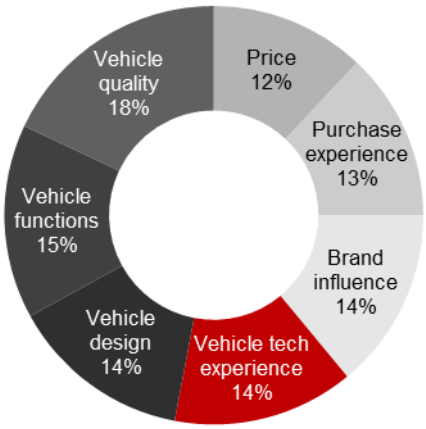
While people analogize the vehicle evolution to mobile phone in the past, we are of the view that the idea is the same: Software-defined functions are becoming more important to consumers for both devices. However, the exact importance to consumers could be slightly different for both devices.

We believe the ecosystem on the smart phones created by software is prevailing. For cars, consumers' needs for ride comfort, stylish appearance and power torque (all supported by hardware) could be higher than these of smart phones, as a car's lifespan and continuous use time are longer than smart phones'. If we had to quantify the importance of software for future cars, we would probably put 50:50 for the software/hardware ratio in terms of consumers' perceived value. Should such ratio be higher than our guesstimate, proprietary software capabilities at automakers could be more important for future car sales volume and the auto industry could be more consolidated in the future. Our analysis in the previous paragraphs for Chinese consumers' preference shift between different vehicle types and sizes also underscores that consumer preference spectrum is probably wider for cars than smart phones.

ICV is current demand, not future dream

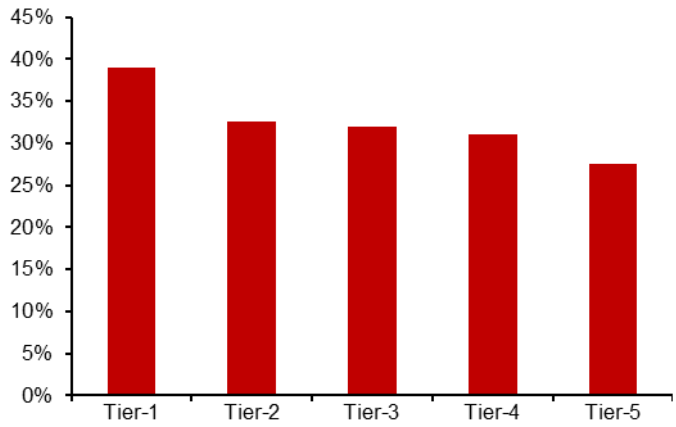
According to J.D. Power's 2021 China New-Vehicle Intender Study (NVIS), vehicle tech experience has become one of the key purchase factors, with an importance weight of 14%, along with six other purchase factors. About 24% of consumers consider their experience with vehicle intelligence features to be the decisive purchase factor. According to Yiche Research Institute's survey in 3Q21, Chinese consumers in higher-tier cities have higher intention for AD features (nearly 40% in tier-1 cities).

Figure 63: J.D. Power 2021 China NVIS purchase factor weightings



Source: J.D. Power, CMBIS

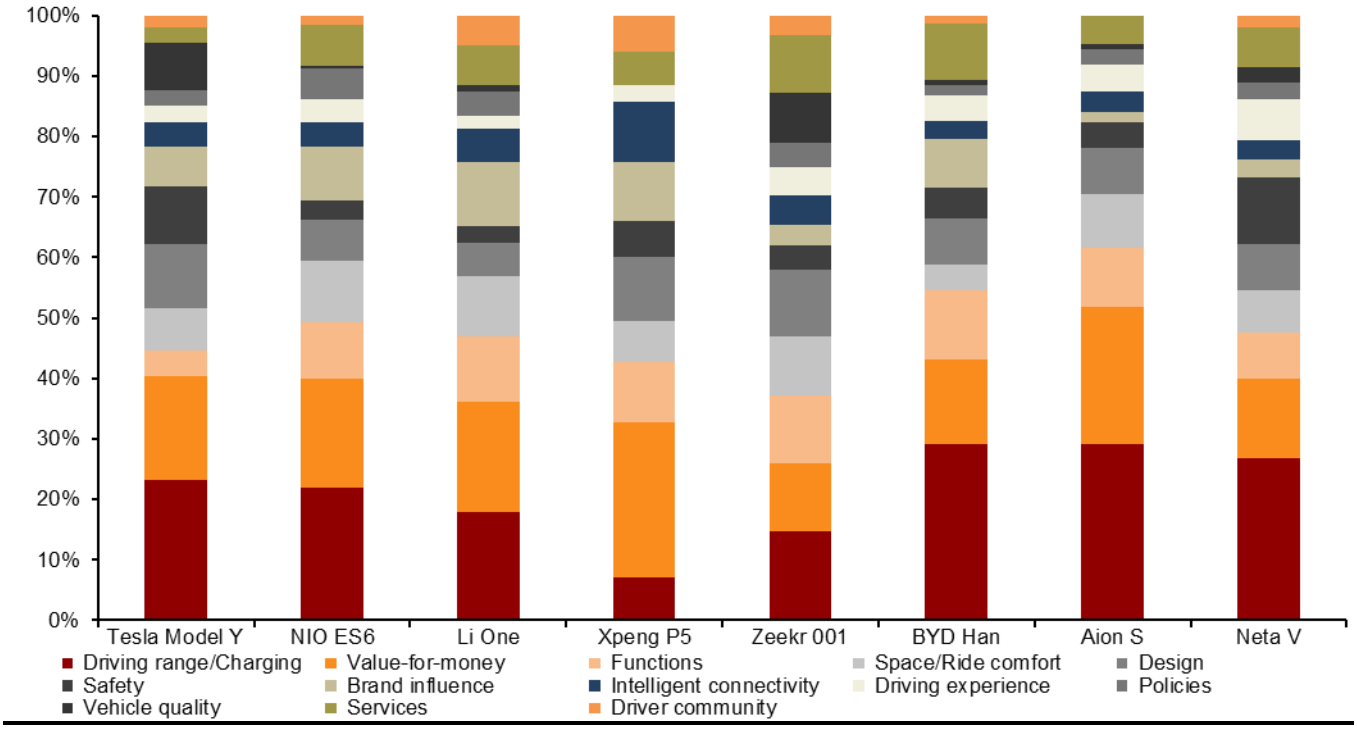
Figure 64: Chinese consumers' purchase intention for AD features by city tier



Source: Yiche Research Institute, CMBIS

We have also compiled some interesting data points to analyze consumer preference of different NEV models. Based on almost 34,000 comments on a number of NEV models from Yiche and Dongchedi users, we group these comments into 13 categories (driving range/charging, value-for-money, functions, space/ride comfort, design, safety, brand influence, intelligent connectivity, driving experience, policies, vehicle quality, services and driver community) and list eight typical models in the chart below. While consumers still pay the most attention to driving range and charging for NEVs, vehicle intelligence experience has become a very important topic, especially for NEV start-ups. We can also see consumer preference differences between models from NEV start-ups and traditional automakers. Based on our data, vehicle intelligent connectivity has a weight of 7% for NEV start-up models and only 2% for traditional brands. Based on the comments from Yiche and Dongchedi, we think Geely's new BEV brand, Zeekr, is perceived somewhere in between traditional and start-up brands. Yet, it is still traditional characteristics–appearance and driving experience–that attract consumers the most.

Figure 65: Topics that consumers talked about at online Chinese auto platforms for different ICVs in 2021



Source: Yiche, Dongchedi, CMBIS

More foreign-brand models available with L2 ADAS functions

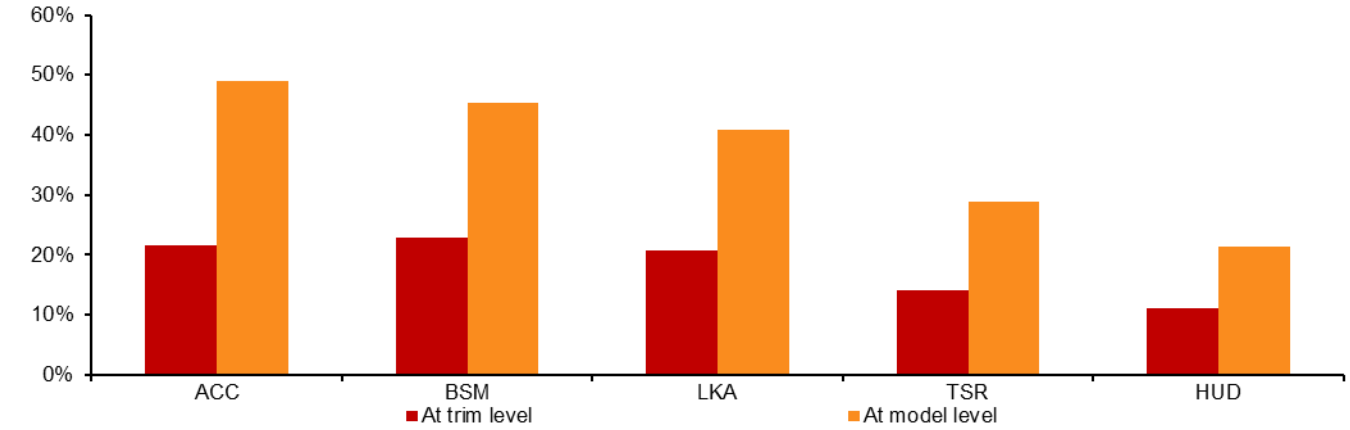
We have compiled the data of 1,218 vehicle models on sale in China and the corresponding 9,403 trim levels of these models from the Autohome (ATHM US, NR) website, in a bid to analyze ADAS (advanced driver-assistance systems) functionalities available in the market.

Among all the 9,403 trim levels, there are about 23% with the Blind Spot Monitoring (BSM) function. The ratios are 22%, 21%, 14% and 11% for Adaptive Cruise Control (ACC), Lane Keeping Assist (LKA), Traffic Sign Recognition (TSR) and Head-up Display (HUD), respectively.

The penetration rates are higher at the model level, if we assume any trim level of a particular model having such functions is counted. Almost half of all the models on sale in

China has the ACC function, and the penetration rates at the model level for BSM, LKA, TSR and HUD are 45%, 41%, 29% and 21%, respectively.

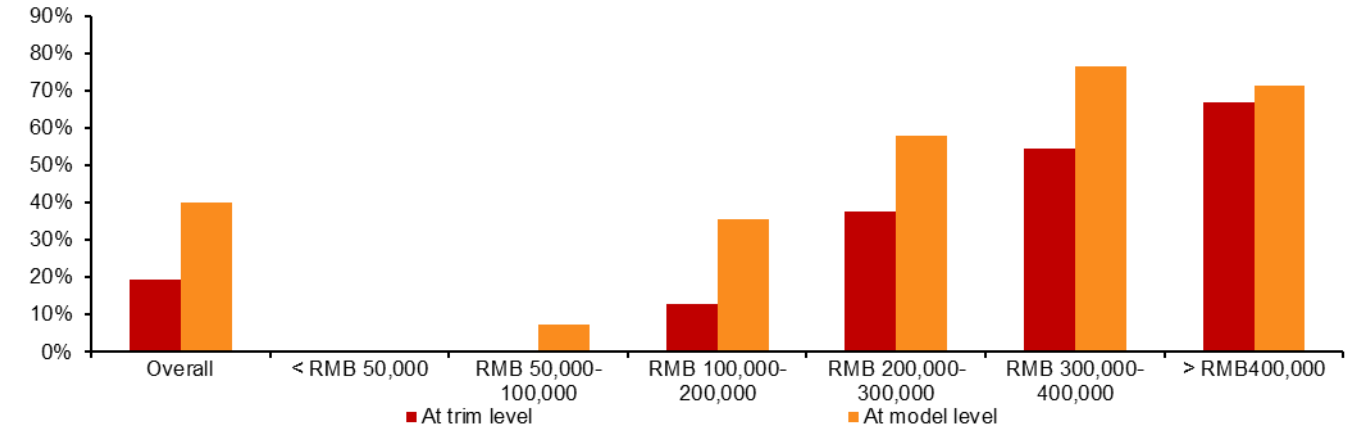
Figure 66: % of models/trim levels on sale in China with different active safety functions



Source: Autohome, CMBIS

Although the Level 0-5 AD functions defined by Society of Automotive Engineers (SAE) are becoming less precise to describe the evolving AD functions after automakers adopt functions like Navigate on Autopilot (NoA) based on different road conditions, we calculate the L2 ADAS penetration rate based on a combination of BSM, LKA and ACC. Accordingly, we find that about 40% of vehicle models on sale and 19% of all the trim levels have the L2 ADAS functions. Most of the trim levels with the L2 functions are priced above RMB 200,000. More than 70% of models priced above RMB 300,000 have the options to be equipped with the L2 functions.

Figure 67: % of models/trim levels on sale with the L2 functions by retail price



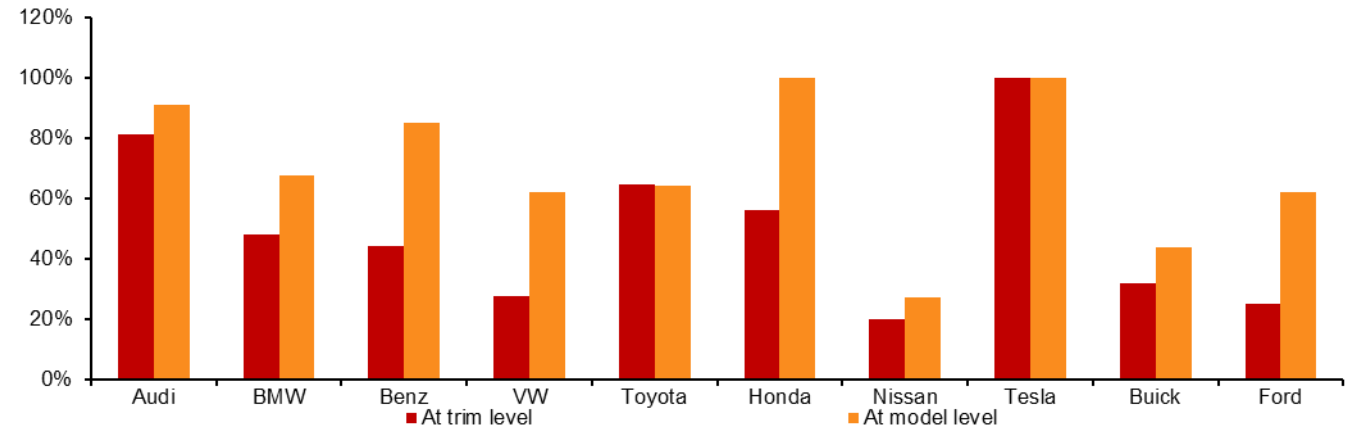
Source: Autohome, CMBIS

Looking into different automakers/brands, Tesla, NIO and Li Auto have the L2 functions equipped for all the trim levels. Xpeng and Honda have all their models covered for the L2 functions, but only 68% and 56% of their trim levels are available for the L2 functions, respectively.

Audi has the highest L2 penetration rate among all the traditional foreign brands in China in both model and trim levels. Both BMW and Mercedes-Benz have more than 2/3 models covered for the L2 functions while their L2 penetration rates at the trim level are only close to 50%. Although VW has 62% models covered for the L2 functions, consumers need to purchase high configurations of these models in order to have these functions equipped.

Toyota has 2/3 of models and trim levels covered for the L2 functions. Buick and Nissan have lower L2 penetration rates than their peers.

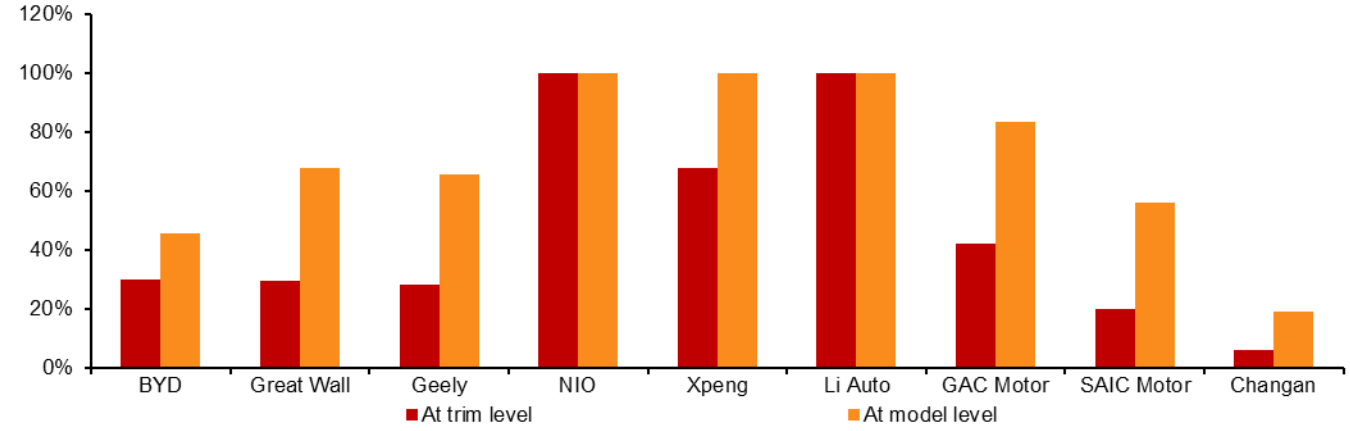
Figure 68: % of models/trim levels on sale for foreign brands with the L2 functions



Source: Autohome, CMBIS

Great Wall and Geely have similar L2 penetration rates in both model (about 2/3) and trim levels (about 30%). GAC Motor has the highest L2 penetration rate among all incumbent Chinese automakers in China in both model and trim levels, and Changan's is ranked the lowest. Among major brands in China, foreign brands still have higher L2 penetration rates than Chinese brands, partially due to their higher retail prices.

Figure 69: % of models/trim levels on sale for Chinese brands with the L2 functions



Source: Autohome, CMBIS

Other than Tesla, Chinese OEMs lead in L2+ AD and smart cockpit

The L2 functions are developed based on traditional computer vision technologies such as motion control. When Tesla started to develop its NoA function using a Neural Network-based AI training model, almost everyone else followed. We take a deep dive into the key models currently on sale in China for its L2+ functions (NoA or similar names called by different automakers) and so-called smart cockpit technologies, in order to better understand each automaker's R&D capabilities and mindsets.

Apart from the *Tesla Model 3*, we list the models on sale from NIO, Li Auto and Xpeng, all of which are capable of the L2+ functions. Great Wall's *Wey Mocha* had its L2+ functions available in Nov 2021 and note that it is not an NEV model. Geely started to deliver its

Zeekr 001 in Nov 2021, while its L2+ functions are scheduled but not released yet. The *BYD Han*, launched in Jul 2020 as BYD's flagship model, does not have the L2+ functions.

Note that technically the high-level AD features can be realized in non-BEV models, but it could be more complicated than BEVs, as drive-by-wire is still compulsory for the autonomous vehicle's operation.

Software iteration is a key metrics–if not the most important–to automakers' AD R&D capabilities. In our view, efficient data training with sufficient data accumulation (mainly for corner cases) will largely determine the pace of software iteration amid the current machine-learning technologies.

Figure 70: Comparison of key configurations for ICV models on sale in China

Model	Tesla Model 3	NIO ES6	Li ONE	Xpeng P7	BYD Han EV	Zeekr 001	Wey Mocha
MSRP (RMB)	255,652-339,900	358,000-518,000	338,000	229,900-369,900	219,800-279,500	299,000-360,000	187,800-223,800
Wheelbase (mm)	2,875	2,900	2,935	2,998	2,920	3,005	2,915
0-100km/h Acceleration (s)	3.4	4.7	6.5	4.3	3.9	3.8	9.1
E/E Architecture(1)	Layer 4	Layer 2.5	Layer 2	Layer 2.5	Layer 2.5	Layer 3	Layer 2
Cockpit Processor	Intel Atom A3950	Nvidia Tegra X1	Qualcomm Snapdragon 820A	Qualcomm Snapdragon 820A	Huawei Kirin 710A	Qualcomm Snapdragon 820A	Qualcomm Snapdragon 8155
Infotainment OS	Linux	Android	Android	Android	Android	Android	Android
Voice Interaction(2)	★★★	★★★★	★★★★☆	★★★★★	★★★★	★★★★	★★★★
Overall Infotainment System Experience	★★★	★★★★	★★★★☆	★★★★★	★★★★	★★★★	★★★★☆
ADAS AI Processor	FSD	Mobileye EyeQ4	Horizon Journey 3	Nvidia Xavier	-	Mobileye EyeQ5	Mobileye EyeQ4
R&D Capabilities on AD(3)	★★★★★	★★★★	★★★	★★★★☆	★★	★★	★★★
AD Level(4)	L2.8	L2.6	L2.5	L2.9	L2	Not released yet	L2.5
Navigate on Autopilot	✔	✔	✔	✔	✘	Not released yet	✔
No. of AD Cameras	5	3	1	9	1	8	1
No. of Circular Cameras	3	4	4	4	4	4	4
No. of Other Cameras	1	1	-	1	1	3	-
No. of Millimeter-wave Radars	1	5	5	5	3	1	5
No. of Ultrasonic-wave Radars	12	12	12	12	12	12	12

Source: Company data, CMBIS estimates

Our comments and views on some metrics (noted with superscript in the table above) are as below.

(1) Electrical/Electronic Architecture (EEA)

Bosch defines six layers of EEA. We are of the view that the *Tesla Model 3* is at the 4th layer or even slightly higher, with only two domains (for AD and infotainment) sharing one water-cooling system and two zone controllers (for basic electrical functions), assisted by cloud computing. Most automakers, especially NEV start-ups, have been developing more integrated EEA on their own, as EEA is one of the foundations for ICVs.

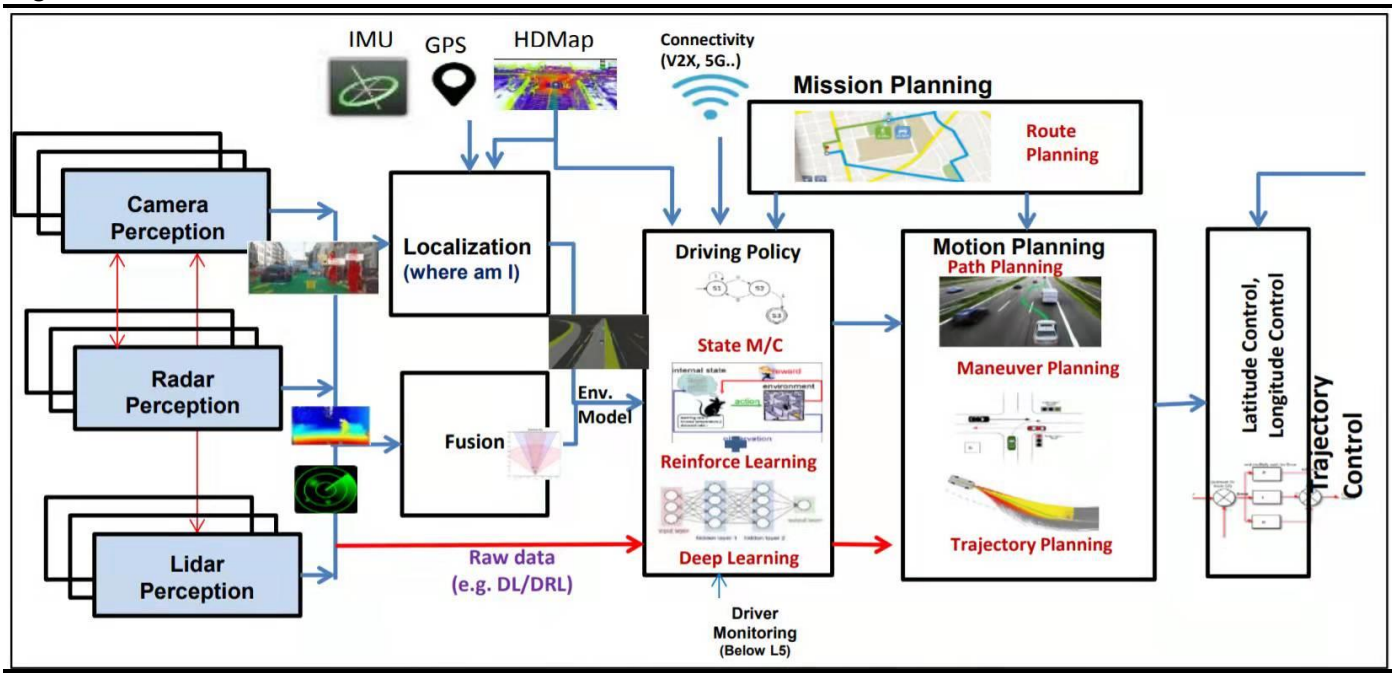
(2) Voice interaction

Voice interaction is one of the smart cockpit technologies that automakers pay the most attention to now. It has been developing rapidly at Chinese automakers with over-the-air (OTA) updates. We have lifted our scores for a few models in the table compared with a year ago. As most automakers use Iflytek's (002230 CH, NR) database and train their algorithms through cloud-based learning system, the difference could be even smaller in the future. Tesla has the localization issue for both voice interaction and AD capabilities.

(3) A comparison of proprietary R&D capabilities for AD: Tesla, Xpeng, NIO, Li Auto, Great Wall, Geely, and BYD

Our scores for automakers' in-house R&D capabilities for AD largely reflect different mindsets and approaches between incumbent automakers and NEV start-ups.

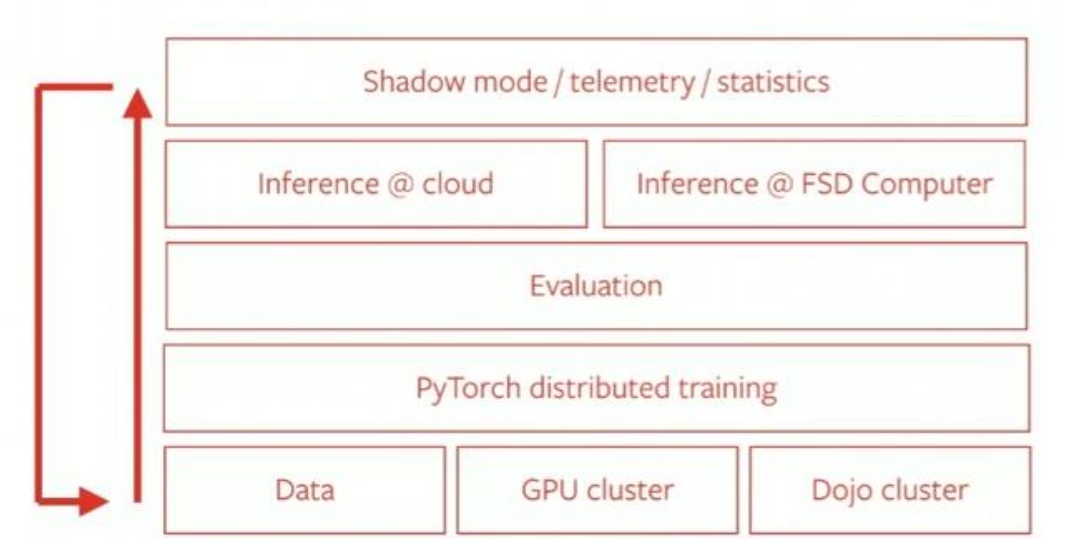
Figure 71: Functional blocks for AD software



Source: Texas Instruments

Tesla overall has the best R&D capabilities in AD among all the automakers globally, mainly because it has proprietary technologies for almost everything: It designs its own chip and builds its own EEA and OS. It forms a closed loop by collecting real-road data from all the vehicles sold to customers and comparing them with the predictions from its machine learning to help improve its algorithm (shadow mode), assisted by a Neural Network training supercomputer 'Dojo'. According to Tesla's chief AI scientist Andrej Karpathy, Tesla had accumulated 3bn miles on its Autopilot as of Feb 2020 and it is still growing exponentially. We think the total mileages on Tesla's Autopilot could exceed 5bn at the end of 2021. The benefit of a fully integrated in-house hardware + software solution is that every part has been optimized. That explains why Tesla needs the lowest tera operations per second (TOPS) from its AI chip to achieve the same functionalities as other automakers do.

Figure 72: Sketch for Tesla's 'operation vacation'



Source: Tesla

Following Tesla's Neural Network data training approach, **Xpeng** has done the best so far in China, in our view. Xpeng utilizes Nvidia's (NVDA US, NR) Xavier chip as its AI processor, and Blackberry's (BB US, NR) QNX as its OS kernel, for AD functions. It develops its proprietary algorithm with a closed loop formed the earliest among automakers in China. In addition, Xpeng is very good at integrating its own software development with outsourced hardware, in our view. Although the entire system could be less efficient than Tesla by outsourcing hardware (mainly the chips), developing software on its own is a right approach for now, agreed by almost all the automakers and industry experts, given automakers' lack of expertise in the chip design and OS kernel development. Tesla did not design its own chip from Day 1, either.

The ***NIO*** *ES6* uses the Mobileye EyeQ4 which provides a one-stop solution for both hardware and software, leaving automakers no choice of collecting the road data for developing their proprietary algorithms. NIO is slightly different from other automakers which also use Mobileye EyeQ4, as NIO purchases the High version and Mobileye agrees to send NIO its labelled data. Therefore, NIO is able to develop some additional functions for some specific scenarios on top of the solution provided by Mobileye. Yet, such proprietary algorithm cannot be transferred to its *ET7* which uses the Nvidia Orin chips. NIO took a detour as it relied on its US R&D team too much at the beginning and also experienced a liquidity issue in 2019, which have deferred its in-house AD development.

Li Auto unveiled the *Li ONE* in April 2019, with a standard L2 solution provided by Mobileye. The facelifted *Li ONE*, debuted in May 2021, switched to Horizon Robotics' Journey 3 chip with the L2+ functions available since Dec 2021 via OTA. Therefore, Li Auto started proprietary algorithm development later than Xpeng and NIO. It makes the L2+ functions as a standard configuration for its only one trim level of the *Li ONE*, in a bid to catch up with more data accumulation. In addition, Li Auto works with Hongjing Drive to launch the L2+ functions in a relatively short period of time.

Great Wall relies on HAOMO.AI (a company incubated by Great Wall's parent) to provide its L2+ functions which have been available just since Nov 2021. We would count HAOMO.AI's R&D capabilities as in-house technologies given it is a sister company of the listco. We are of the view that Great Wall is currently leading among incumbent Chinese automakers in terms of transforming into a more software-oriented tech company. On the

other hand, Great Wall still has a traditional automaker's mindset: diversifying risks with more suppliers. It also works with Huawei and Momenta for AD functions.

Geely also has a traditional automaker's mindset in the AD development: Its Zeekr brand ties up with Intel's (INTC US, NR) Mobileye. Volvo Cars, along with Polestar and Lynk & Co, partners with Waymo. Volvo Cars also develops its proprietary AD algorithm through its in-house Zenseact, and leverages Nvidia's chips. Although Mobileye has opened its data collection to automakers, we believe Mobileye should have done the most job in developing the *Zeekr 001*'s L2+ functions given that the time interval between their partnership and *Zeekr 001*'s launch is so short and Geely had no expertise in the AD development. We think that Geely was only involved in the drive-by-wire chassis part rather than the visual perception and data training parts. Relying too much on suppliers could be disadvantageous for automakers as suppliers provide generic solutions to all automakers and thus software iteration could be much slower than automakers' in-house development.

It appears to us that **BYD** has not prioritized the AD development among its different businesses along the NEV supply chain. It has not laid out a clear roadmap for AD. Its partnership with Momenta could accelerate the timeline for its L2+ enabled models, but it does not necessarily translate into BYD's in-house AD capabilities.

(4) Our defined AD levels for different automakers are largely based on the AD functions realized and customer experience, which is also largely correlated with their proprietary R&D capabilities for AD, as explained above.

Tesla's dilemma in China

We rate the *Xpeng P7* slightly higher than the *Tesla Model 3* in terms of the AD level because some of Tesla's AD functions are limited in China. Tesla is not allowed to send the road data collected in China back to its headquarters for more tailor-made algorithms for China, while China's road condition is different and more complex than some other countries. We argued in 2020 that the top priority for Tesla in China is to localize its R&D for its AD development. It appears to us that Tesla has prioritized production instead, which, in our view, might be a short-term gain, long-term pain. That also leaves some room for Chinese automakers to catch up.

Why cannot automakers rely on suppliers for AD functions?

An industry that is evolving faster than ever before needs pioneers, not followers

For the past many years, automakers have been relying on tier-1 suppliers for all kinds of components, even including batteries for NEVs. Some automakers still have such mentality for the AD development, especially given traditional automakers have little expertise in software capabilities. As noted above, that could put automakers in a disadvantageous position, in our view.

When the automotive industry started, the supply chain was much more integrated than now. When the industry became more mature, automakers started to know what technologies were key to them and gradually outsourced less important components. That explained why many giant parts suppliers were spun off from automakers. Yet, automakers still hold the key to the most important technologies, such as engines and transmissions. Now, the industry has been evolving faster than ever before, in our view, because electrification is to change the industry more drastically than what many people have expected. Intelligent connectivity is one of the important game changers, if not the most important one. Therefore, we expect the industry to become more vertically integrated than before, until automakers figure out what the key technologies are once again. While automakers are still trying to figure out what consumers need the most in the NEV world,

those which fully rely on suppliers for new technologies will only be followers and probably have lower chance to be winners.

Selecting so-called the most important part of the new technologies for in-house development could be risky

Some incumbent automakers argue that they can do it selectively, developing the most important part of the new technologies and leaving less important parts to suppliers. Incumbent automakers often consider the most important part of the technologies to be those which can be perceived by consumers. Such argument seems to be correct on the surface, but our question is: How can automakers identify the most important part if they cannot even draw the whole picture? More importantly, transforming from a traditional manufacturer to a tech company also needs culture changes. Therefore, we are generally less optimistic for SOEs, as their culture, incentive scheme for talent retention and track record may not be suitable for software development. We are also a bit disappointed with the pace of transformation for incumbent automakers in the past year.

State-of-the-art AD technology in China: Chip, LiDAR and data fusion

We have listed the upcoming key ICV models in China, which are to use more powerful AI chips, higher resolution cameras and LiDARs. We take a deep dive into the key metrics of these models, in a bid to get a rough idea about Chinese automakers' latest AD development and some future trends.

Figure 73: ADAS hardware comparison for the upcoming models in China in 2022

Model		NIO ET7	Xpeng P5	Xpeng G9	Weltmeister M7	Zhiji L7	Avatar 11	SL Jijialong
ADAS Computing Platform[1]	No. of Processors	Nvidia Orin x 4	Nvidia Xavier	Nvidia Orin x 2	Nvidia Orin x 4	Nvidia Xavier	Huawei 810	Huawei 810
	Computing Power (TOPS)	1,016	30	508	1,016	30	400-800	400-800
LiDAR[2]	No. of LiDARs	1	2	2	3	-	3	4
	Supplier	Innovusion	Livox	RoboSense	RoboSense	-	Huawei	Huawei
	Laser Beams (equivalence)	300-line	144-line	Est. 128-line	Est. 128-line	-	96-line	96-line
	Detection Distance (m)	250	150	150	150	-	150	150
Camera	No. of Cameras	11	12	12	11	11	13	11
	Megapixels (MP)	8MP x 7 3MP x 4	3MP x 12	8MP ≥ 8	8MP x 7	5MP x 7 2MP x 4	8MP x 13	8MP x 7
No. of Millimeter-wave Radars		5	5	5	5	5	6	5
No. of Ultrasonic Sensors		12	12	12	12	12	12	12
Sensor Fusion[3]		Late fusion	Late fusion	Late fusion	Late fusion	Late fusion	Early fusion	Early fusion
ADAS Algorithm Supplier		-	-	-	Baidu Apollo	-	Huawei	Huawei / Momenta
Est. Total Costs of ADAS Hardware[4] (RMB)		32,000	20,000	25,000	35,000	12,000	22,000	22,000
MSRP (RMB)		448,000-526,000	157,900-223,900	Est. above 300,000	Est. above 300,000	408,800 (Pre-sale)	Est. above 300,000	488,000 (Pre-sale)
Est. Launch Time		1Q22	4Q21	3Q22	2H22	1H22	3Q22	3Q22

Source: Company data, CMBIS

(1) Chips

Unsurprisingly, automakers which are determined to develop their proprietary AD algorithms abandoned Mobileye and most of them have chosen Nvidia, as Nvidia provides an open platform with the best developer toolkits. Some Chinese automakers have also chosen Huawei. Huawei's Domain Specific Software Architecture (DSSA) is in between Nvidia's and Mobileye's to provide flexibility for automakers. Huawei can also help automakers with its one-stop solution when needed. BAIC BluePark New Energy and Chongqing Sokon Industry have already adopted Huawei's one-stop solution.

Higher TOPS is needed, but not necessarily better

In order to support more sensors for more complicated road conditions, automakers have been using AI chips with higher TOPS for better Neural Network performance. On the other hand, we are of the view that using more chips with higher TOPS does not directly translate into better AD solutions. It could mean the system is not optimized, which results in higher power loss and additional costs. It still takes some time for Chinese automakers to figure out the optimal integration of hardware and software.

Will Nvidia dominate in the automotive AI chips?

Our view is that it is not the end of the game yet. There are a variety of moving parts: chip architecture development, geopolitical issues, automakers' priority, which automakers will survive etc. Mobileye used to dominate in the L2 functions and now suffer severely as automakers change their approach to ADAS functions. Qualcomm (QCOM US, NR) now dominates the processors for vehicles' infotainment systems. If the AD and infotainment functions are to be merged into one domain with one chip in the future, Qualcomm has the advantages of faster iteration and better economies of scale.

Although Chinese companies are lagging in this area, we also see potential for some leading chip companies, especially with the help from the Chinese government.

Will automakers design their own chips?

The supply chain of the automotive AI chips has become much more complicated than the numbers shown in the table, as there are a wide range of needs and expertise for different automakers. There are also companies like Desay SV and Thunder Software Technology (300496 CH, NR) in between automakers and AI chip suppliers. Nvidia has been doing more software work for automakers than before. On the other hand, Tesla has showcased to everyone how to optimize the entire AD system, with almost everything developed internally. Although designing chips is still difficult for automakers, we believe there will be a few automakers following suit in the future.

(2) LiDAR

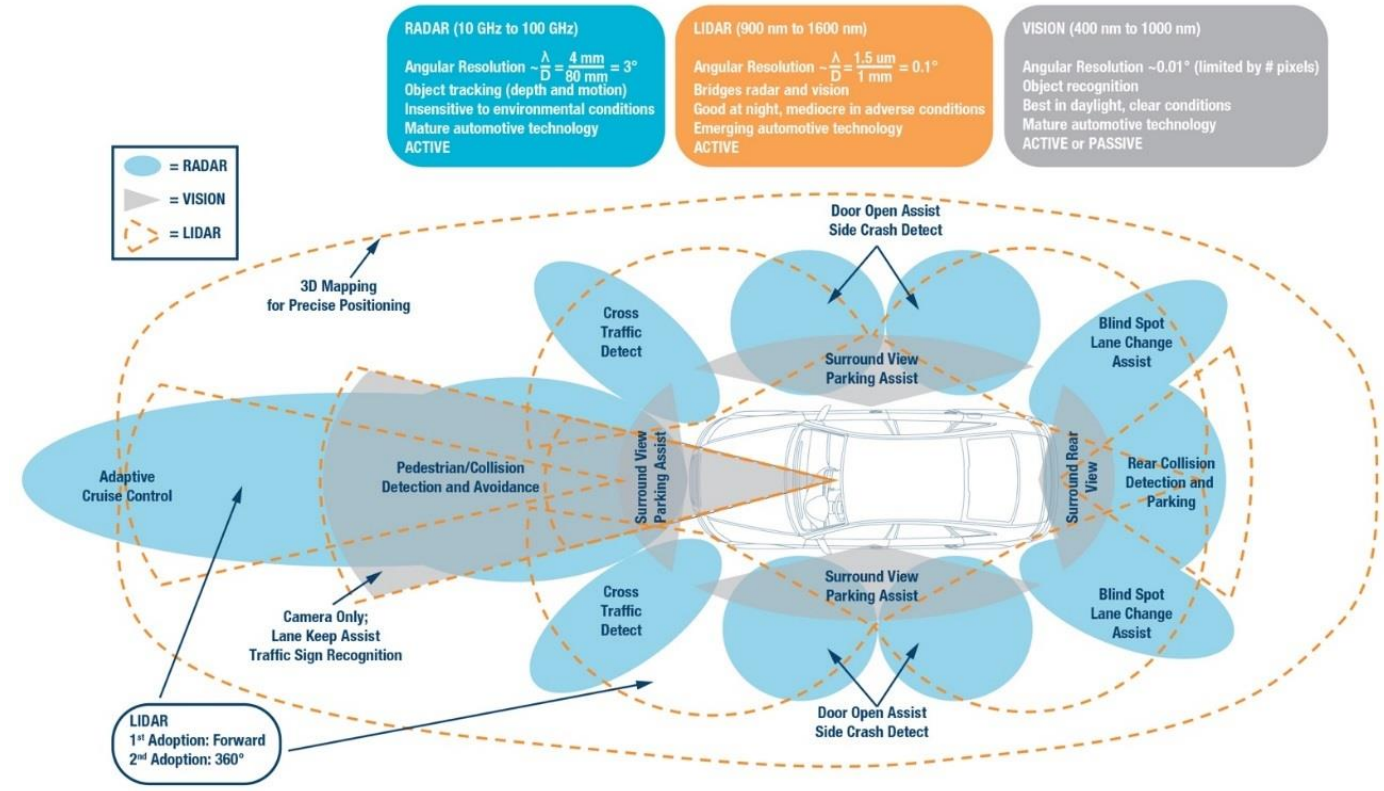
Unlike Tesla's pure vision-based approach, almost all the Chinese automakers have chosen to integrate LiDAR into their sensor systems. In theory, different sensors (camera, radar and LiDAR) have different advantages and disadvantages. By combining them, the overall effect should be improved if one sensor's advantage could be utilized to offset the shortfall of another sensor. However, the other way around is also possible: the flaw of one sensor outweighs the strengths of others in the decision-making process. That is the main reason why Tesla has started to abandon millimeter-wave radars.

Pure vision-based or multi-sensor, that is a question

In our view, it is still too early to conclude which approach will win. It makes sense to us that Chinese automakers are eager to utilize more tools, including LiDAR and High Definition (HD) map, in a bid to narrow the gap with Tesla. However, it also means rewriting code for the multi-sensor based algorithm and higher hardware costs, which is more unaffordable for Tesla as it has been working on vision-based algorithm for so long. The

success of multi-sensor based system depends on the sensor fusion: how much advantage of LiDAR can be utilized and how much shortfall of each sensor can be minimized, which we will probably need to wait until more LiDAR-equipped vehicles on the road.

Figure 74: Diagram of multiple sensors applied in ICVs



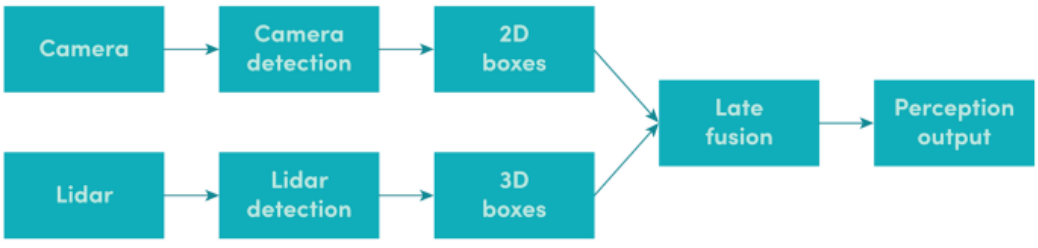
Source: Analog Devices

(3) Sensor fusion

When there are different sensors (camera, radar and LiDAR) to detect objects with their own modalities, data fusion is needed.

Late fusion means each sensor works independently to generate its own result and fuse these results in the late stage using probabilistic techniques such as weighted average and Kalman Filters.

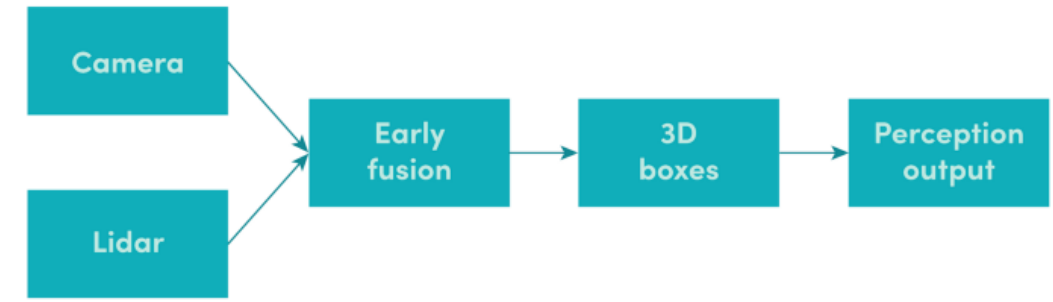
Figure 75: Sketch for late fusion



Source: Woven Planet Level 5

Early fusion means fusing the raw data perceived by different sensors, which can be regarded as a super sensor with complementary strengths of different sensing modalities.

Figure 76: Sketch for early fusion

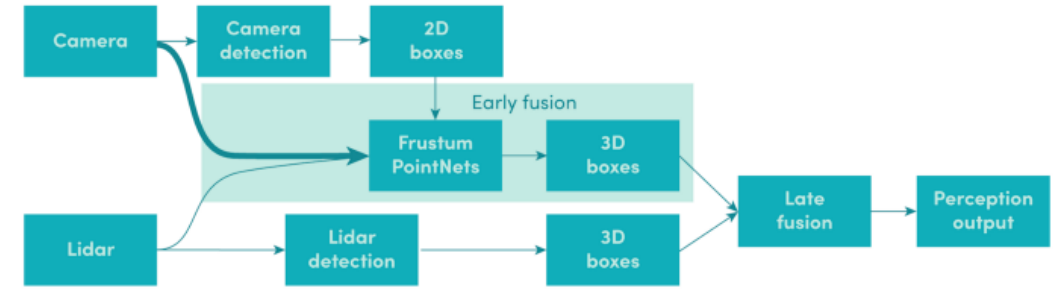


Source: Woven Planet Level 5

Early fusion or late fusion? Or a combination of both?

Accordingly, early fusion can probably provide higher precision of objects, whereas late fusion is less likely to miss objects. For those automakers which have built their algorithms for camera sensing, late fusion could be easier for them as they can still leverage their previous algorithms for camera sensing. That explains why Xpeng, NIO and Baidu (BIDU US, NR) have adopted the late fusion paradigm. On the other hand, a good Neural Network data training to leverage the complementary strengths of sensing modalities while minimizing their weakness could make early fusion a higher potential. We are of the view that a combination of early and late fusion could also emerge to further improve algorithms.

Figure 77: Combination of early and late fusion



Source: Woven Planet Level 5

(4) Our estimates for AD hardware costs

Based on our estimates, total costs of the AD hardware for the *Xpeng P5, G9, Avatar 11* and *SL Jijialong* should be about RMB 20,000-25,000. The AD hardware could cost about RMB 32,000-35,000 for the *NIO ET7* and *Weltmeister M7*, as both models are to use four Nvidia Orin chips. The *Weltmeister M7* is also to equip with three LiDARs. The *Zhiji L7* costs the least in terms of the AD hardware as it is to use the Nvidia Xavier chip without LiDAR. The *Zhiji L7*'s AD hardware configuration is similar to the models currently on sale now, such as the *Xpeng P7*.

Our cost estimates are based on the following assumptions for each item:

RMB 3,200 for one Nvidia Orin;

RMB 5,000 for the remaining parts of the domain controller;

RMB 3,000-5,000 for one LiDAR;

RMB 350-450 for one 8MP camera and RMB250-350 for one 2MP camera;

RMB 300 for one millimeter-wave radar.

Chinese parts suppliers to benefit from OEMs' in-house AD R&D

Tesla has bypassed tier-1 suppliers for sourcing many components as Tesla develops software in house. The advantage of those global tier-1 suppliers such as Bosch is that they provide components with both hardware and software solution under certain standards (AUTOSAR). All automakers need to do is to plug the components, which explains why their EEA is modular based with one Electronic Control Unit (ECU) for one function. Once automakers start to upgrade their EEA to domain based or even vehicle-computer based architectures, they are likely to develop software on their own because different functions are realized through one computer. Automakers no longer need to purchase smart cameras from Bosch but just a camera comprised of lens and image sensor. Automakers develop software in the vehicle computer to connect and control all the components. Therefore, Chinese parts suppliers may become advantageous if they are competing in cost control with hardware manufacturing only.

AD could be foundation for more advanced smart cockpit technology

We spend most of the time on AD with little focus on the smart cockpit for ICVs in this report, as we believe the AD development will be the most important differentiator for automakers in the foreseeable future. We think that smart cockpit could be the next area that automakers compete to lure consumers when the AD technologies can support drivers to pay the least attention to driving. Smart cockpit technologies could be key to defining a vehicle as 'a third space other than home and workplace'. Currently, smart cockpit is only a supplement for drivers such as listening to music and navigation map, as drivers still need to pay attention to driving.

Xpeng Inc. (XPEV US)

Born to be a tech pioneer

Our top pick. We initiate coverage of Xpeng Inc. with a BUY rating and a target price of US$ 80.00, based on 9x our FY22E P/S. We prefer leading NEV start-ups over traditional automakers, because we believe the evolving automotive industry needs pioneers, not followers. Among NEV start-ups, we like Xpeng the most, as we believe the AD and smart cockpit technologies are key to drive NEV sales. We estimate that Xpeng's AD technologies have a leading advantage of at least one year compared with all other Chinese automakers. Such gap may even widen as Xpeng has already adopted LiDAR on its *P5* (unveiled in Sep 2021) for a multi-sensor based system.

- **Management mentality crucial to long-term winner.** We are of the view that Xpeng's current leading AD and smart cockpit technologies are highly correlated with its management mentality. Unlike other founders, Mr He Xiaopeng was very determined to develop proprietary AD software from Day 1 and he puts AD related metrics at higher priority than sales. Xpeng was the first Chinese automaker to form a closed loop for its in-house algorithm development and the first to launch a mass-produced LiDAR-equipped model.
- **AD and infotainment functions have already been facilitating sales.** We are of the view that the OTA for XPilot 3.0 in Feb 2021 was crucial to lift the *P7* sales volume from 2,000–3,000 units every month to 6,000–8,000 units.
- **Consensus could underestimate its sales.** Xpeng ended 2021 with annual sales volume of almost 100,000 units, significantly beat a consensus of 60,000 units at the beginning of 2021. Our FY22E revenue outlook, based on our forecast of sales volume of 220,000 units, is 23% higher than consensus, as we believe Xpeng's leading AD technologies have laid out a solid foundation for its sales growth.
- **Valuation/Key risks.** Our target price is based on 9x FY22E P/S, slightly lower than its average forward 12-month P/S of 10.6x since its IPO, lower than Tesla's current FY22E P/S of 15x on Bloomberg consensus, and higher than NIO's 5x and Li Auto's 4x on our estimates. Key risks to our rating and target price include slower AD technology advancement and a faster catch up from other automakers, lower sales volume than we expect, as well as a sector de-rating.

Earnings Summary

(YE 31 Dec)	FY19A	FY20A	FY21E	FY22E	FY23E
Revenue (RMB mn)	2,321	5,844	20,956	47,851	73,634
YoY growth (%)	23,815.3	151.8	258.6	128.3	53.9
Net income (RMB mn)	(4,643)	(4,890)	(5,356)	(3,026)	(876)
EPS (RMB)	(13.29)	(6.48)	(3.35)	(1.81)	(0.52)
YoY growth (%)	N/A	N/A	N/A	N/A	N/A
P/S (x)	25.4	20.4	12.6	5.5	3.6
P/B (x)	(8.6)	3.5	5.8	6.5	6.7
Yield (%)	N/A	N/A	N/A	N/A	N/A
ROE (%)	N/A	(35.4)	(13.8)	(7.3)	(2.2)
Net gearing (%)	Net cash	Net cash	Net cash	Net cash	Net cash

Source: Company data, Bloomberg, CMBIS estimates

BUY (Initiation)

Target Price	US$ 80.00
Up/Downside	+65.4%
Current Price	US$ 48.38

China Auto Sector

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Stock Data

Mkt Cap (US$ mn)	42,978
Avg 3 mths t/o (US$ mn)	532
52w High/Low (US$)	60.04/22.73
Total Issued Shares (mn)	1,713

Source: Bloomberg

Shareholding Structure

He Xiaopeng	21.2%
Taobao China	11.2%
Others	67.6%

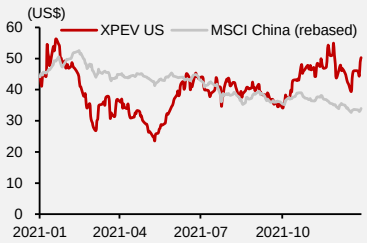
Source: Bloomberg

Share Performance

	Absolute	Relative
1-mth	14.9%	16.8%
3-mth	47.6%	51.4%
6-mth	14.3%	34.3%

Source: Bloomberg

12-mth Price Performance



Source: Bloomberg

Auditor: PricewaterhouseCoopers Zhong Tian

Investment Thesis and Company Overview

Leading AD capabilities results in more efficient R&D, faster iteration

As explained in detail on page 44-46 for Chinese automakers' AD R&D capabilities, Xpeng follows Tesla's Neural Network data training approach at the beginning and has done the best so far in China, in our view.

Unlike Tesla, Xpeng still focuses on developing AD software and leveraging hardware from suppliers including Nvidia, Livox and Desay SV. In our view, Xpeng is very good at integrating its own software development with outsourced hardware. Xpeng formed a closed loop for its proprietary algorithm development (similar to Tesla's shadow mode) the earliest among Chinese automakers.

Unlike Tesla's pure vision-based approach, Xpeng started to adopt LiDAR in its *P5* sedan which was launched in Sep 2021. We also explained the rationale of these two different approaches on page 48-49 titled '*Pure vision-based or multi-sensor, that is a question*'. The multi-sensor based XPilot 3.5 for urban roads is scheduled to be available in 1H22. Should the AD functions of XPilot 3.5 be improved significantly compared with XPilot 3.0, Xpeng's leading position in AD technologies in China could be further strengthened.

It appears to us that Xpeng's R&D has been on the right track as management turns more positive on the future timelines of more advanced AD functions. We are of the view that Xpeng's R&D spending could be more efficient than NIO and Li Auto in the next two years. We estimate RMB 20,000 and RMB 25,000 for hardware costs of the *P5* and *G9*, respectively, much lower than the *NIO ET7*'s RMB 32,000 (see page 47 and 50 titled '*Our estimates for AD hardware costs*' for details). We also believe that Xpeng's AD technologies have a leading advantage of at least one year compared with all other Chinese automakers.

Management mentality crucial to long-term winner

In our opinion, management mentality, especially the company founders' mentality, is even more important than the company's current technological leading position in determining the winners among Chinese NEV start-ups in the long term. Xpeng's leading AD and smart cockpit technologies are highly correlated with its management mentality. Unlike founders at other automakers, Mr He Xiaopeng was very determined to develop proprietary AD software from Day 1. The penetration rate of XPilot and number of active users for these functions are key metrics at Xpeng, on top of sales volume. On 24 Oct 2021, Mr He Xiaopeng announced that Xpeng has accumulated 109mn km on XPilot.

AD functions and smart cockpit have started to facilitate sales

Monthly sales volume for the *P7* was about 2,000–3,000 units prior to 2Q21, and jumped to 6,000–8,000 units in 2H21. Based on our checks with dealers, a large portion of leads for the sales jump were from the existing *P7* owners' referral. We are of the view that the OTA for XPilot 3.0 in Feb 2021 should be critical for such referrals and sales surge. More than 20% of all *P7*s sold were equipped with XPilot 3.0.

The rising popularity of the *P7* has also lifted the *G3* sales volume amid the spillover effect. Yet, the *G3*'s sales volume in 2021 was only about half of *P7*'s despite its lower retail prices, as the *G3* does not have XPilot 3.0.

More premium model pipeline in 2022

Some investors have been concerned if Xpeng is able to go upmarket, as its current ASP is about 15% and 40% lower than Li Auto's and NIO's, respectively. The premiere of the

G9 has probably eased such worries a bit. We are more positive because Xpeng's positioning is not the same as that for Chinese automakers in early days. In addition, Xpeng has been developing flying cars for a few years, which could also improve Xpeng's overall brand image, in our view. It makes sense to us that Xpeng started with more affordable models for higher sales volume given limited resources at beginning, which could help establish brand influence and data accumulation for AD development.

Fast charging to ease range anxiety

Unlike NIO's focus on battery swap, Xpeng and Li Auto have chosen high-voltage fast charging as the main solution to ease range anxiety in the future. The *G9* is to be China's first mass-produced model capable of 800V SiC fast charging. The company claims that it only needs 5 minutes to recharge 200km. Xpeng now has more than 600 self-owned charging piles and Xpeng vehicles are able to recharge from about 2,000 charging piles for free.

Financial Analysis

We expect sales volume to grow rapidly

We project Xpeng's sales volume to more than double to 220,000 units in FY22E, aided by the *P7* and *P5* (180,000 units for both combined). We forecast its sales volume to further surge to 350,000 units in FY23E, helped by new models including the G9. We also expect the new-generation *G3* to be capable of higher level XPilot in FY23E.

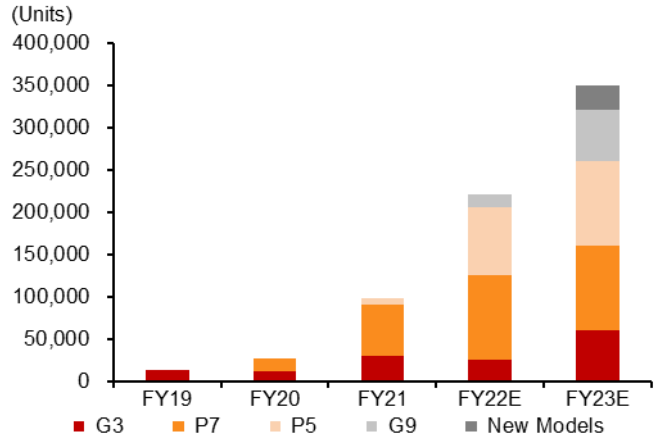
We estimate Xpeng's ASP to rise in FY22E, as its software income could offset diminishing subsidies and higher sales contribution from the *P5*. We project ASP to fall slightly in FY23E, assuming government subsidies are to be completely phased out from 2023.

We expect Xpeng's gross margin to widen to 17.6% in FY22E from 13.5% in FY21E amid greater economies of scale, self-production of the *G3* and higher contribution from software income.

We estimate that Xpeng would spend the least R&D expenses in FY22-23E among the NEV trio, given its better AD technology capabilities. Yet, we project R&D and SG&A to outpace gross profit during FY22-23E, as its expansion is associated with higher marketing efforts, more sales network and charging infrastructure investments.

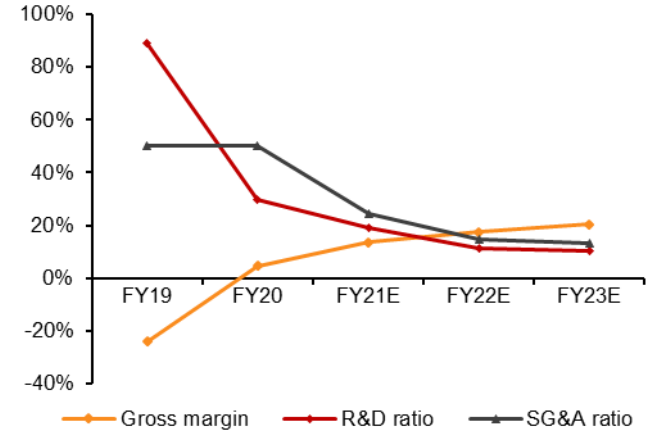
Accordingly, we expect Xpeng's net loss to narrow to about RMB 3bn in FY22E and RMB 876mn in FY23E. Given Xpeng's RMB 41bn net cash now, we believe the automaker would prioritize sales volume and technology development over profitability.

Figure 78: Sales volume forecast



Source: Company data, CMBIS estimates

Figure 79: GPM vs. R&D ratio vs. SG&A ratio



Source: Company data, CMBIS estimates

Our FY21-23E revenue is 5-23% above consensus

We are more bullish than consensus for Xpeng's both top-line and bottom-line earnings outlook, as we believe Xpeng's leading AD technologies have laid out a solid foundation for its future growth.

Figure 80: CMBI estimates vs consensus

	CMBI			Consensus			Diff (%)		
RMB mn	FY21E	FY22E	FY23E	FY21E	FY22E	FY23E	FY21E	FY22E	FY23E
Revenue	20,956	47,851	73,634	20,005	39,020	62,985	4.8%	22.6%	16.9%
Gross Profit	2,837	8,405	15,050	2,641	6,055	11,428	7.4%	38.8%	31.7%
Operating Profit	(5,968)	(3,635)	(1,400)	(6,299)	(5,593)	(2,534)	N/A	N/A	N/A
Net profit	(5,356)	(3,026)	(876)	(5,536)	(4,819)	(2,193)	N/A	N/A	N/A
Gross Margin	13.5%	17.6%	20.4%	13.2%	15.5%	18.1%	0.3 ppt	2.0 ppt	2.3 ppt
Operating Margin	-28.5%	-7.6%	-1.9%	-31.5%	-14.3%	-4.0%	3.0 ppt	6.7 ppt	2.1 ppt
Net Margin	-25.6%	-6.3%	-1.2%	-27.7%	-12.4%	-3.5%	2.1 ppt	6.0 ppt	2.3 ppt

Source: Bloomberg, CMBIS estimates

Valuation

Initiate with BUY; TP of US$ 80.00 (65% upside)

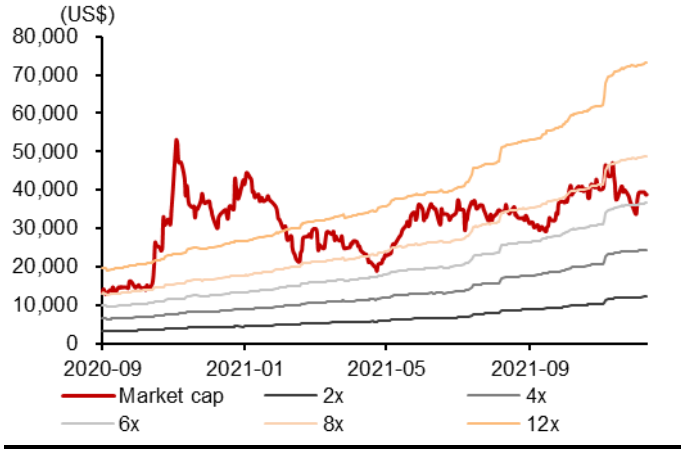
Our target price is based on 9x FY22E P/S, slightly lower than its average forward 12-month P/S of 10.6x since its IPO in Aug 2020. Among peers, Tesla is currently trading at about 15x FY22E P/S on Bloomberg consensus. NIO and Li Auto are currently trading at about 5x and 4x of our FY22E P/S. We are of the view that a 40% discount to Tesla's valuation is justified given Xpeng's leading AD R&D capabilities in China and the current 60% discount could be a sign of oversold. Should the AD functions of XPilot 3.5 by leveraging LiDARs be improved significantly compared with XPilot 3.0, Xpeng could even narrow the technology gap with Tesla.

Figure 81: Peers' valuation

Name	Ticker	Rating	Mkt Cap (US$ mn)	Price (LC)	TP (LC)	Up/Down -side	P/E (x) FY21E	P/E (x) FY22E	P/S (x) FY21E	P/S (x) FY22E	ROE (%) FY21E	ROE (%) FY22E
Xpeng	XPEV US	BUY	41,432	48.38	80.00	65.4%	N/A	N/A	12.6	5.5	(13.8)	(7.3)
Xpeng	9868 HK	BUY	40,384	183.80	312.00	69.7%	N/A	N/A	12.3	5.4	(13.8)	(7.3)
NIO	NIO US	BUY	50,389	31.68	45.00	42.0%	N/A	N/A	9.0	5.2	(32.3)	(9.7)
Li Auto	LI US	BUY	31,760	30.75	48.00	56.1%	N/A	N/A	7.6	3.8	(2.0)	(2.0)
Li Auto	2015 HK	BUY	31,163	117.60	187.20	59.2%	N/A	N/A	7.4	3.7	(2.0)	(2.0)
Tesla	TSLA US	NR	1,110,938	1,106.22	N/A	N/A	224.4	131.7	21.6	15.3	21.7	23.8
	Average								**11.7**	**6.5**	**(7.1)**	**(0.8)**

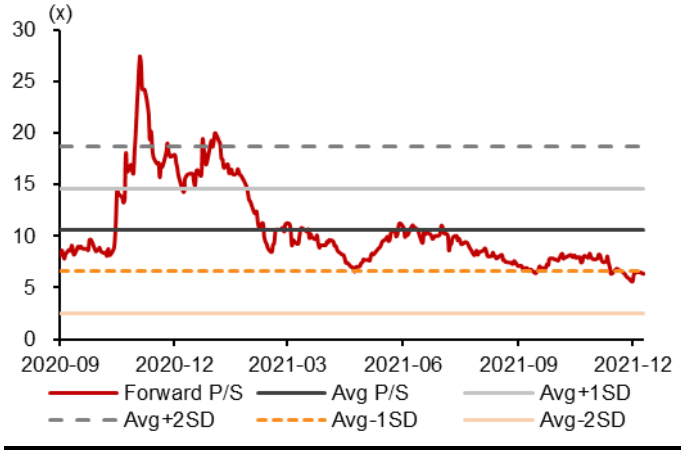
Source: Bloomberg, CMBIS estimates

Figure 82: Xpeng's forward 12-m P/S band



Source: Company data, Bloomberg, CMBIS

Figure 83: Xpeng's forward 12-m P/S range



Source: Company data, Bloomberg, CMBIS

Financial Summary

Income statement

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
Revenue	**2,321**	**5,844**	**20,956**	**47,851**	**73,634**
Cost of sales	(2,879)	(5,578)	(18,119)	(39,446)	(58,585)
Gross profit	**(558)**	**266**	**2,837**	**8,405**	**15,050**
R&D exp.	(2,070)	(1,726)	(4,000)	(5,500)	(7,500)
SG&A exp.	(1,165)	(2,921)	(5,106)	(6,940)	(9,650)
Other income	12	87	300	400	700
Operating profit	**(3,781)**	**(4,294)**	**(5,968)**	**(3,635)**	**(1,400)**
Net finance costs	57	111	562	558	475
Other non-oper exp.	32	1,452	50	50	50
Pre-tax profit	**(3,692)**	**(2,731)**	**(5,356)**	**(3,026)**	**(876)**
Income tax	(0)	(1)	-	-	-
Accr. on preferred shares	(951)	(2,158)	-	-	-
Net profit	**(4,643)**	**(4,890)**	**(5,356)**	**(3,026)**	**(876)**

Cash flow summary

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
Profit before taxation	**(3,692)**	**(2,731)**	**(5,356)**	**(3,026)**	**(876)**
Depreciation/amortization	227	438	588	963	1,862
Change in working capital	(190)	2,495	323	1,373	2,412
Others	92	(340)	(70)	(268)	(173)
Net cash from operating	**(3,563)**	**(140)**	**(4,516)**	**(958)**	**3,225**
Capex	(1,908)	(1,362)	(2,550)	(5,150)	(9,150)
Others	2,649	(3,044)	(910)	1,111	1,037
Net cash from investing	**740**	**(4,406)**	**(3,460)**	**(4,039)**	**(8,113)**
Share issuance	-	27,399	13,592	-	-
Net borrowings	872	(352)	827	475	480
Others	2,722	7,283	-	-	-
Net cash from financing	**3,594**	**34,330**	**14,419**	**475**	**480**
Net change in cash	**771**	**29,784**	**6,442**	**(4,522)**	**(4,408)**
Cash at beginning of the year	1,632	2,408	31,542	37,984	33,462
Exchange difference	5	(650)	-	-	-
Cash at the end of the year	**2,408**	**31,542**	**37,984**	**33,462**	**29,054**

Balance sheet

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
Current assets	**4,961**	**39,679**	**53,738**	**57,513**	**59,795**
Cash & equivalents	1,947	29,209	35,651	31,130	26,722
Account receivables	539	1,129	4,019	7,866	10,087
Inventories	454	1,343	2,482	4,863	6,420
Other current assets	2,020	7,998	11,586	13,654	16,566
Non-current assets	**4,291**	**5,028**	**8,424**	**14,932**	**24,371**
PP&E	3,230	3,082	5,086	9,285	16,584
Intangibles	118	608	634	651	660
Other non-current assets	943	1,338	2,704	4,995	7,126
Total assets	**9,251**	**44,707**	**62,162**	**72,444**	**84,166**
Current liabilities	**3,298**	**7,837**	**14,986**	**26,350**	**36,623**
Bank borrowings	480	173	25	20	20
Account payables	954	5,112	8,935	17,291	24,076
Current deferred revenue	16	164	425	942	1,737
Other current liabilities	1,847	2,389	5,601	8,097	10,790
Non-current liabilities	**3,091**	**2,440**	**4,230**	**6,056**	**8,319**
Bank borrowings	1,690	1,645	2,620	3,100	3,580
Other non-current liabilities	1,401	795	1,610	2,956	4,739
Total liabilities	**6,388**	**10,277**	**19,217**	**32,406**	**44,943**
Mezzanine equity	9,693	-	-	-	-
Ordinary shares	0	0	0	0	0
Reserves	(6,830)	34,430	42,945	40,039	39,223
Shareholders' equity	**(6,830)**	**34,430**	**42,945**	**40,039**	**39,223**
Total equity and liabilities	**9,251**	**44,707**	**62,162**	**72,444**	**84,166**

Key ratios

YE 31 Dec	FY19A	FY20A	FY21E	FY22E	FY23E
Sales mix (%)					
Vehicle sales	93.5	94.9	95.3	95.9	96.2
Services and others	6.5	5.1	4.7	4.1	3.8
Growth (%)					
Revenue	23,815.3	151.8	258.6	128.3	53.9
Gross profit	N/A	N/A	966.7	196.2	79.0
Operating profit	N/A	N/A	N/A	N/A	N/A
Net profit	N/A	N/A	N/A	N/A	N/A
Profit & loss ratio (%)					
Gross margin	(24.0)	4.6	13.5	17.6	20.4
Operating margin	(162.9)	(73.5)	(28.5)	(7.6)	(1.9)
Net profit margin	(200.0)	(83.7)	(25.6)	(6.3)	(1.2)
Balance sheet ratio					
Net cash/total equity (x)	0.2	1.0	0.9	0.9	0.8
Current ratio (x)	1.5	5.1	3.6	2.2	1.6
Receivable turnover days	85	71	70	60	50
Inventory turnover days	58	88	50	45	40
Payable turnover days	121	334	180	160	150
Profitability (%)					
ROE	N/A	(35.4)	(13.8)	(7.3)	(2.2)
ROA	(54.9)	(18.1)	(10.0)	(4.5)	(1.1)
Per share data (RMB)					
EPS	(13.29)	(6.48)	(3.35)	(1.81)	(0.52)
DPS	N/A	N/A	N/A	N/A	N/A

Source: Company data, CMBIS estimates

Xpeng Inc. (9868 HK)

Born to be a tech pioneer

Our top pick. We initiate coverage of Xpeng Inc. with a BUY rating and a target price of HK$ 312.00 for the shares listed in Hong Kong. The target price is based on our target price of US$ 80.00 for the US-listed shares multiplied by forex rate. The average share price difference between XPEV US and 9868 HK is about 0.1% since Xpeng's IPO in Hong Kong in Jul 2021, given free capital flow between these two markets. As the underlying company is identical, please refer to page 52-58 for details. We list the same key points below.

- **Management mentality crucial to long-term winner.** We are of the view that Xpeng's current leading AD and smart cockpit technologies are highly correlated with its management mentality. Unlike other founders, Mr HE Xiaopeng was very determined to develop proprietary AD software from Day 1 and he puts AD related metrics at higher priority than sales. Xpeng was the first Chinese automaker to form a closed loop for its in-house algorithm development and the first to launch a mass-produced LiDAR-equipped model.
- **AD and infotainment functions have already been facilitating sales.** We are of the view that the OTA for XPilot 3.0 in Feb 2021 was crucial to lift the *P7* sales volume from 2,000–3,000 units every month to 6,000–8,000 units.
- **Consensus could underestimate its sales.** Xpeng ended 2021 with annual sales volume of almost 100,000 units, significantly beat a consensus of 60,000 units at the beginning of 2021. Our FY22E revenue, based on our forecast of sales volume of 220,000 units, is 23% higher than consensus, as we believe Xpeng's leading AD technologies have laid out a solid foundation for its growth.
- **Valuation/Key risks.** Our target price is based on 9x FY22E P/S, slightly lower than its average forward 12-month P/S of 10.6x since its IPO, lower than Tesla's current FY22E P/S of 15x on Bloomberg consensus, and higher than NIO's 5x and Li Auto's 4x on our estimates. Key risks to our rating and target price include slower AD technology advancement and a faster catch up from other automakers, lower sales volume than we expect, as well as a sector de-rating.

Earnings Summary

(YE 31 Dec)	FY19A	FY20A	FY21E	FY22E	FY23E
Revenue (RMB mn)	2,321	5,844	20,956	47,851	73,634
YoY growth (%)	23,815.3	151.8	258.6	128.3	53.9
Net income (RMB mn)	(4,643)	(4,890)	(5,356)	(3,026)	(876)
EPS (RMB)	(13.29)	(6.48)	(3.35)	(1.81)	(0.52)
YoY growth (%)	N/A	N/A	N/A	N/A	N/A
P/S (x)	22.6	19.4	12.3	5.4	3.4
P/B (x)	(7.7)	3.3	5.6	6.3	6.4
Yield (%)	N/A	N/A	N/A	N/A	N/A
ROE (%)	N/A	(35.4)	(13.8)	(7.3)	(2.2)
Net gearing (%)	Net cash	Net cash	Net cash	Net cash	Net cash

Source: Company data, Bloomberg, CMBIS estimates

BUY (Initiation)

Target Price	HK$ 312.00
Up/Downside	+69.7%
Current Price	HK$ 183.80

China Auto Sector

SHI Ji, CFA
(852) 3761 8728
shiji@cmbi.com.hk

DOU Wenjing, CFA
(021) 3893 4985
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Stock Data

Mkt Cap (HK$ mn)	335,824
Avg 3 mths t/o (HK$ mn)	326
52w High/Low (HK$)	220.00/131.00
Total Issued Shares (mn)	1,713

Source: Bloomberg

Shareholding Structure

He Xiaopeng	21.2%
Taobao China	11.2%
Others	67.6%

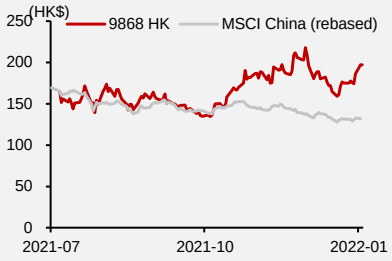
Source: Bloomberg

Share Performance

	Absolute	Relative
1-mth	0.6%	2.5%
3-mth	45.2%	48.7%
6-mth	30.2%	47.1%

Source: Bloomberg

12-mth Price Performance



Source: Bloomberg

Auditor: PricewaterhouseCoopers Zhong Tian

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Gross profit	**(558)**	**266**	**2,837**	**8,405**	**15,050**
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Other income	12	87	300	400	700
Operating profit	**(3,781)**	**(4,294)**	**(5,968)**	**(3,635)**	**(1,400)**
Net finance costs	57	111	562	558	475
Other non-oper exp.	32	1,452	50	50	50
Pre-tax profit	**(3,692)**	**(2,731)**	**(5,356)**	**(3,026)**	**(876)**
Income tax	(0)	(1)	-	-	-
Accr. on preferred shares	(951)	(2,158)	-	-	-
Net profit	**(4,643)**	**(4,890)**	**(5,356)**	**(3,026)**	**(876)**

Cash flow summary

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Others	2,649	(3,044)	(910)	1,111	1,037
Net cash from investing	**740**	**(4,406)**	**(3,460)**	**(4,039)**	**(8,113)**
Share issuance	-	27,399	13,592	-	-
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Others	2,722	7,283	-	-	-
Net cash from financing	**3,594**	**34,330**	**14,419**	**475**	**480**
Net change in cash	**771**	**29,784**	**6,442**	**(4,522)**	**(4,408)**
Cash at beginning of the year	1,632	2,408	31,542	37,984	33,462
Exchange difference	5	(650)	-	-	-
Cash at the end of the year	**2,408**	**31,542**	**37,984**	**33,462**	**29,054**

Balance sheet

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Inventories	454	1,343	2,482	4,863	6,420
Other current assets	2,020	7,998	11,586	13,654	16,566
Non-current assets	**4,291**	**5,028**	**8,424**	**14,932**	**24,371**
PP&E	3,230	3,082	5,086	9,285	16,584
Intangibles	118	608	634	651	660
Other non-current assets	943	1,338	2,704	4,995	7,126
Total assets	**9,251**	**44,707**	**62,162**	**72,444**	**84,166**
Current liabilities	**3,298**	**7,837**	**14,986**	**26,350**	**36,623**
Bank borrowings	480	173	25	20	20
Account payables	954	5,112	8,935	17,291	24,076
Current deferred revenue	16	164	425	942	1,737
Other current liabilities	1,847	2,389	5,601	8,097	10,790
Non-current liabilities	**3,091**	**2,440**	**4,230**	**6,056**	**8,319**
Bank borrowings	1,690	1,645	2,620	3,100	3,580
Other non-current liabilities	1,401	795	1,610	2,956	4,739
Total liabilities	**6,388**	**10,277**	**19,217**	**32,406**	**44,943**
Mezzanine equity	9,693	-	-	-	-
Ordinary shares	0	0	0	0	0
Reserves	(6,830)	34,430	42,945	40,039	39,223
Shareholders' equity	**(6,830)**	**34,430**	**42,945**	**40,039**	**39,223**
Total equity and liabilities	**9,251**	**44,707**	**62,162**	**72,444**	**84,166**

Key ratios

YE 31 Dec	FY19A	FY20A	FY21E	FY22E	FY23E
Sales mix (%)					
Vehicle sales	93.5	94.9	95.3	95.9	96.2
Services and others	6.5	5.1	4.7	4.1	3.8
Growth (%)					
Revenue	23,815.3	151.8	258.6	128.3	53.9
Gross profit	N/A	N/A	966.7	196.2	79.0
Operating profit	N/A	N/A	N/A	N/A	N/A
Net profit	N/A	N/A	N/A	N/A	N/A
Profit & loss ratio (%)					
Gross margin	(24.0)	4.6	13.5	17.6	20.4
Operating margin	(162.9)	(73.5)	(28.5)	(7.6)	(1.9)
Net profit margin	(200.0)	(83.7)	(25.6)	(6.3)	(1.2)
Balance sheet ratio					
Net cash/total equity (x)	0.2	1.0	0.9	0.9	0.8
Current ratio (x)	1.5	5.1	3.6	2.2	1.6
Receivable turnover days	85	71	70	60	50
Inventory turnover days	58	88	50	45	40
Payable turnover days	121	334	180	160	150
Profitability (%)					
ROE	N/A	(35.4)	(13.8)	(7.3)	(2.2)
ROA	(54.9)	(18.1)	(10.0)	(4.5)	(1.1)
Per share data (RMB)					
EPS	(13.29)	(6.48)	(3.35)	(1.81)	(0.52)
DPS	N/A	N/A	N/A	N/A	N/A

Source: Company data, CMBIS estimates

NIO Inc. (NIO US)

First Chinese luxury brand

Initiate with BUY. We initiate coverage of NIO Inc. with a BUY rating and a target price of US$ 45.00, based on 8x our FY22E P/S. NIO is the most successful Chinese auto brand going upmarket, in our view, which empowers NIO with more resources for talents and cutting-edge technologies. NIO has redefined automotive services for automakers, which makes the brand as part of consumers' life and is difficult to mimic.

- **Took a detour in AD but still much better than none.** Although NIO almost needs to build from scratch for the algorithm inside the *ET7*, we still regard NIO as a leading Chinese automaker in the AD software development, right after Xpeng, as its past experience and management mentality do matter for AD technologies.
- **Brand influence to accelerate technology advancement.** NIO has been aggressive in pushing new technologies and ideas for consumers from Day 1. Now, with its brand influence, it is much easier for NIO to work with suppliers to push for cutting-edge technologies, as suppliers are eager to leverage NIO to expand their client base. Semi-solid-state battery in 2022 is a good example.
- **Redefining automotive services to be part of consumers' life.** Despite higher prices paid compared with other Chinese brands, NIO vehicle owners probably have the highest satisfaction. While some new brands have been following NIO's strategies, some services really need determination and excellent mechanism. In our view, NIO's way to increase consumer stickiness is not to make a vehicle, but to make an impact on one's social life, or even become part of one's life.
- **Valuation/Key risks.** Our target price is based on 8x FY22E P/S, in line with NIO's average forward 12-month P/S during the past two years, slightly lower than our target valuation of 9x FY22E P/S for Xpeng. Tesla is currently trading at 15x FY22E P/S on Bloomberg consensus. Key risks to our rating and target price include slower AD technology advancement and a faster catch up from other automakers than our expectation, lower sales volume of new models with NIO's new AD system than we expect, as well as a sector de-rating.

Earnings Summary

(YE 31 Dec)	FY19A	FY20A	FY21E	FY22E	FY23E
Revenue (RMB mn)	7,825	16,258	35,768	63,325	100,007
YoY growth (%)	58.0	107.8	120.0	77.0	57.9
Net income (RMB mn)	(11,413)	(5,611)	(10,051)	(3,887)	(1,294)
EPS (RMB)	(11.08)	(4.74)	(6.25)	(2.27)	(0.74)
YoY growth (%)	N/A	N/A	N/A	N/A	N/A
P/S (x)	29.0	15.0	9.0	5.2	3.6
P/B (x)	(36.1)	9.0	9.4	7.2	7.4
Yield (%)	N/A	N/A	N/A	N/A	N/A
ROE (%)	(4,248)	(53.8)	(32.3)	(9.3)	(2.7)
Net gearing (%)	Net cash	Net cash	Net cash	Net cash	Net cash

Source: Company data, Bloomberg, CMBIS estimates

BUY (Initiation)

Target Price	US$ 45.00
Up/Downside	+42.0%
Current Price	US$ 31.68

China Auto Sector

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Stock Data

Mkt Cap (US$ mn)	53,236
Avg 3 mths t/o (US$ mn)	1,678
52w High/Low (US$)	66.99
Total Issued Shares (mn)	1,591

Source: Bloomberg

Shareholding Structure

Li Bin	11.0%
Tencent entities	10.3%
Others	78.7%

Source: Bloomberg

Share Performance

	Absolute	Relative
1-mth	4.1%	6.0%
3-mth	-0.6%	2.9%
6-mth	-26.6%	-9.7%

Source: Bloomberg

12-mth Price Performance

Source: Bloomberg

Auditor: PricewaterhouseCoopers Zhong Tian

Investment Thesis and Company Overview

NIO is the most successful Chinese auto brand going upmarket, in our view, which empowers NIO with more resources for talents and cutting-edge technologies. NIO has redefined services that an automaker can provide to consumers, which lifts NIO's ASP and increases consumers' stickiness. Many new brands have been following NIO's strategy to build user community, which looks easy on the surface. We are of the view that it could be as difficult as tech transformation, as it requires mentality and business model changes.

Unlike Xpeng and Li Auto, NIO was once very close to liquidation after its IPO. Such experience could make NIO more resilient and react more properly when facing unexpected headwinds.

Autonomous driving: Took a detour but still much better than none

NIO started to develop AD technologies as one of the earliest Chinese automakers. In fact, its NoP (Navigate on Pilot) function was enabled the earliest in China among all the automakers in Oct 2020. On the other hand, as noted on page 45, it is costly to be a forerunner for NIO in terms of its AD development.

1) NIO probably relied too much on its US R&D team for the AD development in the beginning, as there were not many talents in China for AD technologies at that time and automakers did not realize the importance of localization. NIO cut its US R&D team in 2019 when it started to be tight on cash, as the US team did not meet the original expectation.

2) NIO did not realize the importance of an open platform for software development either in the beginning. When there were not many AI chips to choose in the market, NIO partnered with Mobileye and purchased the High version of EyeQ4, in an anticipation of adding more advanced functions with its own algorithm. It did develop its own algorithm and enabled its NoP function based on the Mobileye-labelled data. However, such approach only leaves little room for NIO to add its own scenario-based solutions, as it is limited by the overall architecture designed by Mobileye. Such algorithm for the *ES6* cannot be transferred to the *ET7*.

While it seems that NIO needs to build from scratch for the algorithm inside the *ET7*, we still regard NIO as a leading Chinese automaker in the AD software development, right after Xpeng, because experience and mentality do matter for AD technologies. NIO has been very aggressive in pushing AD functions and such mentality has extended into the *ET7*, which is equipped with four Nvidia Orin chips, one 300-line equivalent LiDAR and 8MP cameras. In our view, four Nvidia Orin chips are probably a bit too much to match the current data processing needs, while NIO's superb brand influence could help lift the *ET7*'s retail prices to cover such costs and make it as free marketing efforts.

From technological perspectives, we believe that NIO is still lagging behind Xpeng with fewer data accumulated, which makes its upcoming *ET7* AD functions crucial, not only for showcasing its current AD capabilities, but also for future data accumulation.

Brand influence to accelerate technology advancement

NIO also leverages its brand influence to accelerate technology advancement with suppliers. While most automakers thought that solid-state battery was still far away, NIO announced in Jan 2021 that its *ET7* will equip semi-solid-state batteries from 2022. It was easy for investors to narrow down the few suppliers who are capable of supplying such batteries at that time. A year later, many more battery suppliers have announced that they could supply such batteries.

The *ET7* will probably be the first vehicle with a subscription model available for AD functions (autonomous driving as a service, or ADaaS). We think that such attempt is also based on NIO's strong brand image.

NIO has been aggressive in pushing new technologies and ideas for consumers from Day 1. Now, with its brand influence, it is much easier for NIO to work with suppliers to push for cutting-edge technologies, as suppliers are eager to leverage NIO to expand their client base.

Redefining services: New business model with excellent mechanism

NIO has redefined automotive services for automakers, which makes the brand as part of consumers' life. Despite higher prices paid compared with other Chinese brands, NIO vehicle owners probably have the highest satisfaction. While some initiatives are probably easy to mimic, such as an insurance package to cover all kinds of accidents, free battery swap service and car repair at home or free delivery, some services to increase consumer stickiness really need determination and excellent mechanism. For example, organizing events in NIO House or NIO Space and building NIO-vehicle owners' community to strengthen bonding and making NIO credits valuable are not as easy as they seem. In our view, NIO's way to increase consumer stickiness is not to make a vehicle, but to make an impact on one's social life, or even become part of one's life.

All these benefits do not come for free but are included in the vehicle price. In NIO's financials, it has separated such services from vehicle income but the services' gross margin is still negative. Such investment is one of the reasons that we project larger net losses at NIO than Xpeng and Li Auto during FY21-23E.

Contract manufacturing with JAC does not drag down margins

Unlike Xpeng and Li Auto, NIO's vehicles are all contract manufactured at JAC's plants in Hefei, Anhui. JAC is responsible for land use, buildings and basic equipment. NIO owns high-end equipment and its powertrain plant in Nanjing. The contract manufacturing fee per vehicle including compensation for JAC's loss was about RMB 19,000–20,000 in FY18-19 (RMB 8,500 for manufacturing + RMB 10,000–11,000 for loss compensation) and fell to about RMB 14,000 per vehicle in FY20. In May 2021, NIO renewed the contract with JAC which removed the compensation fee and lowered manufacturing costs per vehicle but added a fixed cost. The new contract could enable NIO to enjoy the economies of scale. We project the overall manufacturing fee per vehicle to drop to about RMB 7,500 in FY22E and RMB 6,800 in FY23E, which accounts for less than 2% of NIO's ASP.

We are of the view that such contract manufacturing arrangement should not drag down NIO's gross margin, given its premium positioning and the economies of scale from the new contract.

NIO's tie up with Hefei is not limited to JAC. In 2020, a group of investors led by Hefei government injected capital to be minority shareholders of NIO China in a bid to ease NIO's cash crunch. Pursuant to NIO China's share purchase agreement, these investors have the right to request NIO to redeem their equity interests in NIO China at an agreed price in case of NIO China's failure to complete a qualified IPO by Jun 2025. Although similar terms were also applied to minority shareholders of NIO's another subsidiary, XPT Auto, and NIO purchased all the equity interests held by minority shareholders in Nov 2020, we cannot rule out the possibility for NIO China to go public in the STAR board in China in the future.

Battery swap: Benefit consumers; need economies of scale

NIO is one of a few BEV makers which focus primarily on battery swap rather than fast charging, and probably the only automaker to adopt battery swap for individual consumers but not for ride-hailing fleets.

Those who purchased NIO vehicles prior to 12 Oct 2020 can enjoy unlimited free battery swap services for lifetime. After that, NIO buyers are only entitled to four or six free battery swap services per month, depending on the availability of their home charging facilities. NIO also launched a BaaS (battery as a service) scheme: Buyers do not need to pay RMB 70,000 for the battery (70/75kWh) of the vehicle and instead pay a monthly rent of RMB 1,060 (including RMB 80 for service fee). Buyers are not entitled to the ownership of the battery when the scheme is over.

From operational perspectives, we can divide BaaS into two parts: battery bank and battery swap station operation. The battery bank, named Wuhan Weineng Battery Assets, is an associate of NIO (with a stake of about 20%), providing batteries for BaaS and receiving monthly payments from BaaS subscribers. Similar to mortgage providers, the profitability of battery banks is dependent on a series of variables, including monthly cash payment amount, default ratio, percentage of extra batteries needed, battery costs, battery residual value etc. We are not going to discuss in detail about it given its current limited financial impact on NIO.

We have laid out some key assumptions and calculations to examine the profitability for battery swap station operation, which is consolidated in NIO's financials. As noted in the previous paragraphs, the source of income for battery swap stations is the service fee embedded in NIO vehicles' retail prices. During FY19-20, deferred revenue amounted to about 6% of NIO's revenue. We assume 50% of deferred revenue is associated with its battery swap service. Therefore, we can calculate the income contribution to battery swap from one vehicle is about RMB 11,000. Accordingly, we calculate that a battery swap station needs to serve about 500 vehicles in order to break even, based on our simple model illustrated below. Now one battery swap station serves about 240 vehicles on average nationwide.

Figure 84: Key assumptions for battery swap station operation and corresponding breakeven point

Key Assumptions for NIO's battery swap station (RMB)	
Initial Costs	**2,500,000**
Facilities (five-year straight-line depreciation)	1,850,000
Batteries (five-year straight-line, with 20% residual value)	650,000
Annual Fixed Costs, excl. Depreciation	**272,000**
Salary	72,000
Rental	150,000
Maintenance	50,000
Annual Charging Costs	**482,880**
Charging cost (RMB/kWh)	0.5
Battery capacity per vehicle (kWh)	80
No. of vehicles that one station serves	**503**
No. of battery swaps needed every month per vehicle	2
Net Present Value of Cash Outflow	**(5,582,686)**
Battery Swap Station Lifetime Income	**5,583,300**
No. of vehicles that one station serves	**503**
Vehicle ASP	370,000
% of ASP dedicated to battery swap income	3%

Source: Company data, CMBIS estimates

Intuitively, the profitability of battery swap service depends on number of vehicles served, number of batteries recharged, charging costs per kWh, battery residual value, depreciation period and daily operating costs. We have also done a sensitivity analysis for key variables. When the charging costs per kWh or number of battery swaps needed per vehicle reduce by 10%, one battery station needs 6% less number of vehicles served (about 475 vehicles) compared with our base case to break even. The breakeven point is less sensitive to the change of initial battery costs.

Figure 85: Sensitivity analysis for key variables determining battery swap breakeven

	Assumption changes	Corresponding % change for the breakeven number of vehicles that one station serves
Charging cost (RMB/kWh)	-10%	-6%
No. of battery swaps needed every month per vehicle	-10%	-6%
Initial battery cost	-10%	-2%

Source: CMBIS estimates

New mass-market brand

With its current brand influence, the company has emphasized a few times that NIO brand will only focus on premium market and it plans to roll out a new brand for mass market probably in 2023. While the strategy makes perfect sense to us by expanding a broader market with greater economies of scale, it is still too early to conclude how it will evolve in the mass market.

Financial Analysis

Highest R&D and SG&A among NEV trio

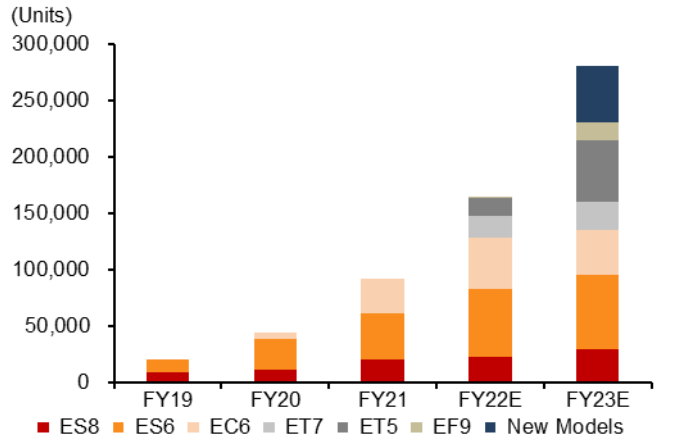
We project NIO's sales volume to rise by 81% YoY to 165,000 units in FY22E, slightly lower than Xpeng's and Li Auto's, given its premium-market focus. The *ET7* ramp-up could be key to NIO in 2022, in our view. We project NIO's sales volume to further surge to 280,000 units, aided by the *ET5* and probably a new mass-market brand.

We estimate NIO's ASP to fall slightly in FY22E with diminishing subsidies. The *ET5*, along with a possible phase-out of NEV subsidies could further drag down NIO's ASP in FY23E. On the other hand, we expect software income to rise with our assumption of 60% ADaaS penetration rate in FY23E.

We expect NIO's gross margin to widen by almost 1ppt to 19.9% in FY22E and to 20.4% in FY23E amid greater economies of scale and higher contribution from software.

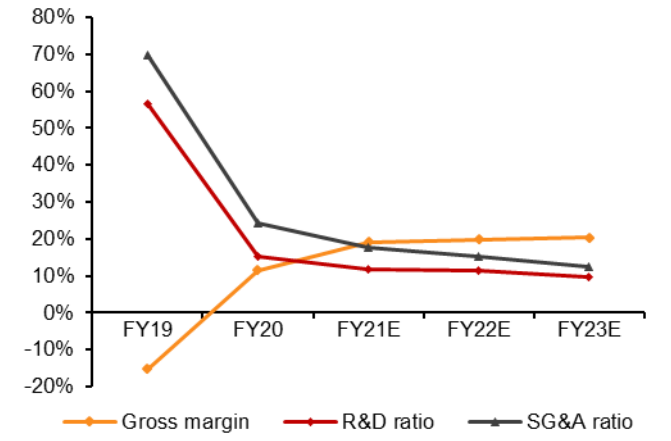
We project NIO to spend the most R&D expenses in FY22-23E among the NEV trio, given its aggressive development plans of the new NIO Autonomous Driving (NAD) system, semi-solid-state battery, battery swap expansion and its mass-market brand. We also project the highest SG&A expenses for NIO among the NEV trio with its higher marketing/service efforts, sales network expansion and battery swap/charging investments. Accordingly, we project NIO's net loss to narrow to about RMB 3.9bn in FY22E and RMB 1.3bn in FY23E, still the largest among the NEV trio.

Figure 86: Sales volume forecast



Source: Company data, CMBIS estimates

Figure 87: GPM vs. R&D ratio vs. SG&A ratio



Source: Company data, CMBIS estimates

Our FY21-23E revenue largely in line with consensus

Our revenue forecasts for FY21-23E are largely in line with consensus with slightly lower gross margin projections. We think that consensus is too bullish on net profit in FY23E. In our view, NIO would rather prioritize customer service differentiation, technology development and sales volume, given its RMB 40bn net cash position.

Figure 88: CMBI estimates vs consensus

	CMBI			Consensus			Diff (%)		
RMB mn	FY21E	FY22E	FY23E	FY21E	FY22E	FY23E	FY21E	FY22E	FY23E
Revenue	35,768	63,325	100,007	35,907	62,989	97,931	-0.4%	0.5%	2.1%
Gross Profit	6,829	12,608	20,372	6,896	12,870	21,154	-1.0%	-2.0%	-3.7%
Operating Profit	(3,647)	(4,045)	(1,456)	(3,661)	(1,831)	2,811	N/A	N/A	N/A
Net profit	(10,051)	(3,887)	(1,294)	(7,527)	(2,369)	1,688	N/A	N/A	N/A
Gross Margin	19.1%	19.9%	20.4%	19.2%	20.4%	21.6%	-0.1 ppt	-0.5 ppt	-1.2 ppt
Operating Margin	-10.2%	-6.4%	-1.5%	-10.2%	-2.9%	2.9%	0.0 ppt	-3.5 ppt	-4.3 ppt
Net Margin	-28.1%	-6.1%	-1.3%	-21.0%	-3.8%	1.7%	-7.1 ppt	-2.4 ppt	-3.0 ppt

Source: Bloomberg, CMBIS estimates

Valuation

Initiate with BUY; TP of US$ 45.00 (42% upside)

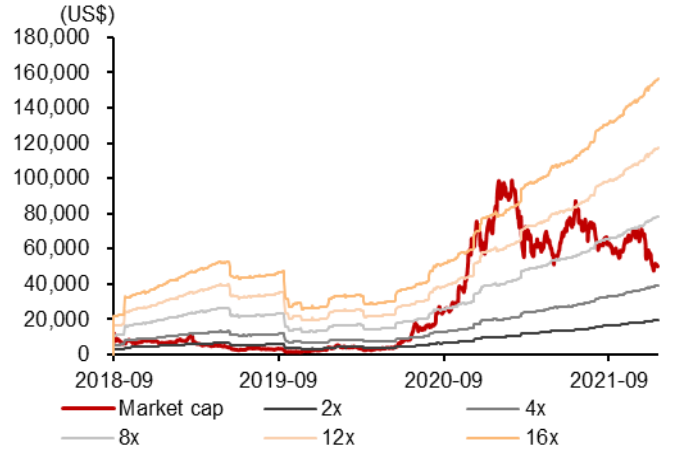
Our target price is based on 8x FY22E P/S, in line with NIO's average forward 12-month P/S during the past two years and higher than its average 12-month P/S of 5.7x since IPO in 2018. Our target valuation for NIO is also slightly lower than our target valuation for Xpeng of 9x FY22E P/S. Tesla is currently trading at about 15x FY22E P/S on Bloomberg consensus and Li Auto is about 4x of our FY22E P/S. We are of the view that such discounts to Tesla and Xpeng are justified by accounting for NIO's brand influence, AD R&D capabilities and operational efficiency.

Figure 89: Peers' valuation

Name	Ticker	Rating	Mkt Cap (US$ mn)	Price (LC)	TP (LC)	Up/Down -side	P/E (x) FY21E	P/E (x) FY22E	P/S (x) FY21E	P/S (x) FY22E	ROE (%) FY21E	ROE (%) FY22E
Xpeng	XPEV US	BUY	41,432	48.38	80.00	65.4%	N/A	N/A	12.6	5.5	(13.8)	(7.3)
Xpeng	9868 HK	BUY	40,384	183.80	312.00	69.7%	N/A	N/A	12.3	5.4	(13.8)	(7.3)
NIO	NIO US	BUY	50,389	31.68	45.00	42.0%	N/A	N/A	9.0	5.2	(32.3)	(9.7)
Li Auto	LI US	BUY	31,760	30.75	48.00	56.1%	N/A	N/A	7.6	3.8	(2.0)	(2.0)
Li Auto	2015 HK	BUY	31,163	117.60	187.20	59.2%	N/A	N/A	7.4	3.7	(2.0)	(2.0)
Tesla	TSLA US	NR	1,110,938	1,106.22	N/A	N/A	224.4	131.7	21.6	15.3	21.7	23.8
	Average								**11.7**	**6.5**	**(7.1)**	**(0.8)**

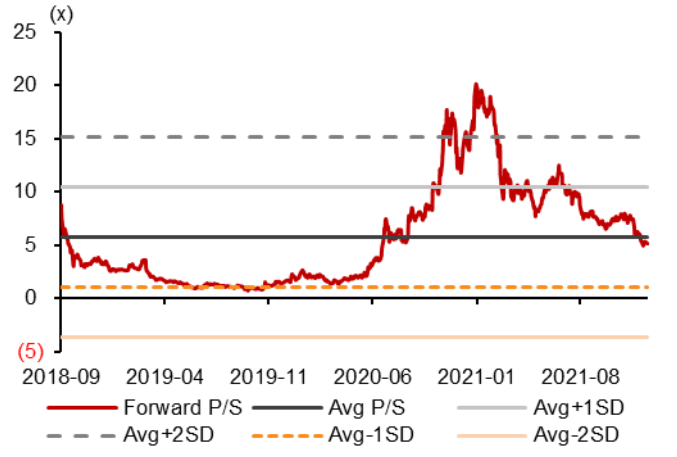
Source: Bloomberg, CMBIS estimates

Figure 90: NIO's forward 12-m P/S band



Source: Company data, Bloomberg, CMBIS

Figure 91: NIO's forward 12-m P/S range



Source: Company data, Bloomberg, CMBIS

Financial Summary

Income statement

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
Revenue	**7,825**	**16,258**	**35,768**	**63,325**	**100,007**
Cost of sales	(9,024)	(14,385)	(28,939)	(50,717)	(79,636)
Gross profit	**(1,199)**	**1,873**	**6,829**	**12,608**	**20,372**
R&D exp.	(4,429)	(2,488)	(4,248)	(7,130)	(9,719)
SG&A exp.	(5,452)	(3,932)	(6,378)	(9,723)	(12,359)
Other income	-	(61)	150	200	250
Operating profit	**(11,079)**	**(4,608)**	**(3,647)**	**(4,045)**	**(1,456)**
Net finance costs	(210)	(259)	72	484	472
Gain/(Loss) of equity investe	(64)	(66)	(100)	(150)	(150)
Other non-oper exp.	66	(365)	150	(20)	10
Pre-tax profit	**(11,288)**	**(5,298)**	**(3,525)**	**(3,731)**	**(1,124)**
Income tax	(8)	(6)	(11)	(11)	(3)
Accr. on redeemable int.	(127)	(312)	(6,520)	(150)	(170)
Minority interests	9	5	5	5	3
Net profit	**(11,413)**	**(5,611)**	**(10,051)**	**(3,887)**	**(1,294)**

Cash flow summary

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
Profit before taxation	**(11,288)**	**(5,298)**	**(3,525)**	**(3,731)**	**(1,124)**
Depreciation/amortization	1,521	1,546	1,918	2,537	3,489
Change in working capital	437	4,830	1,597	3,021	2,282
Others	608	873	693	832	832
Net cash from operating	**(8,722)**	**1,951**	**683**	**2,660**	**5,479**
Capex	(1,707)	(1,128)	(3,201)	(4,501)	(6,001)
Others	5,089	(3,943)	(16,199)	(200)	4,800
Net cash from investing	**3,382**	**(5,071)**	**(19,400)**	**(4,701)**	**(1,201)**
Share issuance	51	34,76	13,234	15,800	600
Net borrowings	(1,234)	615	(1,931)	(270)	967
Others	4,279	5,981	285	20	(2,011)
Net cash from financing	**3,095**	**41,357**	**11,588**	**15,550**	**(445)**
Net change in cash	**(2,245)**	**38,237**	**(7,129)**	**13,508**	**3,834**
Cash at beginning of the year	3,224	990	38,545	31,416	44,924
Exchange difference	10	(682)	-	-	-
Cash at the end of the year	**990**	**38,545**	**31,416**	**44,924**	**48,758**

Balance sheet

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
Current assets	**4,928**	**46,207**	**57,844**	**75,194**	**79,074**
Cash & equivalents	863	38,426	27,756	40,824	44,108
Account receivables	1,352	1,079	2,548	4,511	7,124
Inventories	890	1,082	1,982	3,474	5,673
Other current assets	1,824	5,620	25,558	26,386	22,169
Non-current assets	**9,654**	**8,435**	**11,075**	**14,347**	**17,114**
PP&E	5,533	4,996	6,818	9,428	12,723
Right-of-use assets	1,998	1,350	1,499	1,690	1,100
Other non-current assets	2,123	2,089	2,757	3,229	3,292
Total assets	**14,582**	**54,642**	**68,918**	**89,542**	**96,188**
Current liabilities	**9,499**	**13,976**	**16,972**	**24,068**	**31,106**
Bank borrowings	1,208	1,931	270	33	-
Account payables	3,112	6,368	10,307	16,674	22,909
Tax payable	44	182	182	182	182
Other current liabilities	5,135	5,496	6,213	7,179	8,015
Non-current liabilities	**9,905**	**8,803**	**15,195**	**14,980**	**16,578**
Bank borrowings incl. CB	7,155	5,938	11,312	10,185	11,185
Other non-current liabilities	2,750	2,865	3,883	4,796	5,393
Total liabilities	**19,404**	**22,780**	**32,167**	**39,049**	**47,683**
Mezzanine equity	1,456	4,691	1,711	1,861	-
Share capital	2	3	3	3	3
Treasury shares	-	-	(1,853)	(2,974)	(2,974)
Reserves	(6,302)	27,166	36,878	51,596	51,472
Non-controlling interests	22	2	12	7	4
Shareholders' equity	**(6,300)**	**27,169**	**35,028**	**48,625**	**48,501**
Total equity and liabilities	**14,582**	**54,642**	**68,918**	**89,542**	**96,188**

Key ratios

YE 31 Dec	FY19A	FY20A	FY21E	FY22E	FY23E
Sales mix (%)					
Vehicle sales	94.1	93.4	92.8	93.2	92.2
Others	5.9	6.6	7.2	6.8	7.8
Growth (%)					
Revenue	58.0	107.8	120.0	77.0	57.9
Gross profit	N/A	N/A	264.5	84.6	61.6
Operating profit	N/A	N/A	N/A	N/A	N/A
Net profit	N/A	N/A	N/A	N/A	N/A
Profit & loss ratio (%)					
Gross margin	(15.3)	11.5	19.1	19.9	20.4
Operating margin	(141.6	(28.3)	(10.2)	(6.4)	(1.5)
Net profit margin	(145.9	(34.5)	(28.1)	(6.1)	(1.3)
Balance sheet ratio					
Net cash/total equity (x)	1.5	1.1	1.1	1.1	1.1
Current ratio (x)	0.5	3.3	3.4	3.1	2.5
Receivable turnover days	63	24	26	26	26
Inventory turnover days	36	27	25	25	26
Payable turnover days	126	162	130	120	105
Profitability (%)					
ROE	(4,247.9)	(53.8)	(32.3)	(9.3)	(2.7)
ROA	(68.3)	(16.2)	(16.3)	(4.9)	(1.4)
Per share data (RMB)					
EPS	(11.08)	(4.74)	(6.25)	(2.27)	(0.74)
DPS	N/A	N/A	N/A	N/A	N/A

Source: Company data, CMBIS estimates

Li Auto Inc. (LI US)

Less is more

BUY (Initiation)

Target Price	**US$ 48.00**
Up/Downside	**+56.1%**
Current Price	**US$ 30.75**

Initiate with BUY. We initiate coverage of Li Auto Inc. with a BUY rating and a target price of US$ 48.00, based on 6x our FY22 P/S. We would not think that Li Auto's EREV strategy is inferior to other BEV makers, as long as its products are attractive to consumers, as we believe consumer stickiness should come from new values realized in NEVs but not from a different powertrain. In our view, Li Auto's efficiency and attention to details for consumers' in-car experience are key to its success and difficult to mimic. Li Auto's strong financials from its operational efficiency also enable it to invest more aggressively to catch up in AD R&D.

- **A culture of focus is difficult to mimic.** Unlike NIO which attempts to become part of buyer's life, Li Auto focuses on enhancing buyer's in-car experience, which is not as easy as it seems. Li Auto's attention to details on its *Li ONE* has reflected its culture to prioritize consumer values and disrupt inefficient convention in the industry. It makes the best out of its only model by focusing on one powertrain, one configuration and one group of buyers (young families).
- **EREV lifts sales in regions without license caps.** About 70% of the *Li ONEs* were sold in the cities without ICE-vehicle license registration, higher than the ratio of 54% for Tesla, NIO and Xpeng combined. The *Li ONE* is popular in cities with driving restriction, such as Zhengzhou, Chongqing, Xi'an and Shijiazhuang, where consumers may have higher range anxiety given lower charging infrastructure penetration.
- **Lower valuation for being a follower in AD but on track to catch up.** Autonomous driving was not a priority at Li Auto in the beginning but it attempted to catch up by switching to proprietary algorithm and open-platform Journey 3 chip on the facelifted *Li ONE*. We would still regard Li Auto as a follower in AD development for now and that is the key reason why our target valuation for Li Auto is lower than Xpeng and NIO. The way it makes the new L2+ functions as a standard configuration could better help data accumulation.
- **Valuation/Key risks.** Our target price is based on 6x FY22E P/S, in line with Li Auto's 2021 average forward 12-month P/S. Key risks to our rating and target price include slower AD technology advancement and a faster catch up from other automakers than our expectation, lower sales volume especially for BEVs than we expect, as well as a sector de-rating.

Earnings Summary

(YE 31 Dec)	FY19A	FY20A	FY21E	FY22E	FY23E
Revenue (RMB mn)	284	9,457	26,741	52,917	88,780
YoY growth (%)	N/A	3,225.5	182.8	97.9	67.8
Net income (RMB mn)	(3,282)	(792)	(719)	(838)	(233)
EPS (RMB)	(12.87)	(0.91)	(0.37)	(0.41)	(0.11)
YoY growth (%)	N/A	N/A	N/A	N/A	N/A
P/S (x)	96.0	9.2	7.6	3.8	2.3
P/B (x)	(4.8)	2.9	4.7	4.9	4.8
Yield (%)	N/A	N/A	N/A	N/A	N/A
ROE (%)	N/A	(6.6)	(2.0)	(2.0)	(0.6)
Net gearing (%)	48.9	Net cash	Net cash	Net cash	Net cash

Source: Company data, Bloomberg, CMBIS estimates

China Auto Sector

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Stock Data

Mkt Cap (US$ mn)	33,642
Avg 3 mths t/o (US$ mn)	272
52w High/Low (US$)	37.65/15.98
Total Issued Shares (mn)	2,066

Source: Bloomberg

Shareholding Structure

Li Xiang	22.5%
Wang Xing	18.9%
Others	58.6%

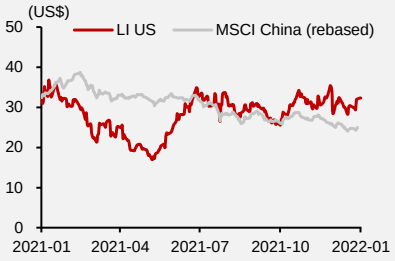
Source: Bloomberg

Share Performance

	Absolute	Relative
1-mth	13.5%	15.4%
3-mth	18.1%	21.5%
6-mth	1.7%	18.6%

Source: Bloomberg

12-mth Price Performance



Source: Bloomberg

Auditor: PricewaterhouseCoopers Zhong Tian

Investment Thesis and Company Overview

EREV strategy should not dent valuation

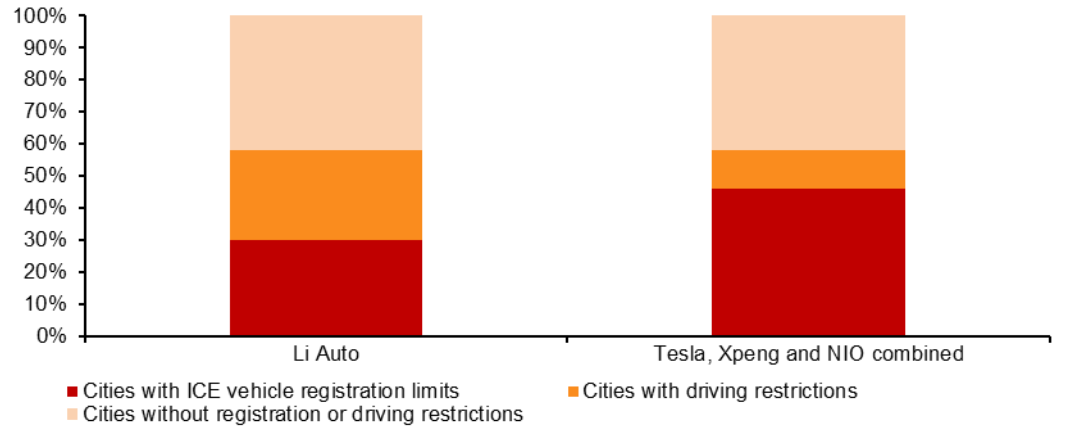
Unlike Xpeng and NIO, Li Auto started its NEV path with EREV, as it believes charging infrastructure in China is not ready yet for mass adoption of BEVs. As noted a few times in this report, we are of the view that consumers' stickiness of NEVs should come from new functions realized in NEVs (namely autonomous driving and smart cockpit), but not from batteries as a different powertrain. Therefore, we would not think that Li Auto's EREV strategy is inferior to other BEV makers, as long as its products are attractive to consumers. According to the company, about 60% of Li Auto users have installed charging piles at home. About 80% of intra-city road driving is on BEV mode for the *Li ONEs* in Shanghai and Beijing.

Investors may also be concerned whether Li Auto will lag in BEV technologies if it only starts to sell BEVs from 2023. We are of the view that most of the EREV related technologies can be transferred to BEV development and Li Auto is still better positioned than those ICE vehicle makers which have limited BEV technologies. Therefore, we think that Li Auto's EREV strategy should not be a reason to dent its valuation.

EREV has probably lifted sales in regions without license caps

We have done an analysis to examine if EREV could lure more consumers in the cities without ICE registration limits who may have range anxiety. In the first 11 months of 2021, about 70% of the *Li ONEs* were sold in the cities without ICE-vehicle license caps, higher than the ratio of 54% for Tesla, NIO and Xpeng combined. About 28% of the *Li ONEs* were sold in the cities without license registration caps but with driving restriction, such as Zhengzhou, Chongqing, Xi'an and Shijiazhuang, where consumers may have higher range anxiety given lower charging infrastructure penetration. The powertrain is just one aspect of the product, which is not difficult to mimic. In our view, Li Auto's efficiency and attention to details for consumers' in-car experience are more crucial to its success.

Figure 92: Li Auto's sales breakdown by city type vs Tesla, Xpeng and NIO



Source: CATRAC, CMBI

A culture of focus is difficult to mimic

In terms of efficiency, Li Auto is probably the closest to Tesla among all NEV makers, in our view. Efficiency comes along with focus: one powertrain, one model, one trim level, and one group of buyers. This model was the 4th best-selling NEV model in China in the first 11 months of 2021, right after the *Wuling Hongguang Mini*, *Tesla Model Y* and *Model 3*. Almost

90% of the *Li ONEs* were bought for family use. The upcoming *X01* is an even larger SUV for family and the company has not planned for any sedan yet.

Unlike NIO which attempts to become part of buyer's life, Li Auto focuses on enhancing buyer's in-car experience. While product positioning and function design sound easy to automakers, disruption to 100-year industry convention needs strong culture led by founders. In our view, one of the reasons why it takes five to seven years for one model's generation change is the ongoing back and forth between product managers and engineers to deal with consumer needs. As the most important player along the supply chain, in the past, automakers defined cars by themselves and closed the loop once the car is out of factory. We are of the view that Li Auto has eliminated such 'play safe' bias with new detailed design, including four-display interactive system and full-coverage in-car voice control system. Such culture is difficult to mimic, in our view.

Lower valuation for being a follower in AD but on track to catch up

Efficiency also means prioritization. Autonomous driving was not a priority at Li Auto in the beginning. That is why the *Li ONE* adopted Mobileye's solution for the AD features when the model was rolled out in 2019. It attempted to catch up by switching to proprietary algorithm and open-platform chip, the Journey 3, on the facelifted *Li ONE* launched in May 2021. We would still regard Li Auto as a follower in AD development for now and that is the key reason why our target valuation for Li Auto is lower than Xpeng and NIO, as we believe that AD is one of the most important differentiators for automakers to lure consumers in the foreseeable future.

Li Auto's way to catch up makes sense to us: It makes the L2+ functions as a standard configuration, which helps Li Auto enable more vehicles for data accumulation. Therefore, it is probably too early to conclude who the final winners will be.

No legacy burden for high-voltage fast charging

Similar to Xpeng, Li Auto has also decided to focus on high-voltage fast charging for its upcoming BEVs to ease consumers' range anxiety. In our view, Li Auto may also benefit from its focus mentality, as it does not have legacy burden for any existing charging piles which cannot be converted to high-voltage fast charging piles.

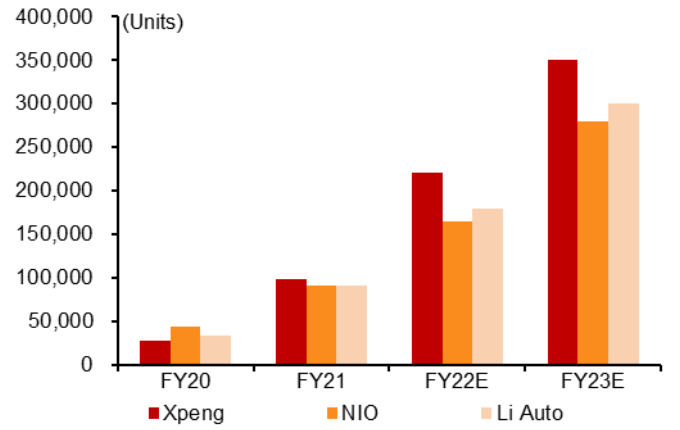
Financial Analysis

Strong financials enable Li Auto to invest more aggressively

We project Li Auto's sales volume to double to 180,000 units in FY22E, ranked the second among the NEV trio. The majority of the sales should still come from the *Li ONE*, as the larger *X01* EREV is scheduled to be unveiled in 3Q22. We forecast Li Auto's sales volume to rise to 300,000 units in FY23E, aided by a plethora of new models including BEVs from dedicated platforms.

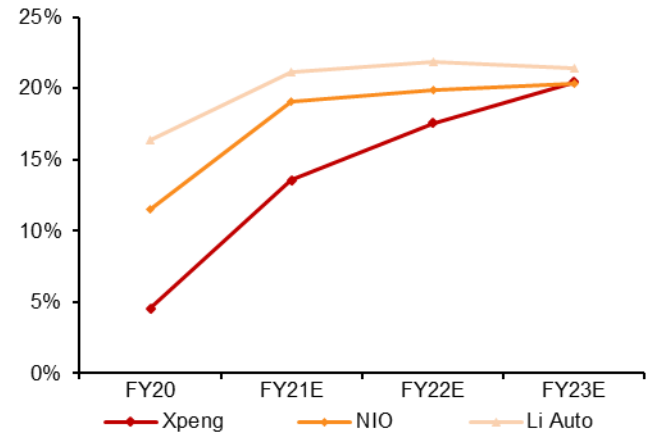
We expect Li Auto's gross margin to widen slightly to 21.9% in FY22E, the highest among the NEV trio, thanks to greater economies of scale, its superb cost control and the EREV powertrain. We expect its gross margin to narrow slightly in FY23E, dragged down by BEVs and investments in new plants.

Figure 93: Sales volume comparison of NEV trio



Source: Company data, CMBIS estimates

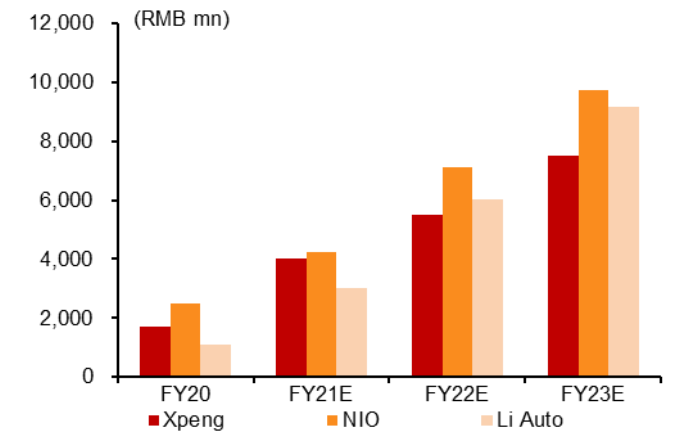
Figure 94: Gross margin comparison of NEV trio



Source: Company data, CMBIS estimates

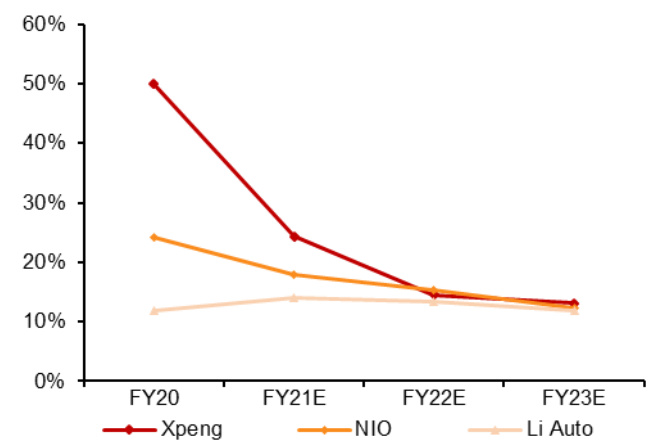
We expect Li Auto's R&D expenses to rise drastically from FY22E, as it has been more aggressive in launching new models and improving AD capabilities. Unlike the previous years when Li Auto spent significantly lower R&D expenses, we forecast Li Auto's R&D expenses to surpass Xpeng's in FY22-23E. We also expect Li Auto's SG&A ratio to remain the lowest but also drop the least among the NEV trio, as it starts to invest heavily in fast charging infrastructure.

Figure 95: R&D expense comparison of NEV trio



Source: Company data, CMBIS estimates

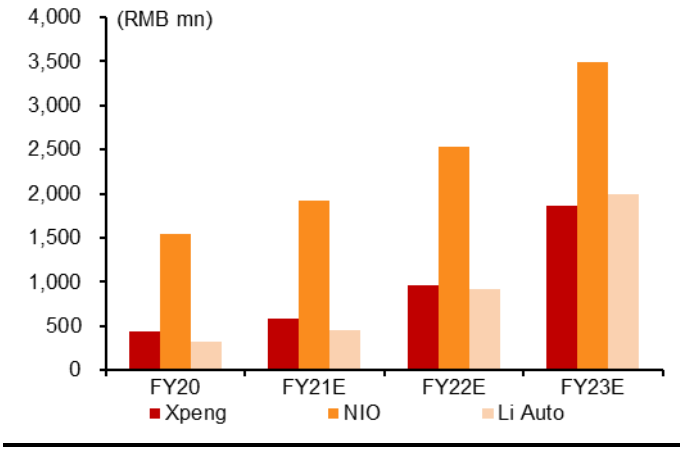
Figure 96: SG&A ratio comparison of NEV trio



Source: Company data, CMBIS estimates

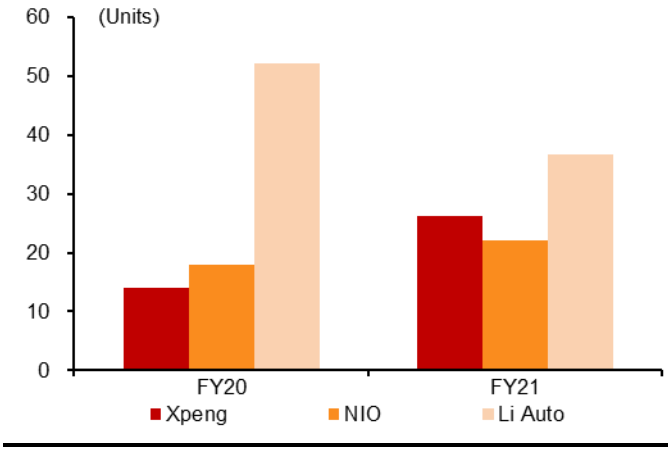
Li Auto aims to double its showrooms to 400 stores in FY22E, which may dent its store efficiency in the short term. In the past two years, Li Auto had the highest sales volume per store among the NEV trio.

Figure 97: Depreciation & amortization of NEV trio



Source: Company data, CMBIS estimates

Figure 98: Monthly sales volume per store (year avg)



Source: Company data, CMBIS

Our FY21-23E revenue is 3-20% above consensus

We are more bullish than consensus for Li Auto's revenue outlook. Our gross margin projections during FY22-23E are slightly lower than consensus amid higher costs on AD hardware as standard configurations and BEV rollouts. We project wider net loss in FY22E than FY21E because of Li Auto's investments in R&D, new plants and fast charging infrastructure. We still expect a net loss in FY23E for Li Auto.

Figure 99: CMBI estimates vs consensus

	CMBI			Consensus			Diff (%)		
RMB mn	FY21E	FY22E	FY23E	FY21E	FY22E	FY23E	FY21E	FY22E	FY23E
Revenue	26,741	52,917	88,780	26,026	45,399	74,037	2.7%	16.6%	19.9%
Gross Profit	5,653	11,585	19,026	5,412	10,132	16,865	4.5%	14.3%	12.8%
Operating Profit	(1,106)	(1,476)	(593)	(1,285)	(727)	2,078	N/A	N/A	N/A
Net profit	(719)	(838)	(233)	(656)	(499)	2,624	N/A	N/A	N/A
Gross Margin	21.1%	21.9%	21.4%	20.8%	22.3%	22.8%	0.3 ppt	-0.4 ppt	-1.3 ppt
Operating Margin	-4.1%	-2.8%	-0.7%	-4.9%	-1.6%	2.8%	0.8 ppt	-1.2 ppt	-3.5 ppt
Net Margin	-2.7%	-1.6%	-0.3%	-2.5%	-1.1%	3.5%	-0.2 ppt	-0.5 ppt	-3.8 ppt

Source: Bloomberg, CMBIS estimates

Valuation

Initiate with BUY; TP of US$ 48.00 (56% upside)

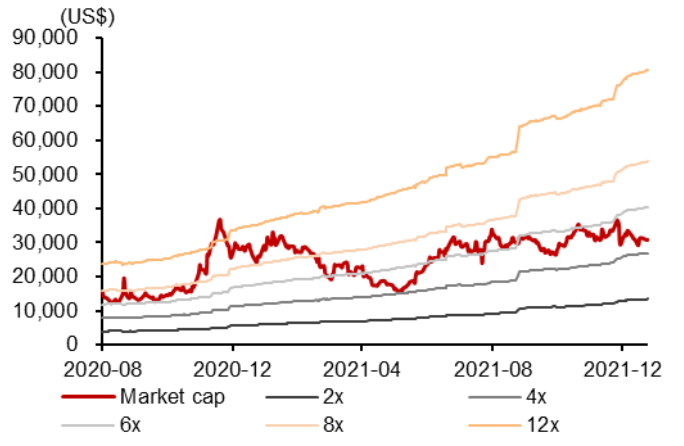
Our target price is based on 6x FY22E P/S, in line with Li Auto's average forward 12-month P/S in 2021 and slightly lower than the average of 6.8x since its IPO in Aug 2020. Our target valuation for Li Auto is also lower than that for Xpeng and NIO, mainly because of its lagging in AD technologies, as noted earlier.

Figure 100: Peers' valuation

Name	Ticker	Rating	Mkt Cap (US$ mn)	Price (LC)	TP (LC)	Up/Down -side	P/E (x) FY21E	P/E (x) FY22E	P/S (x) FY21E	P/S (x) FY22E	ROE (%) FY21E	ROE (%) FY22E
Xpeng	XPEV US	BUY	41,432	48.38	80.00	65.4%	N/A	N/A	12.6	5.5	(13.8)	(7.3)
Xpeng	9868 HK	BUY	40,384	183.80	312.00	69.7%	N/A	N/A	12.3	5.4	(13.8)	(7.3)
NIO	NIO US	BUY	50,389	31.68	45.00	42.0%	N/A	N/A	9.0	5.2	(32.3)	(9.7)
Li Auto	LI US	BUY	31,760	30.75	48.00	56.1%	N/A	N/A	7.6	3.8	(2.0)	(2.0)
Li Auto	2015 HK	BUY	31,163	117.60	187.20	59.2%	N/A	N/A	7.4	3.7	(2.0)	(2.0)
Tesla	TSLA US	NR	1,110,938	1,106.22	N/A	N/A	224.4	131.7	21.6	15.3	21.7	23.8
	Average								**11.7**	**6.5**	**(7.1)**	**(0.8)**

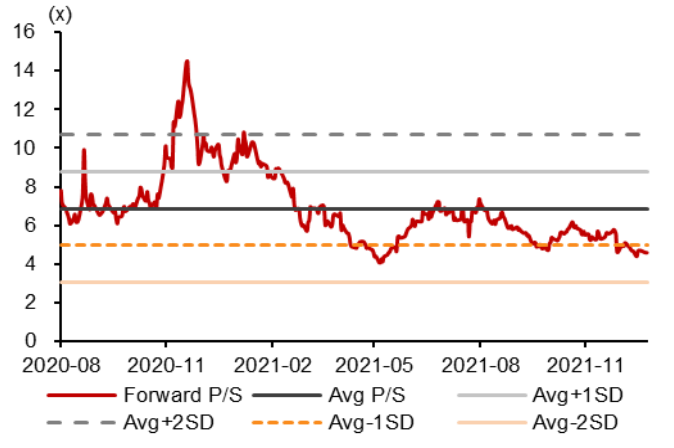
Source: Bloomberg, CMBIS estimates

Figure 101: Li Auto's forward 12-m P/S band



Source: Company data, Bloomberg, CMBIS

Figure 102: Li Auto's forward 12-m P/S range



Source: Company data, Bloomberg, CMBIS

Financial Summary

Income statement

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
Revenue	**284**	**9,457**	**26,741**	**52,917**	**88,780**
Cost of sales	(284)	(7,907)	(21,088)	(41,333)	(69,754)
Gross profit	**(0)**	**1,549**	**5,653**	**11,585**	**19,026**
R&D exp.	(1,169)	(1,100)	(3,033)	(6,039)	(9,158)
SG&A exp.	(689)	(1,119)	(3,726)	(7,022)	(10,461)
Operating profit	**(1,859)**	**(669)**	**(1,106)**	**(1,476)**	**(593)**
Net finance costs	(53)	(26)	113	158	(167)
Investment income	49	214	415	506	538
Other non-oper exp.	(555)	292	(20)	(25)	(10)
Pre-tax profit	**(2,418)**	**(189)**	**(599)**	**(838)**	**(233)**
Tax	-	23	(120)	-	-
Discontinued operations	(21)	14	-	-	-
Accr. on preferred shares	(843)	(640)	-	-	-
Net profit	**(3,282)**	**(792)**	**(719)**	**(838)**	**(233)**

Cash flow summary

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
Profit before taxation	**(2,418)**	**(189)**	**(599)**	**(838)**	**(233)**
Depreciation/amortization	116	321	452	921	1,988
Change in working capital	(154)	3,068	2,703	3,974	3,897
Others	661	(60)	1,051	1,265	1,571
Net cash from operating	**(1,794)**	**3,140**	**3,607**	**5,324**	**7,224**
Capex	(953)	(675)	(2,550)	(7,050)	(9,050)
Others	(1,622)	(18,063)	(2,400)	(3,050)	(5,350)
Net cash from investing	**(2,575)**	**(18,738)**	**(4,950)**	**(10,100)**	**(14,400)**
Share issuance	-	21,026	11,109	7	7
Net borrowings	233	(145)	34	(140)	9,037
Others	5,422	3,830	5,606	-	0
Net cash from financing	**5,656**	**24,711**	**16,749**	**(134)**	**9,043**
Net change in cash	**1,287**	**9,113**	**15,406**	**(4,910)**	**1,867**
Cash at beginning of the year	96	1,436	10,173	25,569	20,659
FX & discontinued operations	54	(377)	(10)	-	-
Cash at the end of the year	**1,436**	**10,173**	**25,569**	**20,659**	**22,525**

Balance sheet

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
Current assets	**5,066**	**31,391**	**50,972**	**52,118**	**63,072**
Cash & equivalents	1,296	8,938	24,069	19,059	20,525
Account receivables	8	116	733	1,450	2,919
Inventories	518	1,048	1,733	3,171	5,351
Other current assets	3,243	21,289	24,437	28,439	34,277
Non-current assets	**4,448**	**4,982**	**10,884**	**21,786**	**33,549**
PP&E	2,795	2,479	4,543	10,577	17,551
Intangibles	674	683	717	740	753
Right-of-use assets	510	1,277	4,533	8,767	13,015
Other non-current assets	468	543	1,092	1,703	2,230
Total assets	**9,513**	**36,373**	**61,856**	**73,904**	**96,622**
Current liabilities	**4,680**	**4,309**	**10,523**	**18,007**	**36,452**
Bank borrowings	239	-	512	-	9,611
Account payables	625	3,161	6,933	12,456	17,200
Current deferred revenue	57	272	875	2,134	4,420
Other current liabilities	3,759	877	2,204	3,416	5,220
Non-current liabilities	**253**	**2,260**	**10,081**	**14,412**	**17,851**
Bank borrowings	-	512	100	600	500
Lease liabilities	241	1,392	3,538	6,716	9,534
Other non-current liabilities	11	357	6,443	7,096	7,817
Total liabilities	**4,932**	**6,570**	**20,604**	**32,419**	**54,303**
Mezzanine equity	10,256	-	-	-	-
Share capital	0	1	1	1	1
Reserves	(5,675)	29,802	41,251	41,484	42,317
Shareholders' equity	**(5,675)**	**29,804**	**41,252**	**41,485**	**42,318**
Total equity and liabilities	**9,513**	**36,373**	**61,856**	**73,904**	**96,622**

Key ratios

YE 31 Dec	FY19A	FY20A	FY21E	FY22E	FY23E
Sales mix (%)					
Vehicle sales	98.8	98.2	96.4	96.9	97.0
Other sales & services	1.2	1.8	3.6	3.1	3.0
Growth (%)					
Revenue	N/A	3,225.5	182.8	97.9	67.8
Gross profit	N/A	N/A	264.9	104.9	64.2
Operating profit	N/A	N/A	N/A	N/A	N/A
Net profit	N/A	N/A	N/A	N/A	N/A
Profit & loss ratio (%)					
Gross margin	(0.0)	16.4	21.1	21.9	21.4
Operating margin	(653.6)	(7.1)	(4.1)	(2.8)	(0.7)
Net profit margin	(1,154.0)	(8.4)	(2.7)	(1.6)	(0.3)
Balance sheet ratio					
Net cash (debt)/total equity (x)	(0.5)	1.0	1.0	1.0	0.9
Current ratio (x)	1.1	7.3	4.8	2.9	1.7
Receivable turnover days	11	4	10	10	12
Inventory turnover days	665	48	30	28	28
Payable turnover days	802	146	120	110	90
Profitability (%)					
ROE	N/A	(6.6)	(2.0)	(2.0)	(0.6)
ROA	(42.9)	(3.5)	(1.5)	(1.2)	(0.3)
Per share data (RMB)					
EPS	(12.87)	(0.91)	(0.37)	(0.41)	(0.11)
DPS	N/A	N/A	N/A	N/A	N/A

Source: Company data, CMBIS estimates

Li Auto Inc. (2015 HK)

Less is more

Initiate with BUY. We initiate coverage of Li Auto Inc. with a BUY rating and a target price of HK$ 187.20 for the shares listed in Hong Kong. The target price is based on our target price of US$ 48.00 for the US-listed shares multiplied by forex rate. The average share price difference between LI US and 2015 HK is about 0.2% since Li Auto's IPO in Hong Kong in Aug 2021, given free capital flow between these two markets. As the underlying company is identical, please refer to page 70-76 for details. We list the same key points below.

- **A culture of focus is difficult to mimic.** Unlike NIO which attempts to become part of buyer's life, Li Auto focuses on enhancing buyer's in-car experience, which is not as easy as it looks like. Li Auto's attention to details on its *Li ONE* has reflected its culture to prioritize consumer values and disrupt inefficient convention in the industry. It makes the best out of its only model by focusing on one powertrain, one configuration and one group of buyers (young families).
- **EREV lifts sales in regions without license caps.** About 70% of the *Li ONE*s were sold in the cities without ICE-vehicle license registration, higher than the ratio of 54% for Tesla, NIO and Xpeng combined. The *Li ONE* is popular in cities with driving restriction, such as Zhengzhou, Chongqing, Xi'an and Shijiazhuang, where consumers may have higher range anxiety given lower charging infrastructure penetration.
- **Lower valuation for being a follower in AD but on track to catch up.** Autonomous driving was not a priority at Li Auto in the beginning but it attempted to catch up by switching to proprietary algorithm and open-platform Journey 3 chip on the facelifted *Li ONE*. We would still regard Li Auto as a follower in AD development for now and that is the key reason why our target valuation for Li Auto is lower than Xpeng and NIO. The way it makes the new L2+ functions as a standard configuration could better help data accumulation.
- **Valuation/Key risks.** Our target price is based on 6x FY22E P/S, in line with Li Auto's 2021 average forward 12-month P/S. Key risks to our rating and target price include slower AD technology advancement and a faster catch up from other automakers than our expectation, lower sales volume especially for BEVs than we expect, as well as a sector de-rating.

Earnings Summary

(YE 31 Dec)	FY19A	FY20A	FY21E	FY22E	FY23E
Revenue (RMB mn)	284	9,457	26,741	52,917	88,780
YoY growth (%)	N/A	3,225.5	182.8	97.9	67.8
Net income (RMB mn)	(3,282)	(792)	(719)	(838)	(233)
EPS (RMB)	(12.87)	(0.91)	(0.37)	(0.41)	(0.11)
YoY growth (%)	N/A	N/A	N/A	N/A	N/A
P/S (x)	86.3	8.9	7.4	3.7	2.2
P/B (x)	(4.3)	2.8	4.5	4.7	4.7
Yield (%)	N/A	N/A	N/A	N/A	N/A
ROE (%)	N/A	(6.6)	(2.0)	(2.0)	(0.6)
Net gearing (%)	48.9	Net cash	Net cash	Net cash	Net cash

Source: Company data, Bloomberg, CMBIS estimates

BUY (Initiation)

Target Price	HK$ 187.20
Up/Downside	+59.2%
Current Price	HK$ 117.60

China Auto Sector

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Stock Data

Mkt Cap (HK$ mn)	262,346
Avg 3 mths t/o (HK$ mn)	106
52w High/Low (HK$)	145.00/98.05
Total Issued Shares (mn)	2,066

Source: Bloomberg

Shareholding Structure

Li Xiang	22.5%
Wang Xing	18.9%
Others	58.6%

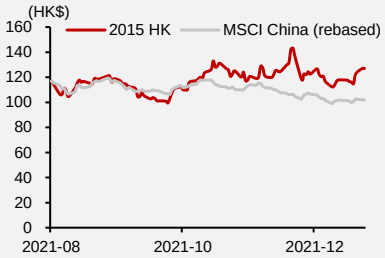
Source: Bloomberg

Share Performance

	Absolute	Relative
1-mth	-6.3%	-4.4%
3-mth	22.7%	26.2%
6-mth	N/A	N/A

Source: Bloomberg

12-mth Price Performance



Source: Bloomberg

Auditor: PricewaterhouseCoopers Zhong Tian

Financial Summary

Income statement

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
Revenue	**284**	**9,457**	**26,741**	**52,917**	**88,780**
Cost of sales	(284)	(7,907)	(21,088)	(41,333)	(69,754)
Gross profit	**(0)**	**1,549**	**5,653**	**11,585**	**19,026**
R&D exp.	(1,169)	(1,100)	(3,033)	(6,039)	(9,158)
SG&A exp.	(689)	(1,119)	(3,726)	(7,022)	(10,461)
Operating profit	**(1,859)**	**(669)**	**(1,106)**	**(1,476)**	**(593)**
Net finance costs	(53)	(26)	113	158	(167)
Investment income	49	214	415	506	538
Other non-oper exp.	(555)	292	(20)	(25)	(10)
Pre-tax profit	**(2,418)**	**(189)**	**(599)**	**(838)**	**(233)**
Tax	-	23	(120)	-	-
Discontinued operations	(21)	14	-	-	-
Accr. on preferred shares	(843)	(640)	-	-	-
Net profit	**(3,282)**	**(792)**	**(719)**	**(838)**	**(233)**

Cash flow summary

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
Profit before taxation	**(2,418)**	**(189)**	**(599)**	**(838)**	**(233)**
Depreciation/amortization	116	321	452	921	1,988
Change in working capital	(154)	3,068	2,703	3,974	3,897
Others	661	(60)	1,051	1,265	1,571
Net cash from operating	**(1,794)**	**3,140**	**3,607**	**5,324**	**7,224**
Capex	(953)	(675)	(2,550)	(7,050)	(9,050)
Others	(1,622)	(18,063)	(2,400)	(3,050)	(5,350)
Net cash from investing	**(2,575)**	**(18,738)**	**(4,950)**	**(10,100)**	**(14,400)**
Share issuance	-	21,026	11,109	7	7
Net borrowings	233	(145)	34	(140)	9,037
Others	5,422	3,830	5,606	-	0
Net cash from financing	**5,656**	**24,711**	**16,749**	**(134)**	**9,043**
Net change in cash	**1,287**	**9,113**	**15,406**	**(4,910)**	**1,867**
Cash at beginning of the year	96	1,436	10,173	25,569	20,659
FX & discontinued operations	54	(377)	(10)	-	-
Cash at the end of the year	**1,436**	**10,173**	**25,569**	**20,659**	**22,525**

Balance sheet

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
Current assets	**5,066**	**31,391**	**50,972**	**52,118**	**63,072**
Cash & equivalents	1,296	8,938	24,069	19,059	20,525
Account receivables	8	116	733	1,450	2,919
Inventories	518	1,048	1,733	3,171	5,351
Other current assets	3,243	21,289	24,437	28,439	34,277
Non-current assets	**4,448**	**4,982**	**10,884**	**21,786**	**33,549**
PP&E	2,795	2,479	4,543	10,577	17,551
Intangibles	674	683	717	740	753
Right-of-use assets	510	1,277	4,533	8,767	13,015
Other non-current assets	468	543	1,092	1,703	2,230
Total assets	**9,513**	**36,373**	**61,856**	**73,904**	**96,622**
Current liabilities	**4,680**	**4,309**	**10,523**	**18,007**	**36,452**
Bank borrowings	239	-	512	-	9,611
Account payables	625	3,161	6,933	12,456	17,200
Current deferred revenue	57	272	875	2,134	4,420
Other current liabilities	3,759	877	2,204	3,416	5,220
Non-current liabilities	**253**	**2,260**	**10,081**	**14,412**	**17,851**
Bank borrowings	-	512	100	600	500
Lease liabilities	241	1,392	3,538	6,716	9,534
Other non-current liabilities	11	357	6,443	7,096	7,817
Total liabilities	**4,932**	**6,570**	**20,604**	**32,419**	**54,303**
Mezzanine equity	10,256	-	-	-	-
Share capital	0	1	1	1	1
Reserves	(5,675)	29,802	41,251	41,484	42,317
Shareholders' equity	**(5,675)**	**29,804**	**41,252**	**41,485**	**42,318**
Total equity and liabilities	**9,513**	**36,373**	**61,856**	**73,904**	**96,622**

Key ratios

YE 31 Dec	FY19A	FY20A	FY21E	FY22E	FY23E
Sales mix (%)					
Vehicle sales	98.8	98.2	96.4	96.9	97.0
Other sales & services	1.2	1.8	3.6	3.1	3.0
Growth (%)					
Revenue	N/A	3,225.5	182.8	97.9	67.8
Gross profit	N/A	N/A	264.9	104.9	64.2
Operating profit	N/A	N/A	N/A	N/A	N/A
Net profit	N/A	N/A	N/A	N/A	N/A
Profit & loss ratio (%)					
Gross margin	(0.0)	16.4	21.1	21.9	21.4
Operating margin	(653.6)	(7.1)	(4.1)	(2.8)	(0.7)
Net profit margin	(1,154.0)	(8.4)	(2.7)	(1.6)	(0.3)
Balance sheet ratio					
Net cash (debt)/total equity (x)	(0.5)	1.0	1.0	1.0	0.9
Current ratio (x)	1.1	7.3	4.8	2.9	1.7
Receivable turnover days	11	4	10	10	12
Inventory turnover days	665	48	30	28	28
Payable turnover days	802	146	120	110	90
Profitability (%)					
ROE	N/A	(6.6)	(2.0)	(2.0)	(0.6)
ROA	(42.9)	(3.5)	(1.5)	(1.2)	(0.3)
Per share data (RMB)					
EPS	(12.87)	(0.91)	(0.37)	(0.41)	(0.11)
DPS	N/A	N/A	N/A	N/A	N/A

Source: Company data, CMBIS estimates

Great Wall Motor (2333 HK)

Best positioned in tech transformation

Our preferred traditional automaker. We initiate coverage of Great Wall Motor with a BUY rating and target price of HK$ 36.00, based on 21x our FY22E P/E. We have seen a new Great Wall since 2H20, as it has significantly enhanced its business model with faster R&D output, more effective platform-based manufacturing, and better marketing efforts to every new model, which results in eight new models in the past five quarters and 11 more in FY22E. More importantly, we are of the view that Great Wall is the most determined incumbent automaker in tech transformation in a bid to sustain new demand.

- **Virtuous cycle of R&D–production–marketing to create new demand.** It keeps creating new models targeting new subsegments or new demand from different groups of consumers and attracts consumers' attention with its effective marketing efforts. If the demand is still low after all kinds of different marketing efforts, the costs of such new models could be offset by platform-based manufacturing. If the demand reaches saturation sooner than expected or the competition is intensified, Great Wall could accelerate its model iteration. Such business model has empowered Great Wall to roll out completely new models including the *Tank 300* and *Dagou* rather than fine-tuning existing successful models, which mitigates product cannibalization.
- **Most determined in tech transformation among traditional OEMs.** Great Wall's SUV market share loss during 2014-18 has probably made it more determined in tech transformation in a bid to sustain demand. Its parent has successfully incubated start-ups for batteries (Svolt), AD (HAOMO.AI) and fuel cell (FTXT). We are of the view that the gap between HAOMO and NIO is about 2-3 quarters in the AD algorithm based on their performance and the gap could be narrowed based on HAOMO's aggressive plans.
- **Consensus could underestimate FY22E earnings.** Our FY22E revenue and net profit forecasts are 19% and 12% above consensus, respectively, despite our 10% lower sales volume projection than the company's guidance.
- **Valuation/Key risks.** Our target price is based on 21x our FY22E P/E, in line with its average forward 12-month P/E in 2021 and our target valuation of 20x for Geely. We are of the view that such valuation is justified given Great Wall's stronger model cycle and more determined tech transformation than Geely. Key risks to our rating and target price include lower sales volume and margins, slower tech transformation than our expectation, as well as a sector de-rating.

Earnings Summary

(YE 31 Dec)	FY19A	FY20A	FY21E	FY22E	FY23E
Revenue (RMB mn)	96,211	103,308	133,344	211,884	257,873
YoY growth (%)	(3.0)	7.4	29.1	58.9	21.7
Net income (RMB mn)	4,497	5,362	7,374	12,753	15,536
EPS (RMB)	0.49	0.58	0.80	1.38	1.68
YoY growth (%)	(13.6)	19.2	37.5	72.9	21.8
P/E (x)	46.6	36.8	26.3	15.2	12.6
P/B (x)	3.9	3.5	3.1	2.6	2.3
Yield (%)	5.0	3.7	1.3	2.3	2.8
ROE (%)	8.4	9.6	12.2	18.6	19.6
Net gearing (%)	Net cash	11.9	7.5	Net cash	Net cash

Source: Company data, Bloomberg, CMBIS estimates

BUY (Initiation)

Target Price	HK$ 36.00
Up/Downside	+40.1%
Current Price	HK$ 25.70

China Auto Sector

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Stock Data

Mkt Cap (HK$ mn)	220,734
Avg 3 mths t/o (HK$ mn)	726
52w High/Low (HK$)	39.00/17.16
Total Issued Shares (mn)	9,236

Source: Bloomberg

Shareholding Structure

Wei Jianjun	56.4%
Others	43.6%

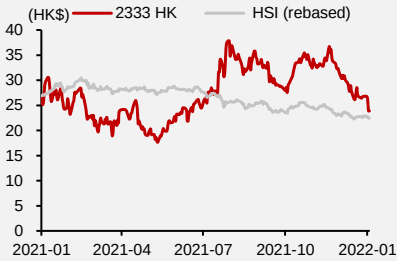
Source: HKEx

Share Performance

	Absolute	Relative
1-mth	-22.9%	-18.4%
3-mth	-18.6%	-10.8%
6-mth	-11.9%	4.3%

Source: Bloomberg

12-mth Price Performance



Source: Bloomberg

Auditor: Deloitte

Investment Thesis and Company Overview

What makes Great Wall great again?

Back in 2017-18 when foreign brands poured SUVs into Chinese market, Great Wall had been losing market share despite its attempt to go upmarket with Wey. Investors were concerned what the SUV sales volume/market share ceiling could be for one Chinese automaker. We believe that a few of the most important lessons learnt by Great Wall during 2017-18 should be how to create more demand when the market seems to be overwhelmed by all kinds of different SUVs and how to make such demand sustainable. We think Great Wall has already given its answers.

Great Wall has shifted its production to platform-based to lower costs since the 3rd-generation *H6* debut in 2H20, accelerated new-model development cycle and changed its marketing efforts to form a closed loop for each new model. This lays out the foundation for new demand creation, in our view. Great Wall has become much more determined in rolling out completely new models in new subsegments rather than fine-tuning existing successful models facing the same target audience. In 2021, Great Wall sold 1.28mn vehicles, the highest in history, with the record-high sales volumes for both pickup trucks and NEVs. Should the chip supply constraints be eased a bit for the *Tank 300*, Great Wall's SUV sales volume would have been all-time high as well in 2021.

In our view, Great Wall has become the most determined in tech/electrification transformation among all traditional automakers in a bid to make its demand more sustainable. Its parent company has incubated start-ups including Svolt for NEV battery making, HAOMI.AI for autonomous driving technologies and FTXT Energy Technology for fuel-cell development. All of them appear to be on the right track now. In fact, the feedback of Great Wall's Navigation on Highwaypilot (NOH) is better than we had expected. Svolt's battery shipments have surged to the 6th position in China during the first 11 months of 2021.

The strong model cycle at Great Wall started in 2H20 and no strong model cycle at Chinese automakers lasted longer than three years in the past. That could be a concern for some investors, in our view. However, we think this time could be a bit different, as the supply constraints have deferred some demand, which could make a strong model cycle longer. The current order backlog for Great Wall is more than 200,000 units, with about 150,000 units from the most profitable Tank brand.

Virtuous cycle of R&D–production–marketing

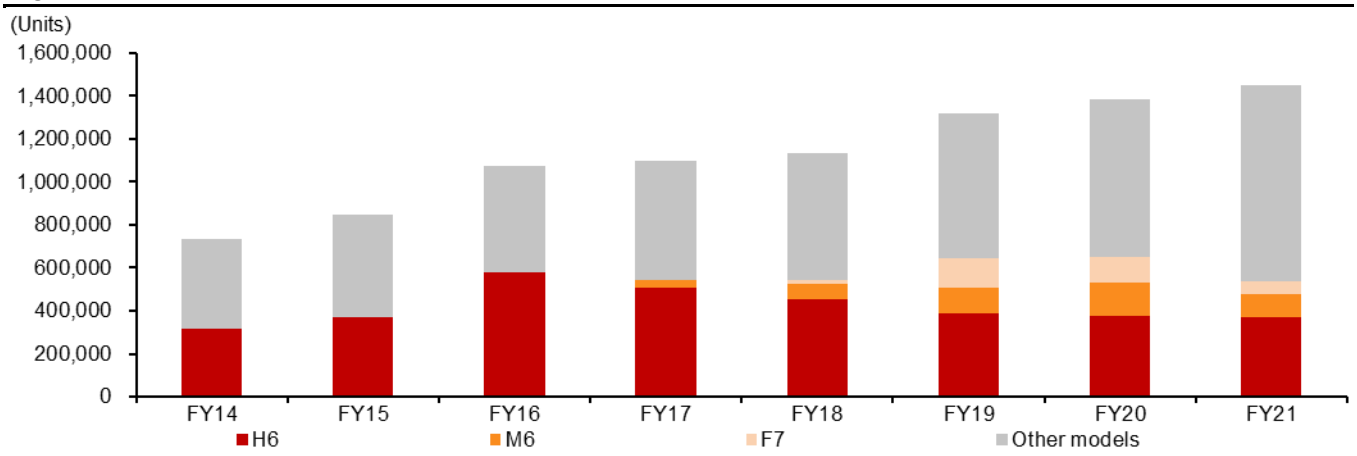
We are of the view that Great Wall has entered a virtuous cycle with faster R&D output, more effective platform-based production, and better marketing efforts for each model since the 3rd-generation *H6* debut in 2H20. In our opinion, the cycle works like this: It creates a new model targeting a segment that was overlooked or defined as niche in the past and attracts consumers' attention with its effective marketing efforts. That often results in larger-than-expected segments, such as the *Tank 300* and *Dagou*, **as consumers now are looking for new and unique values from a vehicle that was previously only regarded as a transportation means**. Even if the segment size remains small after all kinds of marketing efforts, the platform-based production could lower the costs for that particular model (e.g., the *Dagou* shares the same platform with the 3rd-generation *H6*). Even if the demand for such model reaches saturation sooner than a normal model cycle (which happened to Wey in 2018) or the competition becomes more intensified than expected, Great Wall's more efficient R&D capabilities could enable faster model iteration. The company claims that it has shortened the development cycle for a new model from 24 months to 11 months, the fastest in the world.

In our view, this virtuous cycle has mitigated product cannibalization at Great Wall. Sales cannibalization was investors' biggest concern for Great Wall in the past. It also enables Great Wall to launch more different models, reducing its overreliance on the single model (the *H6*) in the past.

From vehicle-size focus to target-audience focus

The product cannibalization mitigation also comes from Great Wall's mentality change in vehicle design. In the past, it developed models for different subsegments based on vehicle size. Now, each new model has been thought thoroughly for different types of consumers. In 2021, Great Wall sold 1.28mn vehicles, the highest in its history. The broader *H6* family (*H6 + M6 + F7*) which used to take up at least half of Great Wall's sales volume, only accounted for 42% of its sales volume in FY21, the lowest since FY14.

Figure 103: Great Wall's sales volume breakdown



Source: Company data, CMBIS

Great Wall's Tank brand launched in late 2020 targets off-road lovers which is defined as a niche market. The company originally allocated a monthly production capacity of 5,000 units while the demand was more than doubled.

The Ora brand was originally designed for small BEVs. After the failure of its first model (the *Ora IQ*) launched in 2018, the brand's focus became more specific–female drivers. Ora's sales volume rose by 144% YoY to about 135,000 units in FY21, higher than its combined sales volumes in the previous years since its debut.

Tank to lift margins significantly

The Tank brand not only lifts Great Wall's sales volume in a new subsegment, but also widens its margins. We project Tank to account for 15% of Great Wall's gross profit in FY21E and 30% in FY22E. We expect Great Wall's net profit per vehicle to rise to RMB 7,500 in FY22E, from RMB 5,900 in FY21E and RMB 4,800 in FY20, largely due to the contribution from Tank.

Spin-off of new technology provides clearer picture, better incentives

Svolt was founded as a battery business unit at Great Wall in 2016 and was spun off from its parent in 2018. Svolt's NEV battery shipments have surged to the 6th position in China in the first 11 months of 2021, according to China Automotive Battery Innovation Alliance. The success of Svolt has showcased that Great Wall has the capabilities to turn a start-up into an industry-leading player in a short period of time. Great Wall used to claim that it has a lot of leading automotive technologies but not many investors believed. The spin-offs with

right incentive scheme placed not only provide a clearer picture for investors but also spur such technology development with more talents.

HAOMO.AI and FTXT are another two examples. We detail our comments on NOH empowered by HAOMO.AI in the next section. We are also optimistic about the long-term outlook of fuel-cell technologies. FTXT could also be a valuation lift for Great Wall in the future.

HAOMO sets to catch up amid its aggressive plans

The current NOH function on the *Wey Mocha* (released in Nov 2021) leverages HAOMO.AI for the planning and decision-making algorithm but still relies on Mobileye for the visual perception part, as it uses the Mobileye EyeQ4 chip. Such solution is very similar to NIO's NoP (see page 45 for details). However, the actual AD performance of Great Wall's current NOH looks better than NIO's back in Oct 2020, especially for navigating extremely curvy off-ramp. We are of the view that Great Wall's current NOH performance should be close to NIO's NoP at the end of 1Q21. To put it in a simple way, the gap between Great Wall and NIO in terms of the AD technologies is about 2-3 quarters, in our view.

Such gap could be narrowed based on the expected timelines for their upcoming more proprietary AD functions. The *NIO ET7*, equipped with the Nvidia Orin chips and NIO's in-house algorithm for both visual perception and decision-making, is to be delivered in 1Q22. HAOMO.AI's algorithm utilizing Qualcomm's open-platform chip is scheduled to be equipped with Great Wall's models in mid-2022. HAOMO.AI also has a very aggressive plan to launch higher AD level functions HSD (HAOMO self-driving) in 2023. Note that Great Wall's current NOH functions are realized in an ICE vehicle.

Financial Analysis

New models, higher margins on Tank, share-based payment

The new model cycle started in 2H20 with the 3rd-generation *H6* (Aug 2020) and *Dagou* (Sep 2020). After rolling out eight new models (the *Haval Jolion, Chitu, Shenshou, Wey Mocha, Macchiato, Latte, Tank 300, Ora Haomao*) in the past five quarters, Great Wall plans to unveil another 11 models in FY22E.

Figure 104: Great Wall's model pipeline

No.	2H20	2021	2022E
1	Ora Baimao (Jul)	Haval Jolion (Jan)	Ora Ballet Cat (1Q22)
2	3rd-Gen Haval H6 (Aug)	Haval Chitu (May)	Tank 400 (2Q22 SOP)
3	Haval Dagou (Sep)	Wey Mocha (May)	Tank 700 (2Q22 SOP)
4	Ora Haomao (Nov)	Wey Macchiato (Sep)	Wey Yuanmeng (2Q22)
5	Tank 300 (Dec)	Wey Latte (Dec)	Wey 1st MPV (2Q22 SOP)
6		Haval Shenshou (Dec)	Haval X-Dog (2Q22)
7			Ora Flash Cat (2Q22)
8			Ora Punk Cat (3Q22)
9			SL Jijialong (3Q22)
10			Wey 2nd MPV (3Q22 SOP)
11			Tank 800 (3Q22 SOP)

Source: Company data, CMBIS

We project Great Wall's sales volume to rise 34% YoY to 1.71mn units in FY22E, lower than its target of 1.90mn units, as we are a bit more conservative about the Ora outlook. We expect its sales volume to further rise 21% YoY to 2.07mn units in FY23E.

We project Great Wall's gross margin to widen from 17.0% in FY21E to 17.9% in FY22E, largely due to the Tank brand. On the other hand, we also expect depreciation and amortization to rise significantly from FY21E, given its investments in a number of new plants and rising capitalized R&D.

Based on our sales volume and net profit forecasts, the restricted shares and share options granted in Jul 2021 are to be 100% exercised in FY22-23E. The corresponding costs, along with previous restricted shares and options, could be as high as RMB 3.9bn and 2.4bn in FY22-23E, respectively. As most of such costs are related to R&D personnel, about half of such costs would be capitalized for future amortization. We have factored these expenses in our model.

Our FY22-23E net profit estimates are 5-12% above consensus

We project Great Wall's 4Q21E net profit to be RMB 2.4bn, 10% lower than consensus. Our revenue projections for FY22-23E are 19-20% higher than consensus, although our FY22E sales volume forecast is 10% below the company's guidance. Our FY22-23E net profit forecasts are 5-12% above consensus, as we believe consensus could underestimate Great Wall's top-line growth.

Figure 105: CMBI estimates vs consensus

	CMBI			Consensus			Diff (%)		
RMB mn	FY21E	FY22E	FY23E	FY21E	FY22E	FY23E	FY21E	FY22E	FY23E
Revenue	133,344	211,884	257,873	132,365	178,632	214,852	0.7%	18.6%	20.0%
Gross Profit	22,662	37,983	46,712	23,096	33,117	41,297	-1.9%	14.7%	13.1%
Operating Profit	8,120	14,466	17,778	7,863	12,576	16,298	3.3%	15.0%	9.1%
Net profit	7,374	12,753	15,536	7,637	11,413	14,873	-3.4%	11.7%	4.5%
Gross Margin	17.0%	17.9%	18.1%	17.4%	18.5%	19.2%	-0.5 ppt	-0.6 ppt	-1.1 ppt
Operating Margin	6.1%	6.8%	6.9%	5.9%	7.0%	7.6%	0.1 ppt	-0.2 ppt	-0.7 ppt
Net Margin	5.5%	6.0%	6.0%	5.8%	6.4%	6.9%	-0.2 ppt	-0.4 ppt	-0.9 ppt

Source: Bloomberg, CMBIS estimates

Valuation

Initiate with BUY; TP of HK$ 36.00 (40% upside)

Our target price is based on 21x FY22E P/E, in line with Great Wall's average forward 12-month P/E in 2021, higher than its 5-year average forward 12-month of 12x during FY17-21. Led by NEV start-ups, valuations for traditional automakers have been changed since 2H20 amid the increasing importance of software for future cars. The average forward 12-month P/E during 2013-1H20 for Great Wall was about 8x with the highest of 13x during the period. The average of forward 12-month P/E during 2H20-2021 jumped to 19x.

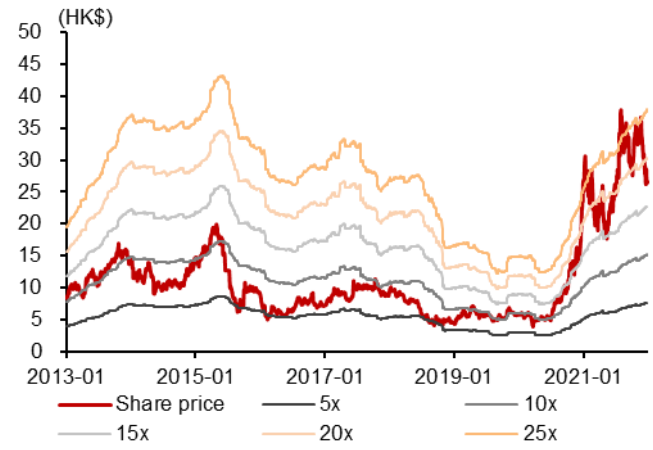
Among peers, Geely is currently trading at 19x of our FY22E P/E and our target valuation is 20x FY22E P/E. We are of the view that our valuation for Great Wall is justified given Great Wall's stronger model cycle and more determined tech transformation than Geely. Our target price for Great Wall also implies 1.3x FY22E P/S, lower than the NEV trio's FY22E P/S.

Figure 106: Peers' valuation

Company	Ticker	Rating	Mkt Cap (US$ mn)	Price (LC)	TP (LC)	Up/Down -side	P/E (x) FY21E	P/E (x) FY22E	P/S (x) FY21E	P/S (x) FY22E	ROE (%) FY21E	ROE (%) FY22E
Great Wall	2333 HK	BUY	30,449	25.70	36.00	40.1%	26.3	15.2	1.5	0.9	10.7	16.1
Great Wall	601633 CH	BUY	68,262	47.05	59.00	25.4%	58.9	34.1	3.3	2.1	10.7	16.1
GAC	2238 HK	BUY	10,909	8.20	10.50	28.0%	9.6	7.7	0.9	0.8	8.3	9.5
GAC	601238 CH	BUY	24,730	15.18	18.40	21.2%	21.7	17.5	2.1	1.8	8.3	9.5
BYD	1211 HK	HOLD	96,947	259.60	270.00	4.0%	178.1	82.3	3.1	2.3	4.6	7.6
BYD	002594 CH	HOLD	117,071	256.00	270.00	5.5%	215.1	99.4	3.7	2.8	4.6	7.6
Geely	175 HK	HOLD	25,705	20.00	21.00	5.0%	27.9	18.6	1.6	1.3	8.9	12.0
	Average						**76.8**	**39.2**	**2.3**	**1.7**	**8.0**	**11.2**

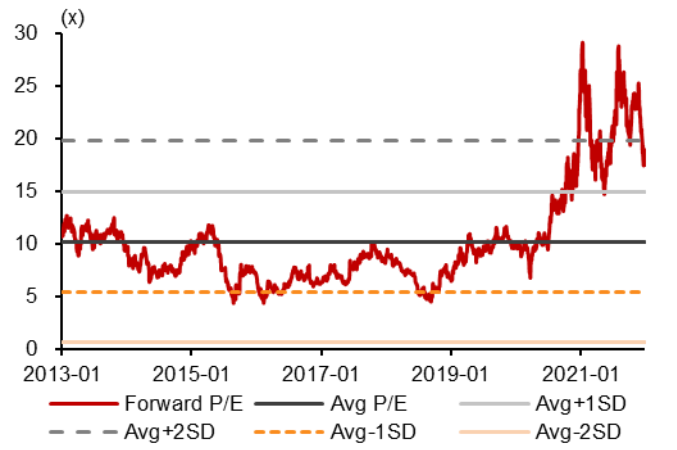
Source: Bloomberg, CMBIS

Figure 107: Great Wall's forward 12-m P/E band



Source: Company data, Bloomberg, CMBIS

Figure 108: Great Wall's forward 12-m P/E range



Source: Company data, Bloomberg, CMBIS

Financial Summary

Income statement

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
Revenue	**96,211**	**103,308**	**133,344**	**211,884**	**257,873**
Cost of sales	(79,684)	(85,531)	(110,681)	(173,901)	(211,161)
Gross profit	**16,526**	**17,777**	**22,662**	**37,983**	**46,712**
Selling exp.	(3,897)	(4,103)	(5,655)	(7,815)	(8,889)
Admin exp. (ex. R&D)	(1,955)	(2,553)	(3,541)	(5,169)	(6,475)
R&D exp.	(2,716)	(3,067)	(4,239)	(7,442)	(10,549)
Others	(3,181)	(2,301)	(1,108)	(3,091)	(3,020)
Operating profit	**4,777**	**5,752**	**8,120**	**14,466**	**17,778**
Non-operating income	342	494	300	500	550
Non-operating exp.	(18)	(18)	(40)	(50)	(50)
Pre-tax profit	**5,101**	**6,227**	**8,380**	**14,916**	**18,278**
Tax	(570)	(865)	(1,006)	(2,163)	(2,742)
Minority interests	(34)	-	-	-	-
Net profit	**4,497**	**5,362**	**7,374**	**12,753**	**15,536**

Cash flow summary

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
Profit before taxation	**5,101**	**6,227**	**8,380**	**14,916**	**18,278**
Depreciation/amortization	4,331	4,430	5,535	6,554	8,032
Change in working capital	4,541	(4,138)	(3,906)	(3,116)	(3,512)
Others	(1)	(1,338)	1,176	6,633	(1,706)
Net cash from operating	**13,972**	**5,181**	**11,184**	**24,986**	**21,092**
Capex	(6,940)	(8,062)	(8,733)	(8,741)	(9,717)
Others	(8,861)	(3,527)	1,953	1,404	2,720
Net cash from investing	**(15,802)**	**(11,588)**	**(6,781)**	**(7,336)**	**(6,997)**
Net borrowings	6,686	13,817	(1,664)	(1,519)	(1,350)
Dividend paid	(2,830)	(2,538)	(2,078)	(3,216)	(5,491)
Others	88	89	-	-	-
Net cash from financing	**3,944**	**11,368**	**(3,742)**	**(4,736)**	**(6,841)**
Net change in cash	**2,115**	**4,960**	**662**	**12,914**	**7,254**
Cash at beginning of the year	6,615	8,777	13,591	14,253	27,167
FX effect	48	(146)	-	-	-
Cash at the end of the year	**8,777**	**13,591**	**14,253**	**27,167**	**34,421**

Balance sheet

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
Current assets	**68,502**	**99,399**	**107,405**	**158,328**	**192,099**
Cash & equivalents	9,723	14,588	15,250	28,164	35,418
Account receivables	35,586	58,448	65,759	98,686	120,105
Inventories	6,237	7,498	8,187	14,293	17,356
Other current assets	16,956	18,865	18,209	17,185	19,220
Non-current assets	**44,594**	**54,613**	**58,969**	**62,542**	**64,439**
PP&E	29,743	28,609	28,818	28,012	25,585
Intangibles	4,710	5,543	6,113	6,908	7,847
Equity investments	3,113	8,415	10,398	12,320	13,608
Other non-current assets	7,028	12,045	13,641	15,301	17,400
Total assets	**113,096**	**154,011**	**166,374**	**220,870**	**256,538**
Current liabilities	**54,600**	**81,166**	**87,721**	**131,627**	**157,912**
Bank borrowings	6,342	10,633	9,719	9,000	9,000
Payables	41,548	59,275	63,680	100,053	121,490
Contract liabilities	4,604	8,028	10,229	16,254	19,782
Other current liabilities	2,106	3,230	4,093	6,320	7,640
Non-current liabilities	**4,097**	**15,504**	**15,506**	**15,029**	**14,054**
Bank borrowings	1,206	10,777	10,277	9,777	8,777
Deferred income	2,193	3,462	3,949	3,937	3,926
Other non-current liabilities	699	1,265	1,280	1,315	1,350
Total liabilities	**58,697**	**96,670**	**103,227**	**146,657**	**171,966**
Share capital	9,127	9,176	9,176	9,176	9,176
Reserves	45,272	48,166	53,971	65,037	75,397
Minority interests	-	-	-	-	-
Shareholders' equity	**54,399**	**57,342**	**63,147**	**74,213**	**84,573**
Total equity and liabilities	**113,096**	**154,011**	**166,374**	**220,870**	**256,538**

Key ratios

YE 31 Dec	FY19A	FY20A	FY21E	FY22E	FY23E
Sales mix (%)					
Sales of vehicles	89.6	89.4	90.3	92.9	93.5
Sales of parts	4.5	5.0	4.3	3.1	2.9
Sales of moulds	0.7	1.2	1.3	0.8	0.8
Others	5.2	4.4	4.0	3.1	2.8
Growth (%)					
Revenue	(3.0)	7.4	29.1	58.9	21.7
Gross profit	(6.9)	7.6	27.5	67.6	23.0
Operating profit	(23.4)	20.4	41.2	78.2	22.9
Net profit	(13.6)	19.2	37.5	72.9	21.8
Profit & loss ratio (%)					
Gross margin	17.2	17.2	17.0	17.9	18.1
Operating margin	5.0	5.6	6.1	6.8	6.9
Net profit margin	4.7	5.2	5.5	6.0	6.0
Balance sheet ratio					
Net cash (debt)/total equity (x)	0.0	(0.1)	(0.1)	0.1	0.2
Current ratio (x)	1.3	1.2	1.2	1.2	1.2
Receivable turnover days	135	207	180	170	170
Inventory turnover days	29	32	27	30	30
Payable turnover days	190	253	210	210	210
Profitability (%)					
ROE	8.4	9.6	12.2	18.6	19.6
ROA	4.0	4.0	4.6	6.6	6.5
Per share data (RMB)					
EPS	0.49	0.58	0.80	1.38	1.68
DPS	0.25	0.28	0.40	0.69	0.84

Source: Company data, CMBIS estimates

Great Wall Motor (601633 CH)

Best positioned in tech transformation

Our preferred traditional automaker. We initiate Great Wall Motor A-share with a BUY rating and a target price of RMB 59.00, based on 42x FY22E P/E. As the underlying company is identical, please refer to page 79-86 for our detailed analysis on fundamentals. We list the same key points below. In the medium- to long-term, we think that Great Wall's H-share could be more attractive given the current H-share price discount is about 55%, much higher than the long-term historical average. Such discount widened from 2H20, which could partially reflect overseas investors' pessimism about traditional OEMs' tech transformation. This could be gradually corrected, should Great Wall's transformation become more apparent.

- **Virtuous cycle of R&D–production–marketing to create new demand.** It keeps creating new models targeting new subsegments or new demand from different groups of consumers and attracts consumers' attention with its effective marketing efforts. If the demand is still low after all kinds of different marketing efforts, the costs of such new models could be offset by platform-based manufacturing. If the demand reaches saturation sooner than expected or the competition is intensified, Great Wall could accelerate its model iteration. Such business model has empowered Great Wall to roll out completely new models including the *Tank 300* and *Dagou* rather than fine-tuning existing successful models, which mitigates product cannibalization.
- **Most determined in tech transformation among traditional OEMs.** Great Wall's SUV market share loss during 2014-18 has probably made it more determined in tech transformation in a bid to sustain demand. Its parent has successfully incubated start-ups for batteries (Svolt), AD (HAOMO.AI) and fuel cell (FTXT). We are of the view that the gap between HAOMO and NIO is about 2-3 quarters in the AD algorithm based on their performance and the gap could be narrowed based on HAOMO's aggressive plans.
- **Consensus could underestimate FY22E earnings.** Our FY22E revenue and net profit forecasts are 19% and 12% above consensus, respectively, despite our 10% lower sales volume projection than the company's guidance.
- **Valuation/Key risks.** Our target price is based on 42x our FY22E P/E, in line with its average forward 12-month P/E in 2021. Key risks to our rating and target price include lower sales volume and margins, slower tech transformation than our expectation, as well as a sector de-rating.

Earnings Summary

(YE 31 Dec)	FY19A	FY20A	FY21E	FY22E	FY23E
Revenue (RMB mn)	96,211	103,308	133,344	211,884	257,873
YoY growth (%)	(3.0)	7.4	29.1	58.9	21.7
Net income (RMB mn)	4,497	5,362	7,374	12,753	15,536
EPS (RMB)	0.49	0.58	0.80	1.38	1.68
YoY growth (%)	(13.6)	19.2	37.5	72.9	21.8
P/E (x)	95.5	80.1	58.7	34.1	28.0
P/B (x)	7.9	7.5	6.9	5.9	5.2
Yield (%)	5.0	3.7	1.3	2.3	2.8
ROE (%)	8.4	9.6	12.2	18.6	19.6
Net gearing (%)	Net cash	11.9	7.5	Net cash	Net cash

Source: Company data, Bloomberg, CMBIS estimates

BUY (Initiation)

Target Price	RMB 59.00
Up/Downside	+25.4%
Current Price	RMB 47.05

China Auto Sector

SHI Ji, CFA
(852) 3761 8728
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Stock Data

Mkt Cap (RMB mn)	424,658
Avg 3 mths t/o (RMB mn)	1,271
52w High/Low (RMB)	69.80/27.11
Total Issued Shares (mn)	9,236

Source: Bloomberg

Shareholding Structure

Wei Jianjun	56.4%
Others	43.6%

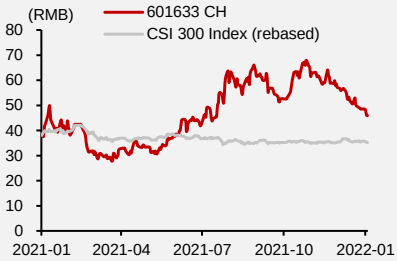
Source: Company data

Share Performance

	Absolute	Relative
1-mth	-17.7%	-16.6%
3-mth	-13.5%	-12.2%
6-mth	-6.0%	-2.0%

Source: Bloomberg

12-mth Price Performance



Source: Bloomberg

Auditor: Deloitte

Financial Summary

Income statement

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
Revenue	**96,211**	**103,308**	**133,344**	**211,884**	**257,873**
Cost of sales	(79,684)	(85,531)	(110,681)	(173,901)	(211,161)
Gross profit	**16,526**	**17,777**	**22,662**	**37,983**	**46,712**
Selling exp.	(3,897)	(4,103)	(5,655)	(7,815)	(8,889)
Admin exp. (ex. R&D)	(1,955)	(2,553)	(3,541)	(5,169)	(6,475)
R&D exp.	(2,716)	(3,067)	(4,239)	(7,442)	(10,549)
Others	(3,181)	(2,301)	(1,108)	(3,091)	(3,020)
Operating profit	**4,777**	**5,752**	**8,120**	**14,466**	**17,778**
Non-operating income	342	494	300	500	550
Non-operating exp.	(18)	(18)	(40)	(50)	(50)
Pre-tax profit	**5,101**	**6,227**	**8,380**	**14,916**	**18,278**
Tax	(570)	(865)	(1,006)	(2,163)	(2,742)
Minority interests	(34)	-	-	-	-
Net profit	**4,497**	**5,362**	**7,374**	**12,753**	**15,536**

Cash flow summary

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
Profit before taxation	**5,101**	**6,227**	**8,380**	**14,916**	**18,278**
Depreciation/amortization	4,331	4,430	5,535	6,554	8,032
Change in working capital	4,541	(4,138)	(3,906)	(3,116)	(3,512)
Others	(1)	(1,338)	1,176	6,633	(1,706)
Net cash from operating	**13,972**	**5,181**	**11,184**	**24,986**	**21,092**
Capex	(6,940)	(8,062)	(8,733)	(8,741)	(9,717)
Others	(8,861)	(3,527)	1,953	1,404	2,720
Net cash from investing	**(15,802)**	**(11,588)**	**(6,781)**	**(7,336)**	**(6,997)**
Net borrowings	6,686	13,817	(1,664)	(1,519)	(1,350)
Dividend paid	(2,830)	(2,538)	(2,078)	(3,216)	(5,491)
Others	88	89	-	-	-
Net cash from financing	**3,944**	**11,368**	**(3,742)**	**(4,736)**	**(6,841)**
Net change in cash	**2,115**	**4,960**	**662**	**12,914**	**7,254**
Cash at beginning of the year	6,615	8,777	13,591	14,253	27,167
FX effect	48	(146)	-	-	-
Cash at the end of the year	**8,777**	**13,591**	**14,253**	**27,167**	**34,421**

Balance sheet

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
Current assets	**68,502**	**99,399**	**107,405**	**158,328**	**192,099**
Cash & equivalents	9,723	14,588	15,250	28,164	35,418
Account receivables	35,586	58,448	65,759	98,686	120,105
Inventories	6,237	7,498	8,187	14,293	17,356
Other current assets	16,956	18,865	18,209	17,185	19,220
Non-current assets	**44,594**	**54,613**	**58,969**	**62,542**	**64,439**
PP&E	29,743	28,609	28,818	28,012	25,585
Intangibles	4,710	5,543	6,113	6,908	7,847
Equity investments	3,113	8,415	10,398	12,320	13,608
Other non-current assets	7,028	12,045	13,641	15,301	17,400
Total assets	**113,096**	**154,011**	**166,374**	**220,870**	**256,538**
Current liabilities	**54,600**	**81,166**	**87,721**	**131,627**	**157,912**
Bank borrowings	6,342	10,633	9,719	9,000	9,000
Payables	41,548	59,275	63,680	100,053	121,490
Contract liabilities	4,604	8,028	10,229	16,254	19,782
Other current liabilities	2,106	3,230	4,093	6,320	7,640
Non-current liabilities	**4,097**	**15,504**	**15,506**	**15,029**	**14,054**
Bank borrowings	1,206	10,777	10,277	9,777	8,777
Deferred income	2,193	3,462	3,949	3,937	3,926
Other non-current liabilities	699	1,265	1,280	1,315	1,350
Total liabilities	**58,697**	**96,670**	**103,227**	**146,657**	**171,966**
Share capital	9,127	9,176	9,176	9,176	9,176
Reserves	45,272	48,166	53,971	65,037	75,397
Minority interests	-	-	-	-	-
Shareholders' equity	**54,399**	**57,342**	**63,147**	**74,213**	**84,573**
Total equity and liabilities	**113,096**	**154,011**	**166,374**	**220,870**	**256,538**

Key ratios

YE 31 Dec	FY19A	FY20A	FY21E	FY22E	FY23E
Sales mix (%)					
Sales of vehicles	89.6	89.4	90.3	92.9	93.5
Sales of parts	4.5	5.0	4.3	3.1	2.9
Sales of moulds	0.7	1.2	1.3	0.8	0.8
Others	5.2	4.4	4.0	3.1	2.8
Growth (%)					
Revenue	(3.0)	7.4	29.1	58.9	21.7
Gross profit	(6.9)	7.6	27.5	67.6	23.0
Operating profit	(23.4)	20.4	41.2	78.2	22.9
Net profit	(13.6)	19.2	37.5	72.9	21.8
Profit & loss ratio (%)					
Gross margin	17.2	17.2	17.0	17.9	18.1
Operating margin	5.0	5.6	6.1	6.8	6.9
Net profit margin	4.7	5.2	5.5	6.0	6.0
Balance sheet ratio					
Net cash (debt)/total equity (x)	0.0	(0.1)	(0.1)	0.1	0.2
Current ratio (x)	1.3	1.2	1.2	1.2	1.2
Receivable turnover days	135	207	180	170	170
Inventory turnover days	29	32	27	30	30
Payable turnover days	190	253	210	210	210
Profitability (%)					
ROE	8.4	9.6	12.2	18.6	19.6
ROA	4.0	4.0	4.6	6.6	6.5
Per share data (RMB)					
EPS	0.49	0.58	0.80	1.38	1.68
DPS	0.25	0.28	0.40	0.69	0.84

Source: Company data, CMBIS estimates

GAC Group (2238 HK)

Ride on Aion spin-off and JV cash cow

Initiate with BUY. We initiate our coverage of GAC Group H-share with a BUY rating and a target price of HK$ 10.50. GAC is one of the few SOE automakers which is committed to coping with industry development, in our view. Its BEV brand, Aion, is on the right track with sales volume doubled in 2021, which could lift GAC's valuation with a planned spin-off. GAC Toyota and GAC Honda are still better positioned than most foreign brands in China, given their new model pipeline and high capacity utilization rates. We take a conservative approach in valuing both its homegrown brand Trumpchi and joint ventures.

- **Aion's planned spin-off to lift GAC's valuation.** We project Aion's sales volume to rise 29% YoY to 1.55mn units in FY22E, by taking our concerns about ride-hailing fleets into consideration. We value 3x FY22E P/S on Aion, lower than 3.5x that we have applied for BYD's auto business due to an 'SOE discount'. We also value 0 for GAC's Trumpchi brand.
- **We take a conservative valuation for JVs and associates.** We expect equity income from JVs and associates at GAC to rise 12%/15%/5% YoY in FY21-23E, aided by GAC Toyota and GAC Honda. We are of the view that Toyota is the best positioned mass-market foreign brand in China now. We value 4x FY22E P/E for all the JVs and associates combined at GAC. We think that such valuation is conservative given strong cash flow provided by JVs.
- **AD technologies still rely on suppliers.** Although GAC has been incubating auto tech related start-ups especially for battery technologies, it currently still relies heavily on suppliers for the AD technologies.
- **Valuation/Key risks.** We use sum-of-the-parts (SOTP) valuation to factor in Aion's planned spin-off, with details illustrated in the first two bullet points. We value HK$ 4.7 per share for 70% of Aion, HK$ 5.8 per share for JVs and associates and 0 for Trumpchi. Key risks to our rating and target price include lower sales volume and margins at GAC especially for Aion and slower spin-off progress than we expect, as well as a sector de-rating.

Earnings Summary

(YE 31 Dec)	FY19A	FY20A	FY21E	FY22E	FY23E
Revenue (RMB mn)	59,704	63,157	75,965	87,601	97,892
YoY growth (%)	(17.5)	5.8	20.3	15.3	11.7
Net income (RMB mn)	6,616	5,964	7,247	9,021	10,029
EPS (RMB)	0.64	0.58	0.69	0.86	0.95
YoY growth (%)	(39.3)	(9.9)	21.5	24.5	11.2
P/E (x)	11.2	12.5	9.6	7.7	7.2
P/B (x)	0.9	0.8	0.8	0.7	0.7
Yield (%)	2.7	2.7	2.6	3.2	3.5
ROE (%)	8.4	7.2	8.3	9.5	9.7
Net gearing (%)	Net cash	Net cash	Net cash	Net cash	Net cash

Source: Company data, Bloomberg, CMBIS estimates

BUY (Initiation)

Target Price	HK$ 10.50
Up/Downside	+28.0%
Current Price	HK$ 8.20

China Auto Sector

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(852) 3761 8728
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DOU Wenjing, CFA
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Stock Data

Mkt Cap (HK$ mn)	79,335
Avg 3 mths t/o (HK$ mn)	222
52w High/Low (HK$)	10.08/6.10
Total Issued Shares (mn)	10,371

Source: Bloomberg

Shareholding Structure

Guangzhou Automobile Industry	53.1%
Others	46.9%

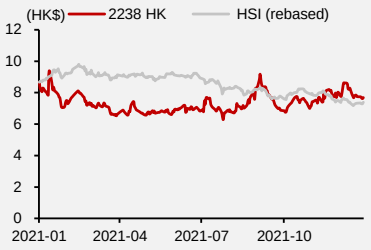
Source: HKEx

Share Performance

	Absolute	Relative
1-mth	-3.4%	1.1%
3-mth	7.6%	15.4%
6-mth	-0.5%	15.7%

Source: Bloomberg

12-mth Price Performance



Source: Bloomberg

Auditor: PricewaterhouseCoopers

Investment Thesis and Company Overview

GAC is one of the few SOE automakers which is committed to coping with industry development, in our view. Its homegrown brand, Trumpchi, unveiled its first model as late as 2011 and reached an annual sales volume of 500,000 units in 2017. The strong model cycle ended in 2018 as the heightened SUV competition dented its *GS4* sales and made the *GS8* a one-hit wonder.

GAC also started its NEV business late, which made it determined to develop BEV-dedicated platforms. Its BEV brand, Aion, rolled out its first model in Apr 2019 and reached an annual sales volume of 120,000 units in 2021. In our view, the potential spin-off of Aion could provide a positive catalyst for GAC's share price.

Like some other Chinese automakers, GAC has been incubating auto tech related start-ups amid an evolving industry landscape, especially for battery technologies. GAC is one of the few SOE automakers which provides share option incentives to employees.

Despite low valuation since 2018, GAC's equity income from JVs and associates, especially from GAC Toyota and GAC Honda, has been rising steadily for the past seven years and is more resilient than almost all the JVs at other SOE automakers in China. Dividends from these businesses have funded GAC with strong cash flow.

Aion: Lift GAC's valuation with a planned spin-off

Sales volume of Aion doubled in 2021 to about 120,000 units. Such trend could make Aion's spin-off more appealing and lift GAC's valuation. We project Aion's sales volume to rise to 155,000 units in FY22E, which should be lower than the company guidance of about 180,000-200,000 units, mainly because of our concerns about the demand sustainability for ride-hailing fleets. About half of the Aion vehicles were sold as ride-hailing fleets in 2021, based on insurance data. We expect Aion's sales volume to rise to 190,000 units in FY23E, with more competitive 2nd-generation models.

GAC plans to introduce two rounds of strategic investors, both of which are scheduled to be completed in 2022. The valuation implied from these fundings could be good indicators for Aion's valuation.

We assume GAC to hold about 70% stakes of Aion after the spin-off and apply 3.0x FY22E P/S for Aion. We put an 'SOE discount' on Aion compared with our target valuation of 3.5x FY22E P/S for BYD's auto business.

Trumpchi: We value 0 on its ICE-vehicle business

Trumpchi's sales volume declined for two consecutive years during 2019-20 to less than 300,000 units in 2020. Sales volume rose about 10% YoY in 2021, aided by the *GM8* MPV and new *Empow* sedan. We expect Trumpchi's sales volume to rise 16% YoY in FY22E and 9% YoY to 410,000 units in FY23E. It is still well below its peak of 535,000 units in FY18. Accordingly, the capacity utilization rate should remain low in FY22-23E, which makes Trumpchi difficult to be profitable. We continue to forecast more than RMB 2.9bn net loss for GAC's consolidated businesses in FY22-23E. Meanwhile, we expect Aion's gross margin to surpass Trumpchi's from FY22E. We value 0 for GAC's Trumpchi amid its loss making since FY19, as we have not seen the inflection point yet.

GAC Toyota: Best positioned mass-market foreign brand in China

Sales volume at GAC Toyota rose 8% YoY in 2021 despite chip shortage, which makes it outperform the industry average for five consecutive years. We expect the outperformance

to continue in FY22E, with the redesigned *Highlander*, the new *Frontlander* and *Venza*. Toyota's conservative approach, along with efficient management, has led to high margins at GAC Toyota. We also expect such trend to continue amid its high production capacity utilization rate.

GAC Honda: We expect high single-digit sales growth in FY22-23E

Sales volume at GAC Honda experienced its first YoY decline in 2021 during the past nine years, due in large to chip shortage. GAC Honda's sales volume growth started to wind down from 2018, along with the industry slowdown, but still managed to outperform by at least 9ppts during 2018-20. We would be slightly less optimistic about GAC Honda than GAC Toyota, but we still project high single-digit sales volume growth for GAC Honda in FY22-23E with its new *Integra* (the *Civic*'s sister model) and the upcoming redesigned *Vezel*. Margins at GAC Honda should also be stable during FY22-23E given its high production capacity utilization rate.

We value 4x FY22E P/E for GAC's JVs and associates

We are of the view that it is getting more difficult for GAC FCA and GAC Mitsubishi to survive in China and we expect losses at these JVs to continue in FY22-23E. We detail share of profits from major JVs and associates in the table below.

Figure 109: Share of profits at GAC's JVs and associates

(RMB mn)	FY17	FY18	FY19	FY20	FY21E	FY22E	FY22E YoY
Share of Profits of Joint Ventures	**6,726**	**7,241**	**8,253**	**8,460**	**9,504**	**10,849**	**14.1%**
GAC Honda	2,959	3,459	3,925	4,078	4,100	4,252	3.7%
GAC Toyota	2,440	3,251	4,746	5,685	6,592	7,947	20.6%
GAC FCA	463	(475)	(1,068)	(1,334)	(1,174)	(1,166)	N/A
GAC Mitsubishi	383	556	224	(437)	(495)	(694)	N/A
Other Joint Ventures	481	451	427	469	482	511	5.9%
Share of Profits of Associates	**1,559**	**1,540**	**1,215**	**1,244**	**1,198**	**1,449**	**21.0%**
Total Share of Profits of JVs & Assos	**8,285**	**8,781**	**9,468**	**9,705**	**10,702**	**12,298**	**14.9%**

Source: Company data, CMBIS estimates

GAC's share price was largely driven by its homegrown brands in the past six years. Investors also lowered the importance of the JVs from May 2018, when the Chinese government announced that China was to remove the foreign shareholding caps for automakers. We apply 4x FY22E P/E for GAC's all JVs and associates combined based on our equity income estimates, which is fairly conservative, in our view.

AD technologies still rely on suppliers

GAC's NDA (Navigated Driving Assist) function is scheduled to be available in early 2022 on its *Aion V Plus*. As far as we know, GAC has leveraged Bosch for visual perception, Baidu for memory parking and Horizon Robotics for driver monitoring. The performance was not very exciting based on the feedback from the engineering version test drive. On the other hand, GAC is to use Huawei's solution for the L2+ functions on the *Aion LX Plus*, its flagship model.

Financial Analysis

We project net profit to rise 5%, 32%, 14% YoY in FY21-23E

We project GAC's revenue to rise 15% YoY in FY22E and 11% YoY in FY23E, in line with our projected sales volume growth for Trumpchi and Aion. We expect GAC's gross margin to widen to 6.2-8.5% in FY21-23E, from 3.6% in FY20, thanks to greater economies of scale and lowering BOM costs for NEVs.

We project equity income from JVs and associates at GAC to rise 12% YoY in FY21E, 15% YoY in FY22E and 5% YoY in FY23E. Accordingly, we forecast GAC's net profit to be RMB 7.2bn, 9.0bn and 10.0bn in FY21-23E, respectively. Our net profit projections would meet the profit requirements for the all three batches of the share options and restricted shares granted in Dec 2020. We have factored the associated share-based payments in our model. On 11 Jan 2022, GAC issued a profit alert that it expects FY21 net profit to be ranged between RMB 6.6-7.6bn.

Our FY22-23E net profit estimates are 6-12% below consensus

Consensus has been overestimating GAC's net profits since FY18, due in part to its unexpected impairment losses and gross margin plunge for Trumpchi. GAC's FY21E profit alert seems to suggest that unexpected losses have been minimized in FY21E.

Our top-line growth forecasts are largely in line with consensus. While operating costs are the most difficult part to forecast for GAC, our bottom-line earnings estimates are 6% and 12% lower than consensus for FY22E and FY23E, respectively.

Figure 110: CMBI estimates vs consensus

	CMBI			Consensus			Diff (%)		
RMB mn	FY21E	FY22E	FY23E	FY21E	FY22E	FY23E	FY21E	FY22E	FY23E
Revenue	75,965	87,601	97,892	74,603	87,654	98,041	1.8%	-0.1%	-0.2%
Gross Profit	4,404	6,791	8,310	4,885	7,160	8,856	-9.8%	-5.1%	-6.2%
Operating Profit	(3,351)	(3,082)	(2,781)	(3,910)	(157)	(318)	N/A	N/A	N/A
Net profit	7,247	9,021	10,029	7,060	9,549	11,404	2.6%	-5.5%	-12.1%
Gross Margin	5.8%	7.8%	8.5%	6.5%	8.2%	9.0%	-0.7 ppt	-0.4 ppt	-0.5 ppt
Operating Margin	-4.4%	-3.5%	-2.8%	-5.2%	-0.2%	-0.3%	0.8 ppt	-3.3 ppt	-2.5 ppt
Net Margin	9.5%	10.3%	10.2%	9.5%	10.9%	11.6%	0.1 ppt	-0.6 ppt	-1.4 ppt

Source: Bloomberg, CMBIS estimates

Valuation

Initiate with BUY; TP of HK$ 10.50 (28% upside)

We adopt a sum-of-the-parts (SOTP) valuation for GAC to factor in Aion's potential spin-off.

Aion: We assume GAC to hold 70% stakes at Aion after the spin-off. We apply 3x our FY22E P/S on Aion. Accordingly, we value HK$ 4.7 per share for the Aion business.

Trumpchi: We value 0 for Trumpchi.

Joint ventures and associates: We value HK$ 5.8 per share for all the JVs and associates combined at GAC, based on 4x our FY22E P/E.

Figure 111: SOTP valuation for GAC

GAC (2238 HK)	FY22E (RMB mn)	Target P/E Multiple	Target P/S Multiple	Est. Shareholding	Target Market Cap (RMB mn)	Target Price (HK$)
Estimated Share of Profits of Joint Ventures & Associates	12,298	4.0x	-	-	49,194	5.8
Estimated NEV Revenue	18,868	-	3.0x	70%	39,623	4.7
SOTP					**88,816**	**10.5**

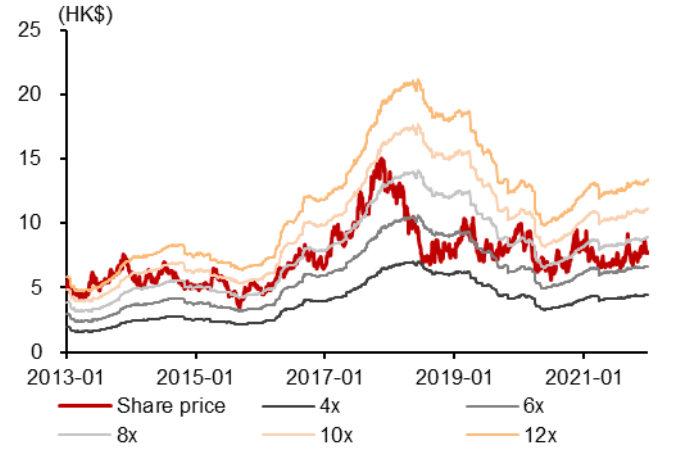
Source: CMBIS estimates

Figure 112: Peers' valuation

Company	Ticker	Rating	Mkt Cap (US$ mn)	Price (LC)	TP (LC)	Up/Down -side	P/E (x) FY21E	P/E (x) FY22E	P/S (x) FY21E	P/S (x) FY22E	ROE (%) FY21E	ROE (%) FY22E
Great Wall	2333 HK	BUY	30,449	25.70	36.00	40.1%	26.3	15.2	1.5	0.9	10.7	16.1
Great Wall	601633 CH	BUY	68,262	47.05	59.00	25.4%	58.9	34.1	3.3	2.1	10.7	16.1
GAC	2238 HK	BUY	10,909	8.20	10.50	28.0%	9.6	7.7	0.9	0.8	8.3	9.5
GAC	601238 CH	BUY	24,730	15.18	18.40	21.2%	21.7	17.5	2.1	1.8	8.3	9.5
BYD	1211 HK	HOLD	96,947	259.60	270.00	4.0%	178.1	82.3	3.1	2.3	4.6	7.6
BYD	002594 CH	HOLD	117,071	256.00	270.00	5.5%	215.1	99.4	3.7	2.8	4.6	7.6
Geely	175 HK	HOLD	25,705	20.00	21.00	5.0%	27.9	18.6	1.6	1.3	8.9	12.0
	Average						**76.8**	**39.2**	**2.3**	**1.7**	**8.0**	**11.2**

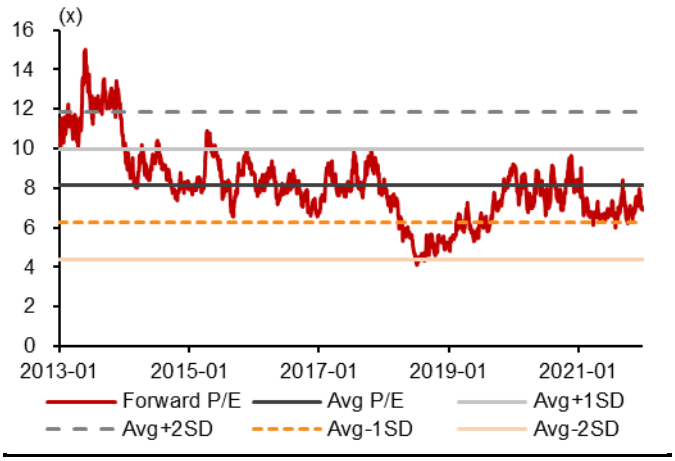
Source: Bloomberg, CMBIS

Figure 113: GAC's forward 12-m P/E band



Source: Company data, Bloomberg, CMBIS

Figure 114: GAC's forward 12-m P/E range



Source: Company data, Bloomberg, CMBIS

Financial Summary

Income statement

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
Revenue	**59,704**	**63,157**	**75,965**	**87,601**	**97,892**
Cost of sales	(57,181)	(60,861)	(71,560)	(80,810)	(89,581)
Gross profit	**2,523**	**2,296**	**4,404**	**6,791**	**8,310**
Selling exp.	(4,553)	(3,641)	(4,313)	(4,897)	(5,248)
Admin exp.	(3,590)	(3,850)	(4,962)	(6,295)	(7,162)
Other gains	2,857	1,629	1,519	1,319	1,319
Operating profit	**(2,763)**	**(3,567)**	**(3,351)**	**(3,082)**	**(2,781)**
Net finance costs	(345)	(312)	(353)	(233)	(65)
Profit share of asso.&JVs	9,399	9,571	10,702	12,298	12,902
Pre-tax profit	**6,292**	**5,692**	**6,998**	**8,984**	**10,056**
Tax	417	356	333	133	57
Minority interests	(93)	(84)	(84)	(95)	(84)
Net profit	**6,616**	**5,964**	**7,247**	**9,021**	**10,029**

Cash flow summary

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
Profit before taxation	**6,292**	**5,692**	**6,998**	**8,984**	**10,056**
Depreciation/amortization	4,284	5,110	5,812	6,639	7,513
Change in working capital	(2,953)	(4,168)	5,110	1,213	1,328
Others	(10,010)	(10,305)	(9,515)	(11,275)	(12,028)
Net cash from operating	**(2,388)**	**(3,671)**	**8,404**	**5,561**	**6,868**
Capex	(10,101)	(6,586)	(7,900)	(8,900)	(9,000)
Others	10,048	3,647	8,391	11,290	13,134
Net cash from investing	**(52)**	**(2,938)**	**491**	**2,390**	**4,134**
Net borrowings	996	1,105	(572)	(2,878	(3,364
Dividend paid	(3,464)	(1,936)	(2,191)	(2,471)	(2,950)
Others	757	(347)	(212)	(222)	(242)
Net cash from financing	**(1,711)**	**(1,178)**	**(2,974)**	**(5,570)**	**(6,556)**
Net change in cash	**(4,151)**	**(7,787)**	**5,921**	**2,380**	**4,446**
Cash at beginning of the year	27,730	23,605	15,791	21,713	24,093
Exchange difference	26	(27)	-	-	-
Cash at the end of the year	**23,605**	**15,791**	**21,713**	**24,093**	**28,539**

Balance sheet

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
Current assets	**56,865**	**56,643**	**64,981**	**71,563**	**79,790**
Cash & equivalents	23,605	15,791	21,713	24,093	28,539
Account receivables	16,844	19,616	20,812	24,000	26,820
Inventories	6,928	6,622	7,842	8,856	9,817
Other current assets	9,488	14,614	14,614	14,614	14,614
Non-current assets	**80,599**	**86,218**	**90,503**	**93,683**	**94,731**
PP&E	19,396	20,073	19,987	20,146	20,035
Intangibles	10,810	12,259	13,909	15,514	16,501
Deferred income tax	1,705	2,124	2,124	2,124	2,124
Other non-current assets	48,688	51,762	54,483	55,899	56,071
Total assets	**137,464**	**142,861**	**155,484**	**165,246**	**174,520**
Current liabilities	**41,775**	**42,543**	**50,332**	**52,452**	**54,625**
Bank borrowings	6,169	6,504	6,613	3,135	-
Account payables	35,145	35,464	43,132	48,707	53,994
Tax payable	284	103	103	103	103
Other current liabilities	177	472	484	507	527
Non-current liabilities	**13,180**	**13,604**	**12,402**	**10,964**	**9,902**
Bank borrowings	7,692	8,473	7,406	6,061	5,061
Government Grants	2,796	2,556	2,245	1,996	1,797
Other non-current liabilities	2,693	2,575	2,751	2,906	3,044
Total liabilities	**54,955**	**56,147**	**62,733**	**63,416**	**64,526**
Share capital	10,238	10,350	10,370	10,470	10,552
Reserves	69,950	74,025	80,033	89,004	97,078
Non-controlling interests	2,320	2,339	2,347	2,357	2,365
Shareholders' equity	**80,188**	**84,375**	**90,404**	**99,474**	**107,629**
Total equity and liabilities	**137,464**	**142,861**	**155,484**	**165,246**	**174,520**

Key ratios

YE 31 Dec	FY19A	FY20A	FY21E	FY22E	FY23E
Sales mix (%)					
Automobile	60.4	60.1	65.4	68.4	69.2
Parts and services	35.7	35.9	31.0	28.4	27.9
Finance and others	3.9	4.0	3.6	3.2	3.0
Growth (%)					
Revenue	(17.5)	5.8	20.3	15.3	11.7
Gross profit	(78.1)	(9.0)	91.8	54.2	22.4
Operating profit	(179.7)	29.1	(6.0)	(8.0)	(9.8)
Net profit	(39.3)	(9.9)	21.5	24.5	11.2
Profit & loss ratio (%)					
Gross margin	4.2	3.6	5.8	7.8	8.5
Operating margin	(4.6)	(5.6)	(4.4)	(3.5)	(2.8)
Net profit margin	11.1	9.4	9.5	10.3	10.2
Balance sheet ratio					
Net cash/total equity (x)	0.2	0.1	0.2	0.3	0.3
Current ratio (x)	1.4	1.3	1.3	1.4	1.5
Receivable turnover days	103	113	100	100	100
Inventory turnover days	44	40	40	40	40
Payable turnover days	224	213	220	220	220
Profitability (%)					
ROE	8.4	7.2	8.3	9.5	9.7
ROA	4.9	4.3	4.9	5.6	5.9
Per share data (RMB)					
EPS	0.64	0.58	0.69	0.86	0.95
DPS	0.20	0.18	0.22	0.27	0.30

Source: Company data, CMBIS estimates

GAC Group (601238 CH)

Ride on Aion spin-off and JV cash cow

Initiate with BUY. We initiate our coverage of GAC Group A-share with a BUY rating and a target price of RMB 18.40. We apply 110% premium (the average A-H premium in the past seven years) on H-share for our A-share target price. We are of the view that GAC H-share is a bit more attractive given its current A-H premium is larger than historical average. When GAC entered a strong model cycle during 2015-17, its A-H premium narrowed significantly. GAC A-share appears to be more resilient than H-share amid headwinds. As the underlying company is identical, please refer to page 89-94 for our detailed analysis on fundamentals. We list the same key points below.

- **Aion's planned spin-off to lift GAC's valuation.** We project Aion's sales volume to rise 29% YoY to 1.55mn units in FY22E, by taking our concerns about ride-hailing fleets into consideration. We value 3x FY22E P/S on Aion, lower than 3.5x that we have applied for BYD's auto business due to an 'SOE discount'. We also value 0 for GAC's Trumpchi brand.
- **We take a conservative valuation for JVs and associates.** We expect equity income from JVs and associates at GAC to rise 12%/15%/5% YoY in FY21-23E, aided by GAC Toyota and GAC Honda. We are of the view that Toyota is best positioned mass-market foreign brand in China now. We value 4x our FY22E P/E for all the JVs and associates combined at GAC. We think that such valuation is conservative given strong cash flow provided by JVs.
- **AD technologies still rely on suppliers.** Although GAC has been incubating auto tech related start-ups especially for battery technologies, it currently still relies heavily on suppliers for the AD technologies.
- **Valuation/Key risks.** We use sum-of-the-parts (SOTP) valuation to factor in Aion's planned spin-off, with details illustrated in the first two bullet points. We value GAC H-share with HK$ 4.7 per share for 70% of Aion, HK$ 5.8 per share for JVs and associates and 0 for Trumpchi. We apply 110% premium on H-share for our A-share target price of RMB 18.40. Key risks to our rating and target price include lower sales volume and margins at GAC especially for Aion and slower spin-off progress than we expect, as well as a sector de-rating.

Earnings Summary

(YE 31 Dec)	FY19A	FY20A	FY21E	FY22E	FY23E
Revenue (RMB mn)	59,704	63,157	75,965	87,601	97,892
YoY growth (%)	(17.5)	5.8	20.3	15.3	11.7
Net income (RMB mn)	6,616	5,964	7,247	9,021	10,029
EPS (RMB)	0.64	0.58	0.69	0.86	0.95
YoY growth (%)	(39.3)	(9.9)	21.5	24.5	11.2
P/E (x)	23.5	26.1	21.7	17.6	15.9
P/B (x)	1.9	1.8	1.7	1.6	1.5
Yield (%)	2.7	2.7	2.6	3.2	3.5
ROE (%)	8.4	7.2	8.3	9.5	9.7
Net gearing (%)	Net cash	Net cash	Net cash	Net cash	Net cash

Source: Company data, Bloomberg, CMBIS estimates

BUY (Initiation)

Target Price	RMB 18.40
Up/Downside	+21.2%
Current Price	RMB 15.18

China Auto Sector

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shiji@cmbi.com.hk

DOU Wenjing, CFA
(021) 3893 4985
douwenjing@cmbi.com.hk

Stock Data

Mkt Cap (RMB mn)	155,870
Avg 3 mths t/o (RMB mn)	689
52w High/Low (RMB)	21.00/10.08
Total Issued Shares (mn)	10,371

Source: Bloomberg

Shareholding Structure

Guangzhou Automobile Industry	53.1%
Others	46.9%

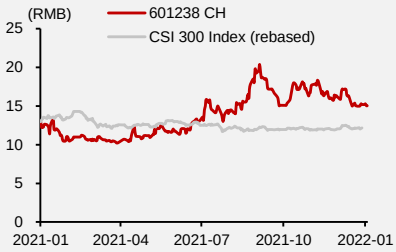
Source: Company data

Share Performance

	Absolute	Relative
1-mth	-5.3%	-4.2%
3-mth	-2.1%	-0.9%
6-mth	-5.1%	-1.1%

Source: Bloomberg

12-mth Price Performance



Source: Bloomberg

Auditor: PricewaterhouseCoopers

Financial Summary

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Gross profit	**2,523**	**2,296**	**4,404**	**6,791**	**8,310**
Selling exp.	(4,553)	(3,641)	(4,313)	(4,897)	(5,248)
Admin exp.	(3,590)	(3,850)	(4,962)	(6,295)	(7,162)
Other gains	2,857	1,629	1,519	1,319	1,319
Operating profit	**(2,763)**	**(3,567)**	**(3,351)**	**(3,082)**	**(2,781)**
Net finance costs	(345)	(312)	(353)	(233)	(65)
Profit share of asso.&JVs	9,399	9,571	10,702	12,298	12,902
Pre-tax profit	**6,292**	**5,692**	**6,998**	**8,984**	**10,056**
Tax	417	356	333	133	57
Minority interests	(93)	(84)	(84)	(95)	(84)
Net profit	**6,616**	**5,964**	**7,247**	**9,021**	**10,029**

Cash flow summary

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
Profit before taxation	**6,292**	**5,692**	**6,998**	**8,984**	**10,056**
Depreciation/amortization	4,284	5,110	5,812	6,639	7,513
Change in working capital	(2,953)	(4,168)	5,110	1,213	1,328
Others	(10,010)	(10,305)	(9,515)	(11,275)	(12,028)
Net cash from operating	**(2,388)**	**(3,671)**	**8,404**	**5,561**	**6,868**
Capex	(10,101)	(6,586)	(7,900)	(8,900)	(9,000)
Others	10,048	3,647	8,391	11,290	13,134
Net cash from investing	**(52)**	**(2,938)**	**491**	**2,390**	**4,134**
Net borrowings	996	1,105	(572)	(2,878	(3,364
Dividend paid	(3,464)	(1,936)	(2,191)	(2,471)	(2,950)
Others	757	(347)	(212)	(222)	(242)
Net cash from financing	**(1,711)**	**(1,178)**	**(2,974)**	**(5,570)**	**(6,556)**
Net change in cash	**(4,151)**	**(7,787)**	**5,921**	**2,380**	**4,446**
Cash at beginning of the year	27,730	23,605	15,791	21,713	24,093
Exchange difference	26	(27)	-	-	-
Cash at the end of the year	**23,605**	**15,791**	**21,713**	**24,093**	**28,539**

Balance sheet

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
Current assets	**56,865**	**56,643**	**64,981**	**71,563**	**79,790**
Cash & equivalents	23,605	15,791	21,713	24,093	28,539
Account receivables	16,844	19,616	20,812	24,000	26,820
Inventories	6,928	6,622	7,842	8,856	9,817
Other current assets	9,488	14,614	14,614	14,614	14,614
Non-current assets	**80,599**	**86,218**	**90,503**	**93,683**	**94,731**
PP&E	19,396	20,073	19,987	20,146	20,035
Intangibles	10,810	12,259	13,909	15,514	16,501
Deferred income tax	1,705	2,124	2,124	2,124	2,124
Other non-current assets	48,688	51,762	54,483	55,899	56,071
Total assets	**137,464**	**142,861**	**155,484**	**165,246**	**174,520**
Current liabilities	**41,775**	**42,543**	**50,332**	**52,452**	**54,625**
Bank borrowings	6,169	6,504	6,613	3,135	-
Account payables	35,145	35,464	43,132	48,707	53,994
Tax payable	284	103	103	103	103
Other current liabilities	177	472	484	507	527
Non-current liabilities	**13,180**	**13,604**	**12,402**	**10,964**	**9,902**
Bank borrowings	7,692	8,473	7,406	6,061	5,061
Government Grants	2,796	2,556	2,245	1,996	1,797
Other non-current liabilities	2,693	2,575	2,751	2,906	3,044
Total liabilities	**54,955**	**56,147**	**62,733**	**63,416**	**64,526**
Share capital	10,238	10,350	10,370	10,470	10,552
Reserves	69,950	74,025	80,033	89,004	97,078
Non-controlling interests	2,320	2,339	2,347	2,357	2,365
Shareholders' equity	**80,188**	**84,375**	**90,404**	**99,474**	**107,629**
Total equity and liabilities	**137,464**	**142,861**	**155,484**	**165,246**	**174,520**

Key ratios

YE 31 Dec	FY19A	FY20A	FY21E	FY22E	FY23E
Sales mix (%)					
Automobile	60.4	60.1	65.4	68.4	69.2
Parts and services	35.7	35.9	31.0	28.4	27.9
Finance and others	3.9	4.0	3.6	3.2	3.0
Growth (%)					
Revenue	(17.5)	5.8	20.3	15.3	11.7
Gross profit	(78.1)	(9.0)	91.8	54.2	22.4
Operating profit	(179.7)	29.1	(6.0)	(8.0)	(9.8)
Net profit	(39.3)	(9.9)	21.5	24.5	11.2
Profit & loss ratio (%)					
Gross margin	4.2	3.6	5.8	7.8	8.5
Operating margin	(4.6)	(5.6)	(4.4)	(3.5)	(2.8)
Net profit margin	11.1	9.4	9.5	10.3	10.2
Balance sheet ratio					
Net cash/total equity (x)	0.2	0.1	0.2	0.3	0.3
Current ratio (x)	1.4	1.3	1.3	1.4	1.5
Receivable turnover days	103	113	100	100	100
Inventory turnover days	44	40	40	40	40
Payable turnover days	224	213	220	220	220
Profitability (%)					
ROE	8.4	7.2	8.3	9.5	9.7
ROA	4.9	4.3	4.9	5.6	5.9
Per share data (RMB)					
EPS	0.64	0.58	0.69	0.86	0.95
DPS	0.20	0.18	0.22	0.27	0.30

Source: Company data, CMBIS estimates

BYD Company (1211 HK)

Do you want one champion or four runners-up?

Initiate with HOLD. BYD has a bit of everything about green energy: BEV, PHEV, ICE, commercial vehicles, IGBT, handset, photovoltaic and monorail, which has helped BYD's share price with much more catalysts than peers in the past two years. We believe BYD will continue to be a proxy when investors are optimistic about NEV supply chain. However, we prefer the best players in each subsector rather than a top-tier player for everything but not the best for any of them. Vertically integrated business can help BYD secure supply, cut costs and expand a new business along the supply chain in the short- to medium-term. On the other hand, such nature also makes its execution difficult, especially for BYD, as it is not as determined and focused as some of its peers.

- **It makes good NEVs, but not smart NEVs.** The key difference between our view and some other brokers' on BYD is the valuation on its auto business. We believe that applying the NEV trio's valuations for BYD is inappropriate, as BYD is lagging in AD technologies. We value BYD in between NEV trios and traditional automakers, as it is better positioned in the NEV supply chain.
- **Battery: Dilemma between self-sufficiency and external expansion.** We think valuing BYD's battery business as 1/3 of CATL's market cap given its current battery shipment difference is also inappropriate, as BYD's internal battery consumption has been valued in the auto segment. The current supply constraints offer a good opportunity to BYD. We project BYD's batteries to equip 0.25mn units of other-brand BEVs in 2023, but it may not be as easy as it is on paper.
- **Volatile earnings, non-transparent financials.** BYD's earnings are vulnerable to a large number of assumptions, including its R&D capitalization rate, commercial BEV sales volume and mask business. That has made investors shun away from its fundamentals. We rebuilt our model in 2H21 in a bid to make the best out of it.
- **Valuation/Key risks.** Our target price of HK$ 270.00 is based on our sum-of-the-parts valuation: 3.5x FY22E P/S for its auto segment, 5x FY23E P/S for its battery and photovoltaic businesses, 16x FY22E P/E for its handset segment and 19x FY22E P/S on its semiconductor business. Key risks to our rating and target price include higher or lower NEV sales volume, faster or slower battery external supply progress than we expect, as well as sector re-rating or de-rating.

Earnings Summary

(YE 31 Dec)	FY19A	FY20A	FY21E	FY22E	FY23E
Revenue (RMB mn)	127,739	156,598	200,327	264,217	299,234
YoY growth (%)	(1.8)	22.6	27.9	31.9	13.3
Net income (RMB mn)	1,614	4,234	3,465	7,499	10,276
EPS (RMB)	0.50	1.47	1.18	2.57	3.52
YoY growth (%)	(41.9)	162.3	(18.2)	116.5	37.0
P/E (x)	435.1	146.9	178.1	82.3	61.4
P/B (x)	11.1	11.1	6.6	6.1	5.6
Yield (%)	0.2	0.2	0.1	0.2	0.2
ROE (%)	2.9	7.5	4.6	7.6	9.6
Net gearing (%)	71.3	25.9	Net cash	Net cash	Net cash

Source: Company data, Bloomberg, CMBIS estimates

HOLD (Initiation)

Target Price	HK$ 270.00
Up/Downside	+4.0%
Current Price	HK$ 259.60

China Auto Sector

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Stock Data

Mkt Cap (HK$ mn)	727,786
Avg 3 mths t/o (HK$ mn)	1,996
52w High/Low (HK$)	324.60/138.40
Total Issued Shares (mn)	2,911

Source: Bloomberg

Shareholding Structure

Wang Chuanfu	17.6%
Lv Xiangyang	8.2%
Berkshire Hathaway	7.7%
Others	66.4%

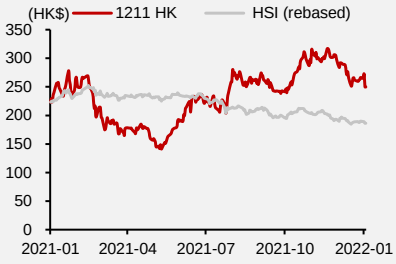
Source: HKEx

Share Performance

	Absolute	Relative
1-mth	-14.4%	-10.0%
3-mth	1.6%	9.4%
6-mth	15.6%	31.9%

Source: Bloomberg

12-mth Price Performance



Source: Bloomberg

Auditor: Ernst & Young

Investment Thesis and Company Overview

A bit of everything provides more catalysts and execution difficulty

BYD has a bit of everything about green energy: Passenger BEVs, passenger PHEVs, commercial BEVs, NEV batteries, IGBT, photovoltaic and monorail. That has created much more positive catalysts for BYD than other companies when investors are optimistic about NEVs.

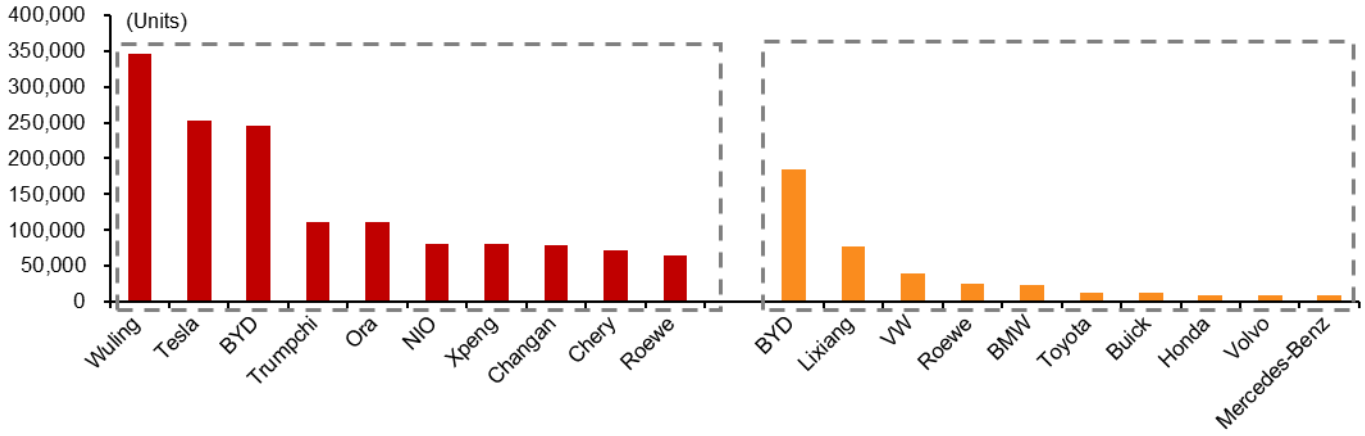
We acknowledge that BYD's NEV battery business could help its NEV manufacturing in terms of cost control and supply chain security in the short- to medium-term. The current battery supply constraints have also put BYD in a more advantangeous position than before in supplying batteries to other automakers. As noted earlier in this report, the electrification/tech transformation, along with supply chain challenges post COVID-19, also benefits Chinese parts suppliers in components which was dominated by global tier-1 suppliers. The list should include IGBT, in our opinion. BYD's early attempts in the hybrid technologies have also given it an edge in the cost control now because of its patents for the P1 + P3 architecture. In summary, we believe BYD has been benefiting from more vertically integrated supply chain, a trend that we noted on page 46 titled '*Why cannot automakers rely on suppliers for AD functions*'.

On the other hand, a bit of everything makes BYD's exeuction more difficult, especially as BYD is not as determined and focused as some of its peers, such as Tesla, Xpeng and Li Auto. For example, BYD shifted all of its batteries from LFP (lithium-iron phosphate) to NMC (nickel-manganese-cobalt) batteries in 2018 in a bid to maximize government subsidies, and shifted back to LFP in 2020 when battery energy density became less important to subsidies. We are of the view that the current diversified business portfolio at BYD could be one of the reasons that BYD is good at technology innovation but not very capable of product design and marketing efforts, because the decision-making of all kinds of different businesses now at BYD is based on its technological expertise, but not based on market demand. Monorail is an example. This has also led to a fact that BYD is a top-tier NEV maker, battery maker and Chinese IGBT maker and handset maker, but not the best for any of them, in our view.

It makes good NEVs, but not smart NEVs

BYD's NEV market share in China on retail basis (we will explain in the 'Financial Analysis' section why we use retail sales volume here) fell from 20% in 2018-19 to 13% in 2020 and rebounded to 18% in the first 11 months of 2021. BYD's BEV sales volume fell to the 3rd position in 2020-21 in China. Meanwhile, new BEV brands at traditional automakers such as Aion and Ora are catching up.

Figure 115: Top 10 BEV brands and Top 10 PHEV brands in China in 11M21 (retail sales volume basis)



Source: CATARC, CMBIS

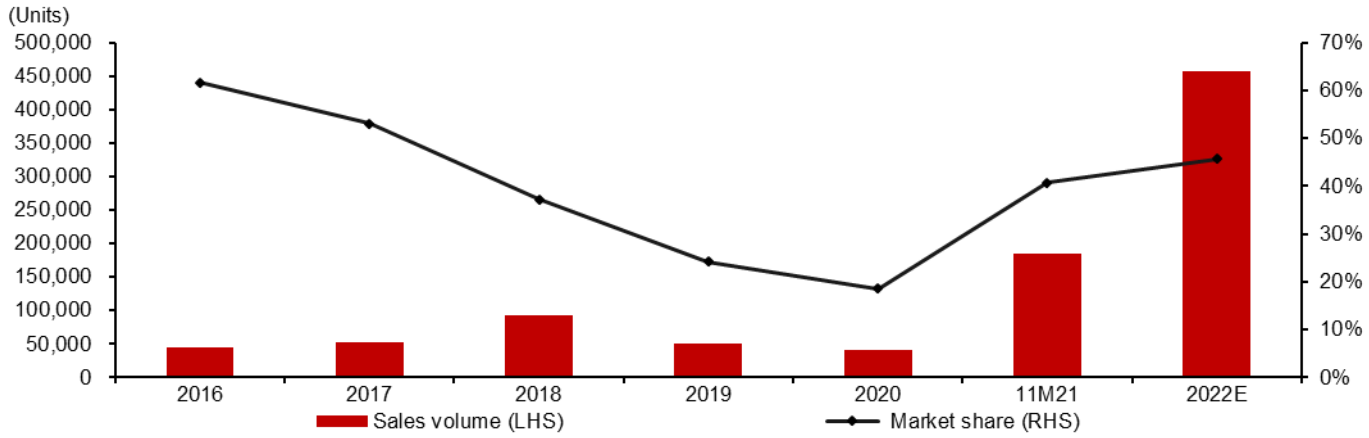
The key difference between our view and some other brokers' on BYD is the valuation on its auto business. We believe that applying the NEV trio's valuations for BYD's auto business is inappropriate, because BYD is lagging in AD technologies while AD and smart cockpit technologies are key to consumer stickiness and thus higher valuation, in our view. BYD's NEV product positioning is closer to traditional automakers, but BYD started its NEV manufacturing much earlier and is better positioned in the NEV supply chain. We are of the view that BYD's automotive business valuation should be in between traditional automakers' and NEV trio's. Therefore, we give 3.5x FY22E P/S for BYD's auto business, including its passenger BEVs, PHEVs, commercial BEVs and ICE vehicles.

The popularity of DM-i underscores BYD's advantage as a first mover

As noted on page 32-36 titled '*Hybrid technology comparison: Who's the best*', the advantage of BYD's PHEV technologies in cost efficiency mainly comes from the barrier of its patents for the P1 + P3 architecture. BYD used to dominate PHEV sales in China as a first mover with more than 60% market share prior to 2017. Its market share narrowed to 19% in 2020, as consumers favored foreign-brand PHEVs, especially for those who desired to buy a luxury car but did not have a license plate for ICE vehicle.

The DM-i models (BYD's 4th-generation PHEV technologies) launched in early 2021 has lifted BYD's PHEV market share to 41% during the first 11 months of 2021. We expect BYD's PHEV sales volume to double to about 0.46mn units in FY22E, or 46% of China's PHEV segment. Despite its cost advantage and early adoption, it may still be difficult for BYD to revive its dominance in early days, as the current PHEV models at Great Wall, Geely and Li Auto are also quite competitive. Moreover, we estimate that BYD's PHEV business was not profitable in the past two years and is hard to lift profit for FY22-23E.

Figure 116: BYD's PHEV sales volume and market share in China (retail sales volume basis)

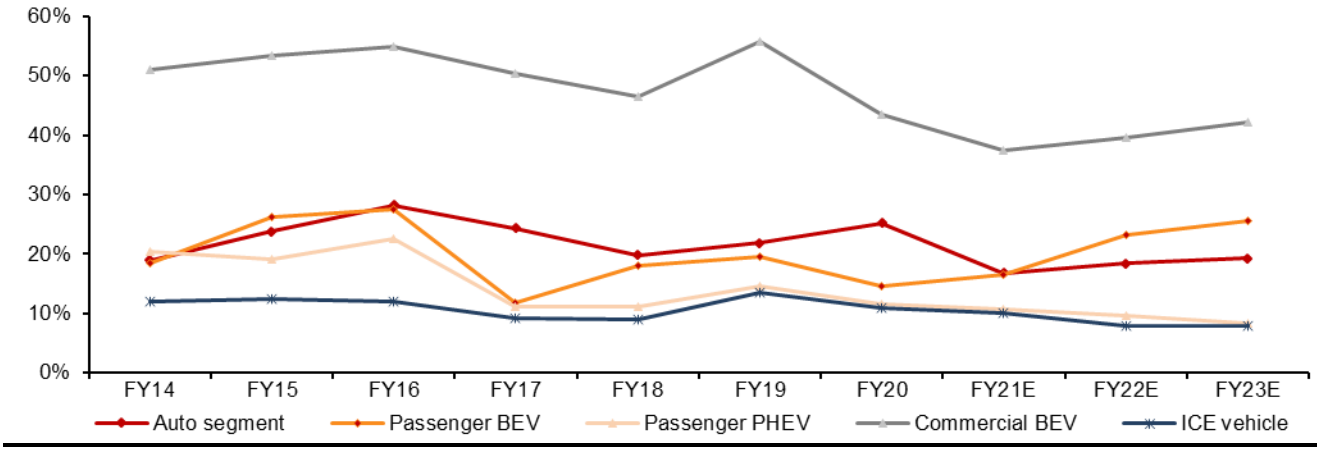


Source: CATARC, CMBIS estimates

Commercial BEVs: Source of auto business profit in the past

While it is difficult to break down profits for different vehicles within the auto segment given BYD's poor financial disclosure, we try our best to estimate gross margins for passenger BEVs, passenger PHEVs, commercial BEVs, ICE vehicles, NEV credits, monorail, mask and IGBT businesses under the auto segment. We estimate that gross margins for commercial BEVs were between 43-56% during FY14-20. Commercial BEVs accounted for about 36-53% of BYD's total auto business gross profits during FY14-19 (we estimate that its mask business dominated BYD's auto gross profit in FY20). While we still project high gross margins for BYD's commercial BEV business, the market size growth is limited in the foreseeable future. In addition, Zhengzhou Yutong Bus (600066 CH, NR), as a leading commercial electric bus maker, has a much lower valuation than BYD.

Figure 117: Our estimated gross margin breakdown for BYD's auto segment



Source: Company data, CMBIS estimates

Despite BYD's volatile passenger-BEV gross margin during FY17-20 when subsidies started to diminish significantly, we project 23-26% gross margin for its passenger BEVs in FY22-23E, higher than our forecasts for Xpeng and NIO, thanks to its own battery supply and greater economies of scale. We expect its passenger PHEV gross margin to remain low in FY22-23E amid subsidy cuts, which could be more sensitive to PHEV models.

Battery: Dilemma between self-sufficiency and external expansion

Market has been talking about BYD's external battery supplies, especially with its so-called 'blade' battery, or a long-size cell-to-pack (CTP) LFP battery. Battery supply constraints, noted on page 26-27 titled '*Battery supply constraints still exist in 2022*', also increase BYD's chance for external battery supply, as automakers prioritize supply security over the subtle relationship with BYD. However, BYD itself has also benefited from the NEV boom and has put a higher priority at its own battery supply.

Based on the data that we have compiled, BYD's aggressive battery capacity expansion should allow BYD to supply external batteries. There may be some time mismatch as some battery plants need to be converted from previous NMC production to BEV blade batteries or PHEV DM-i blade batteries. If BYD could not seize the chance now, it could be a bit late to be major suppliers for automakers as CATL and other battery suppliers have probably taken up the majority of the pie. Transforming from a battery business unit under its own umbrella to an independent battery supplier is not as easy as some investors would think.

Figure 118: BYD NEV battery capacity by plant

	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21E	FY22E
NEV Battery Capacity (GWh)	**2**	**10**	**12**	**16**	**26**	**40**	**53**	**95**	**140**
Huizhou LFP	2	2	2	2	2	2	2	2	2
Shenzhen Kengzi LFP		8	8	8	8	8	8	8	8
Shenzhen Kengzi NMC			2	6	6	6	6	6	6
Qinghai Nanchuan NMC					10	14	14	24	24
Xi'an NMC + Energy Storage						10	10	10	10
Xi'an LFP DM-i Blade									20
Chongqing Bishan LFP Blade							13	20	20
Changsha LFP Blade								10	20
Guiyang LFP Blade								5	10
Bengbu LFP Blade									10
Chongqing Liangjiang NMC (50:50 JV with Changan)								10	10

Source: Company data, CMBIS estimates

Many investors use analogy to value BYD's battery business: BYD's battery market cap should be proportional to CATL's based on their current battery shipments. We think this is inappropriate for two reasons.

(1) CATL's valuation is based on its long-term growth potential. The battery landscape in five years could be very different from now. BYD's 17% share in China's NEV battery market now (vs CATL's 51%) is primarily from its own NEVs. As the NEV penetration rises over the time, most investors would agree that BYD's own NEV demand could not sustain BYD's battery market share now. Forecasting battery demand from external automakers for BYD is not easy, but it is likely that the market share gap between CATL and BYD is to widen, especially if we take LG Chem (051910 KS, NR), Panasonic (6752 JP, NR) and Tesla into consideration. We project BYD's external battery sales of about 6GWh and 13GWh in FY22-23E, or about 126,000 units and 250,000 units of 50kWh BEVs, respectively.

(2) In our view, BYD's internal battery consumption should not be valued as part of its battery business, because this has already been valued in the auto segment.

We value 5x our FY23E P/S for BYD's battery segment, which includes its batteries for consumer electronics and energy storage, photovoltaic and external NEV batteries. CATL is trading at 5x FY23E P/S on Wind consensus, higher than other battery makers. Our target valuation implies 17x FY23E P/S on our estimated external battery revenue at BYD.

We believe that our high valuation for BYD's battery business has already taken its possible external business expansion into consideration.

Figure 119: Chinese battery makers' valuation comparison

Company	Ticker	Rating	Mkt. Cap (RMB mn)	P/E (x) FY22E	P/E (x) FY23E	P/S (x) FY22E	P/S (x) FY23E
CATL	300750 CH	NR	1,258,427	62.4	43.5	6.6	4.6
Eve Energy	300014 CH	NR	200,057	41.1	29.4	7.1	4.9
Guoxuan High-Tech	002074 CH	NR	75,062	89.6	60.8	5.3	3.8
Farasis	688567 CH	NR	34,015	77.2	31.2	3.1	2.1
Average				**67.6**	**41.2**	**5.5**	**3.8**

Source: WIND Database, CMBIS

IGBT: Riding on IGBT localization but still a long way to go

BYD plans to spin off its semiconductor business (mainly IGBT) for A-share listing. The company has disclosed its FY19-20 revenues of RMB 1.1bn and 1.4bn, respectively. We estimate 35-45% of such revenues were from external clients.

Chinese automotive IGBT makers, including BYD, Starpower (603290 CH, NR) and Zhuzhou CRRC Times Electric (3898 HK, NR), have been benefiting from the IGBT chip shortage. BYD's IGBT 4.0 is equivalent to Infineon's (IFX GR, NR) 2.5-generation, and one generation behind CRRC and Starpower. Its Changsha plant aims to break through the trench IGBT technologies but it has asked Hua Hong Semiconductor (1347 HK, NR) to contract manufacture its IGBT 5.0. While it is still a bit too early to tell who the winners will be given their advantages and disadvantages, BYD again is not the best positioned player, in our view. We value 19x our FY22E P/S on our estimated external semiconductor sales, which amounts to HK$ 35bn market cap.

Figure 120: Chinese IGBT makers' valuation comparison

Company	Ticker	Rating	Mkt. Cap (RMB mn)	P/E (x) FY22E	P/E (x) FY23E	P/S (x) FY22E	P/S (x) FY23E
Starpower	603290 CH	NR	57,682	108.8	79.3	22.9	16.8
Silan Microelectronics	600460 CH	NR	71,172	54.6	45.9	7.3	5.8
Resources Microelectronics	688396 CH	NR	80,842	32.0	28.4	7.5	6.5
Gigadevice	603986 CH	NR	104,787	37.6	30.0	8.8	7.0
Average				**58.3**	**45.9**	**11.6**	**9.0**

Source: WIND Database, CMBIS

Handset: We largely follow Bloomberg consensus

BYD's handset business is primarily from BYDE (285 HK, HOLD), which is rated as HOLD by our hardware team. BYD holds 65.76% stakes of BYDE. We largely follow Bloomberg consensus for its net profit projections and give 16x FY22E P/E for its handset business (there is a small net profit discrepancy between BYDE and our estimated BYD's handset segment due to different accounting standards adopted).

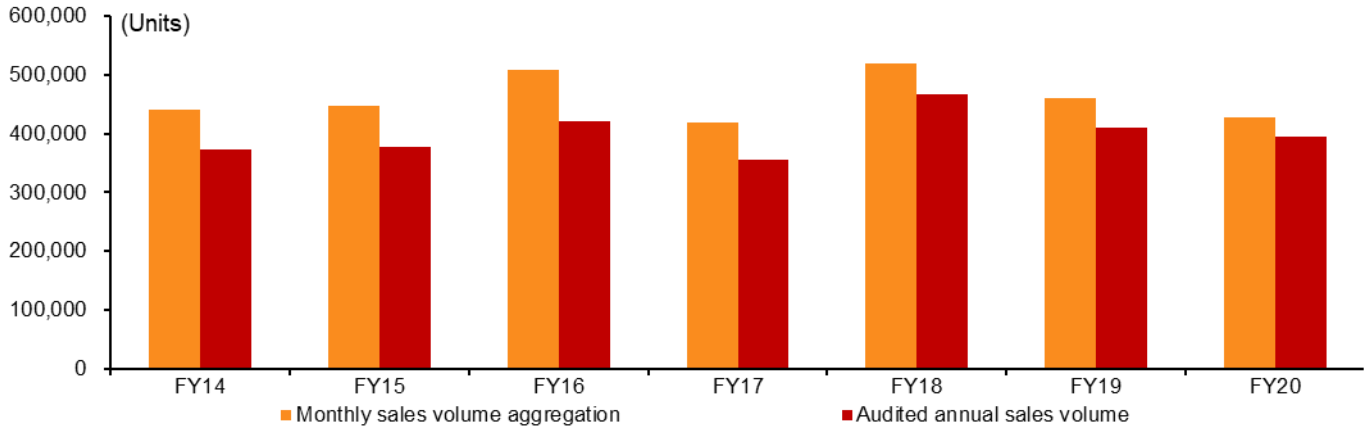
Financial Analysis

Sales discrepancy explains 'missing inventories'

We rebuilt our model for BYD in 2H21 in a bid to make the best out of it, as the company and industry have evolved so much in the past few years. Government subsidies play a less important role for NEVs now whereas cost estimates for batteries, controllers and motors become more important in our model. We have a few findings from our new model as below.

(1) The company started to disclose sales volume in the annual report from FY19. The audited sales volumes in the FY19-20 annual reports were about 52,000 units and 32,000 units lower than the aggregated monthly sales announcements, respectively. The company did not disclose audited sales volumes prior to FY19 but only with rough numbers. We estimate that its actual sales volumes were 11-20% lower than its monthly sales volume reports prior to FY19. That explains why our calculated BYD's inventories based on monthly retail and wholesale volumes were as high as 5-10 months in the past while the dealer channel checks did not support it at all.

Figure 121: Monthly sales volume aggregation vs audited annual sales volume at BYD



Source: Company data, CMBIS

(2) BYD capitalized 13-49% of its R&D investments each year during FY14-20, much lower than Geely. However, the capitalization rate was quite volatile, which could result in extremely unstable net profits for BYD and increase our forecast difficulty. For example, BYD cut its R&D capitalization rate to 13% in FY20 from an average of 40% during FY14-19. If BYD capitalized 40% of its R&D investments in FY20, its FY20 net profit would have been lifted by 55%.

(3) Even with sales volume and revenue for NEV and ICE vehicles disclosed in the annual report, there could still be some noises to lower its financial transparency. For example, we can derive ASP for BYD's ICE vehicles in FY19, based on its disclosed total auto revenue, NEV revenue and ICE sales volume. The result was larger than BYD's blended MSRP (manufacturer's suggested retail price) for the most expensive trim level for each model excluding VAT and dealer rebates. A similar issue occurred to the NEV ASP in FY20.

(4) Although we believe the mask business in FY20 significantly strengthened BYD's financial stability (we called it 'make lemonade out of lemons'), it lowers its financial transparency at the same time and make our forecasts even more difficult.

Our FY22-23E net profits 6-9% above consensus

We project BYD's NEV sales volume to rise to 0.89mn units in FY22E, which could be lower than consensus. The company almost never met its sales-volume targets in the past. We assume BYD's R&D capitalization rate to remain at around 80% during FY21-23E. We have also listed other key assumptions in the above paragraphs including PHEV sales volume, gross margins for different vehicle types and external battery sales outlook.

Our FY22-23E net profit projections are 6-9% above consensus. Both our forecasts and consensus could change drastically, as BYD's earnings are vulnerable to a large number of assumptions.

Figure 122: CMBI estimates vs consensus

	CMBI			Consensus			Diff (%)		
RMB mn	FY21E	FY22E	FY23E	FY21E	FY22E	FY23E	FY21E	FY22E	FY23E
Revenue	200,327	264,217	299,234	218,472	289,318	355,508	-8.3%	-8.7%	-15.8%
Gross Profit	27,363	39,879	46,215	31,539	44,940	56,156	-13.2%	-11.3%	-17.7%
Operating Profit	5,119	10,117	13,733	8,974	13,618	17,468	-43.0%	-25.7%	-21.4%
Net profit	3,465	7,499	10,276	4,140	6,902	9,719	-16.3%	8.6%	5.7%
Gross Margin	13.7%	15.1%	15.4%	14.4%	15.5%	15.8%	-0.8 ppt	-0.4 ppt	-0.4 ppt
Operating Margin	2.6%	3.8%	4.6%	4.1%	4.7%	4.9%	-1.6 ppt	-0.9 ppt	-0.3 ppt
Net Margin	1.7%	2.8%	3.4%	1.9%	2.4%	2.7%	-0.2 ppt	0.5 ppt	0.7 ppt

Source: Bloomberg, CMBIS estimates

Valuation

Initiate with HOLD; TP of HK$ 270.00 (4% upside)

We use sum-of-the-parts (SOTP) to value BYD and we have largely explained the rationale for each business in the previous paragraphs.

Auto business: We value HK$ 197 per share for BYD's auto business, which is based on 3.5x FY22E P/S including passenger BEVs, PHEVs, commercial BEVs and ICE vehicles. That also implies 3.7x FY22E P/S for BYD's NEV business. Our target valuations for Xpeng, NIO and Li Auto are 6-9x our FY22E P/S and 1.3-1.4x for Great Wall and Geely.

Battery and photovoltaic: We value HK$ 48 per share for BYD's battery segment, based 5x FY23E P/S. The segment includes its batteries for consumer electronics and energy storage, photovoltaic and external NEV batteries. Our target valuation also implies 17x FY23E P/S on our estimated external battery revenue at BYD.

Handset business: We value HK$ 13 per share for BYD's handset business, which is based on 16x FY22E P/E. Our target valuation implies a market cap of HK$ 58bn for BYDE, similar to its current market cap of HK$ 59bn.

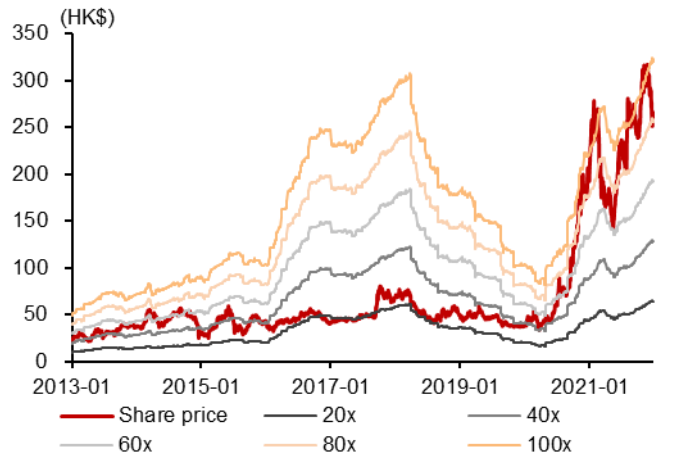
Semiconductor business: We value HK$ 12 per share for BYD's semiconductor business, which is based on 19x FY22E P/S on our estimated external semiconductor sales. That implies a market cap of HK$ 35bn for the semiconductor business.

Figure 123: Peers' valuation

Company	Ticker	Rating	Mkt Cap (US$ mn)	Price (LC)	TP (LC)	Up/Down -side	P/E (x) FY21E	P/E (x) FY22E	P/S (x) FY21E	P/S (x) FY22E	ROE (%) FY21E	ROE (%) FY22E
Great Wall	2333 HK	BUY	30,449	25.70	36.00	40.1%	26.3	15.2	1.5	0.9	10.7	16.1
Great Wall	601633 CH	BUY	68,262	47.05	59.00	25.4%	58.9	34.1	3.3	2.1	10.7	16.1
GAC	2238 HK	BUY	10,909	8.20	10.50	28.0%	9.6	7.7	0.9	0.8	8.3	9.5
GAC	601238 CH	BUY	24,730	15.18	18.40	21.2%	21.7	17.5	2.1	1.8	8.3	9.5
BYD	1211 HK	HOLD	96,947	259.60	270.00	4.0%	178.1	82.3	3.1	2.3	4.6	7.6
BYD	002594 CH	HOLD	117,071	256.00	270.00	5.5%	215.1	99.4	3.7	2.8	4.6	7.6
Geely	175 HK	HOLD	25,705	20.00	21.00	5.0%	27.9	18.6	1.6	1.3	8.9	12.0
	Average						**76.8**	**39.2**	**2.3**	**1.7**	**8.0**	**11.2**

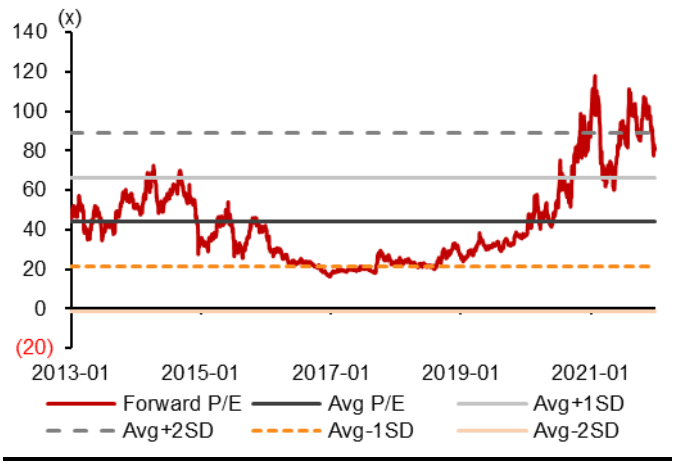
Source: Bloomberg, CMBIS

Figure 124: BYD's forward 12-m P/E band



Source: Company data, Bloomberg, CMBIS

Figure 125: BYD's forward 12-m P/E range



Source: Company data, Bloomberg, CMBIS

Financial Summary

Income statement

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
Revenue	**127,739**	**156,598**	**200,327**	**264,217**	**299,234**
Cost of sales	(106,924)	(126,251)	(172,964)	(224,338)	(253,019)
Gross profit	**20,814**	**30,346**	**27,363**	**39,879**	**46,215**
Selling exp.	(4,346)	(5,056)	(6,155)	(7,701)	(8,436)
Admin exp.	(4,141)	(4,321)	(5,166)	(6,725)	(7,561)
R&D exp.	(5,629)	(7,465)	(7,600)	(10,400)	(11,200)
Others	(4,386)	(6,419)	(3,323)	(4,935)	(5,285)
Operating profit	**2,312**	**7,086**	**5,119**	**10,117**	**13,733**
Non-operating income	226	282	350	300	300
Non-operating expenses	(107)	(485)	(300)	(200)	(150)
Pre-tax profit	**2,431**	**6,883**	**5,169**	**10,217**	**13,883**
Tax	(312)	(869)	(772)	(1,596)	(2,186)
Minority interests	(504)	(1,780)	(932)	(1,122)	(1,422)
Net profit	**1,614**	**4,234**	**3,465**	**7,499**	**10,276**

Cash flow summary

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
Profit before taxation	**2,431**	**6,883**	**5,169**	**10,217**	**13,883**
Depreciation/amortization	9,840	12,519	12,883	14,205	15,516
Change in working capital	(1,721)	21,399	(5,433)	(6,302)	(4,311)
Others	4,191	4,592	2,853	126	1,729
Net cash from operating	**14,741**	**45,393**	**15,473**	**18,246**	**26,817**
Capex	(20,627)	(11,774)	(14,920)	(17,130)	(17,330)
Others	(254)	(2,670)	(650)	(900)	(990)
Net cash from investing	**(20,881)**	**(14,444)**	**(15,570)**	**(18,030)**	**(18,320)**
Share issuance	-	-	36,438	-	-
Net borrowings	9,879	(24,490)	(12,645)	(4,900)	1,000
Others	(3,269)	(4,418)	(3,984)	(1,835)	(3,512)
Net cash from financing	**6,610**	**(28,907)**	**19,809**	**(6,735)**	**(2,512)**
Net change in cash	**470**	**2,041**	**19,711**	**(6,519)**	**5,985**
Cash at beginning of the year	11,151	11,674	13,738	33,450	26,931
Exchange difference	53	23	-	-	-
Cash at the end of the year	**11,674**	**13,738**	**33,450**	**26,931**	**32,916**

Balance sheet

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
Current assets	**106,967**	**111,605**	**156,794**	**186,789**	**212,311**
Cash & equivalents	12,650	14,445	34,250	27,831	33,916
Account receivables	50,943	50,079	62,980	83,065	94,074
Inventories	25,572	31,396	41,701	55,316	62,388
Other current assets	17,802	15,685	17,864	20,577	21,933
Non-current assets	**88,675**	**89,412**	**92,563**	**97,497**	**101,153**
PP&E	49,443	54,585	58,262	60,045	61,382
Intangibles	12,716	11,870	12,169	12,701	13,066
Investment in JVs & assos	4,060	5,466	6,336	7,506	8,716
Other non-current assets	22,455	17,492	15,797	17,245	17,990
Total assets	**195,642**	**201,017**	**249,358**	**284,286**	**313,465**
Current liabilities	**108,029**	**106,431**	**115,262**	**144,224**	**163,761**
Bank borrowings	45,330	16,401	-	-	-
Account payables	22,521	42,983	53,074	71,296	80,412
Contract Liabilities	4,504	8,193	9,477	12,292	3,119
Other current liabilities	35,674	38,854	52,710	60,635	80,230
Non-current liabilities	**25,011**	**30,133**	**30,411**	**27,296**	**26,461**
Bank borrowings	11,948	14,745	16,745	15,745	13,745
Bond payables	9,969	8,880	6,980	6,980	7,980
Other non-current liabilities	3,095	6,507	6,685	4,570	4,735
Total liabilities	**133,040**	**136,563**	**145,673**	**171,521**	**190,222**
Share capital	2,728	2,728	2,911	2,911	2,911
Reserves	49,640	53,052	91,949	99,002	108,225
Non-controlling interests	5,839	7,580	8,326	10,354	11,608
Shareholders' equity	**56,762**	**56,874**	**95,359**	**102,412**	**111,635**
Total equity and liabilities	**195,642**	**201,017**	**249,358**	**284,286**	**313,465**

Key ratios

YE 31 Dec	FY19A	FY20A	FY21E	FY22E	FY23E
Sales mix (%)					
Automobile	49.5	53.6	49.3	53.5	51.0
Handset	41.8	38.3	43.4	39.2	41.2
Battery & others	8.7	8.0	7.3	7.2	7.7
Growth (%)					
Revenue	(1.8)	22.6	27.9	31.9	13.3
Gross profit	(2.4)	45.8	(9.8)	45.7	15.9
Operating profit	(45.5)	206.4	(27.8)	97.6	35.7
Net profit	(41.9)	162.3	(18.2)	116.5	37.0
Profit & loss ratio (%)					
Gross margin	16.3	19.4	13.7	15.1	15.4
Operating margin	1.8	4.5	2.6	3.8	4.6
Net profit margin	1.3	2.7	1.7	2.8	3.4
Balance sheet ratio					
Net cash/total equity (x)	(0.7)	(0.3)	0.2	0.1	0.2
Current ratio (x)	1.0	1.0	1.4	1.3	1.3
Receivable turnover days	172	136	135	135	135
Inventory turnover days	87	91	88	90	90
Payable turnover days	123	150	140	145	145
Profitability (%)					
ROE	2.9	7.5	4.6	7.6	9.6
ROA	0.8	2.1	1.5	2.8	3.4
Per share data (RMB)					
EPS	0.50	1.47	1.18	2.57	3.52
DPS	0.06	0.15	0.18	0.39	0.53

Source: Company data, CMBIS estimates

BYD Company (002594 CH)

Do you want one champion or four runners-up?

Initiate with HOLD. We initiate BYD A-share with a HOLD rating, the same as the H-share, and a target price of RMB 270.00, which is 20% premium to our H-share TP, in line with its historical average A-H premium. BYD's A-H premium is relatively stable compared with its peers. As the underlying company is identical, please refer to page 97-106 for our detailed analysis on fundamentals. We list the same key points below.

- **It makes good NEVs, but not smart NEVs.** The key difference between our view and some other brokers' on BYD is the valuation on its auto business. We believe that applying the NEV trio's valuations for BYD is inappropriate, as BYD is lagging in AD technologies. We value BYD in between NEV trios and traditional automakers, as it is better positioned in the NEV supply chain.
- **Battery: Dilemma between self-sufficiency and external expansion.** We think valuing BYD's battery business as 1/3 of CATL's market cap given its current battery shipment difference is also inappropriate, as BYD's internal battery consumption has been valued in the auto segment. The current supply constraints offer a good opportunity to BYD. We project BYD's batteries to equip 0.25mn units of other-brand BEVs in 2023, but it may not be as easy as it is on paper.
- **Volatile earnings, non-transparent financials.** BYD's earnings are vulnerable to a large number of assumptions, including its R&D capitalization rate, commercial BEV sales volume and mask business. That has made investors shun away from its fundamentals. We rebuilt our model in 2H21 in a bid to make the best out of it.
- **Valuation/Key risks.** Our target price of RMB 270.00 is based on our sum-of-the-parts valuation and 20% premium to our H-share TP: 3.5x FY22E P/S for its auto segment, 5x FY23E P/S for its battery and photovoltaic businesses, 16x FY22E P/E for its handset segment and 19x FY22E P/S on its semiconductor business. Key risks to our rating and target price include higher or lower NEV sales volume, faster or slower battery external supply progress than we expect, as well as sector re-rating or de-rating.

Earnings Summary

(YE 31 Dec)	FY19A	FY20A	FY21E	FY22E	FY23E
Revenue (RMB mn)	127,739	156,598	200,327	264,217	299,234
YoY growth (%)	(1.8)	22.6	27.9	31.9	13.3
Net income (RMB mn)	1,614	4,234	3,465	7,499	10,276
EPS (RMB)	0.50	1.47	1.18	2.57	3.52
YoY growth (%)	(41.9)	162.3	(18.2)	116.5	37.0
P/E (x)	514.8	173.8	215.1	99.4	72.7
P/B (x)	13.1	13.1	7.8	7.3	6.7
Yield (%)	0.2	0.2	0.1	0.2	0.2
ROE (%)	2.9	7.5	4.6	7.6	9.6
Net gearing (%)	71.3	25.9	Net cash	Net cash	Net cash

Source: Company data, Bloomberg, CMBIS estimates

招銀国际 CMB INTERNATIONAL
招商银行全资附属机构 A Wholly Owned Subsidiary Of China Merchants Bank

HOLD (Initiation)

Target Price	RMB 270.00
Up/Downside	+5.5%
Current Price	RMB 256.00

China Auto Sector

SHI Ji, CFA
(852) 3761 8728
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DOU Wenjing, CFA
(021) 3893 4985
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Stock Data

Mkt Cap (HK$ mn)	737,276
Avg 3 mths t/o (HK$ mn)	5,835
52w High/Low (HK$)	333.33/140.97
Total Issued Shares (mn)	2,911

Source: Bloomberg

Shareholding Structure

Wang Chuanfu	17.6%
Lv Xiangyang	8.2%
Berkshire Hathaway	7.7%
Others	66.4%

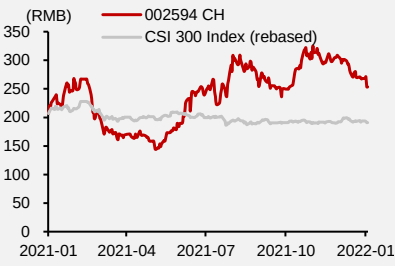
Source: HKEx

Share Performance

	Absolute	Relative
1-mth	-14.1%	-13.0%
3-mth	0.1%	1.4%
6-mth	1.8%	5.8%

Source: Bloomberg

12-mth Price Performance



Source: Bloomberg

Auditor: Ernst & Young

Financial Summary

Income statement

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
Revenue	**127,739**	**156,598**	**200,327**	**264,217**	**299,234**
Cost of sales	(106,924)	(126,251)	(172,964)	(224,338)	(253,019)
Gross profit	**20,814**	**30,346**	**27,363**	**39,879**	**46,215**
Selling exp.	(4,346)	(5,056)	(6,155)	(7,701)	(8,436)
Admin exp.	(4,141)	(4,321)	(5,166)	(6,725)	(7,561)
R&D exp.	(5,629)	(7,465)	(7,600)	(10,400)	(11,200)
Others	(4,386)	(6,419)	(3,323)	(4,935)	(5,285)
Operating profit	**2,312**	**7,086**	**5,119**	**10,117**	**13,733**
Non-operating income	226	282	350	300	300
Non-operating expenses	(107)	(485)	(300)	(200)	(150)
Pre-tax profit	**2,431**	**6,883**	**5,169**	**10,217**	**13,883**
Tax	(312)	(869)	(772)	(1,596)	(2,186)
Minority interests	(504)	(1,780)	(932)	(1,122)	(1,422)
Net profit	**1,614**	**4,234**	**3,465**	**7,499**	**10,276**

Cash flow summary

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
Profit before taxation	**2,431**	**6,883**	**5,169**	**10,217**	**13,883**
Depreciation/amortization	9,840	12,519	12,883	14,205	15,516
Change in working capital	(1,721)	21,399	(5,433)	(6,302)	(4,311)
Others	4,191	4,592	2,853	126	1,729
Net cash from operating	**14,741**	**45,393**	**15,473**	**18,246**	**26,817**
Capex	(20,627)	(11,774)	(14,920)	(17,130)	(17,330)
Others	(254)	(2,670)	(650)	(900)	(990)
Net cash from investing	**(20,881)**	**(14,444)**	**(15,570)**	**(18,030)**	**(18,320)**
Share issuance	-	-	36,438	-	-
Net borrowings	9,879	(24,490)	(12,645)	(4,900)	1,000
Others	(3,269)	(4,418)	(3,984)	(1,835)	(3,512)
Net cash from financing	**6,610**	**(28,907)**	**19,809**	**(6,735)**	**(2,512)**
Net change in cash	**470**	**2,041**	**19,711**	**(6,519)**	**5,985**
Cash at beginning of the year	11,151	11,674	13,738	33,450	26,931
Exchange difference	53	23	-	-	-
Cash at the end of the year	**11,674**	**13,738**	**33,450**	**26,931**	**32,916**

Balance sheet

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
Current assets	**106,967**	**111,605**	**156,794**	**186,789**	**212,311**
Cash & equivalents	12,650	14,445	34,250	27,831	33,916
Account receivables	50,943	50,079	62,980	83,065	94,074
Inventories	25,572	31,396	41,701	55,316	62,388
Other current assets	17,802	15,685	17,864	20,577	21,933
Non-current assets	**88,675**	**89,412**	**92,563**	**97,497**	**101,153**
PP&E	49,443	54,585	58,262	60,045	61,382
Intangibles	12,716	11,870	12,169	12,701	13,066
Investment in JVs & assos	4,060	5,466	6,336	7,506	8,716
Other non-current assets	22,455	17,492	15,797	17,245	17,990
Total assets	**195,642**	**201,017**	**249,358**	**284,286**	**313,465**
Current liabilities	**108,029**	**106,431**	**115,262**	**144,224**	**163,761**
Bank borrowings	45,330	16,401	-	-	-
Account payables	22,521	42,983	53,074	71,296	80,412
Contract Liabilities	4,504	8,193	9,477	12,292	3,119
Other current liabilities	35,674	38,854	52,710	60,635	80,230
Non-current liabilities	**25,011**	**30,133**	**30,411**	**27,296**	**26,461**
Bank borrowings	11,948	14,745	16,745	15,745	13,745
Bond payables	9,969	8,880	6,980	6,980	7,980
Other non-current liabilities	3,095	6,507	6,685	4,570	4,735
Total liabilities	**133,040**	**136,563**	**145,673**	**171,521**	**190,222**
Share capital	2,728	2,728	2,911	2,911	2,911
Reserves	49,640	53,052	91,949	99,002	108,225
Non-controlling interests	5,839	7,580	8,326	10,354	11,608
Shareholders' equity	**56,762**	**56,874**	**95,359**	**102,412**	**111,635**
Total equity and liabilities	**195,642**	**201,017**	**249,358**	**284,286**	**313,465**

Key ratios

YE 31 Dec	FY19A	FY20A	FY21E	FY22E	FY23E
Sales mix (%)					
Automobile	49.5	53.6	49.3	53.5	51.0
Handset	41.8	38.3	43.4	39.2	41.2
Battery & others	8.7	8.0	7.3	7.2	7.7
Growth (%)					
Revenue	(1.8)	22.6	27.9	31.9	13.3
Gross profit	(2.4)	45.8	(9.8)	45.7	15.9
Operating profit	(45.5)	206.4	(27.8)	97.6	35.7
Net profit	(41.9)	162.3	(18.2)	116.5	37.0
Profit & loss ratio (%)					
Gross margin	16.3	19.4	13.7	15.1	15.4
Operating margin	1.8	4.5	2.6	3.8	4.6
Net profit margin	1.3	2.7	1.7	2.8	3.4
Balance sheet ratio					
Net cash/total equity (x)	(0.7)	(0.3)	0.2	0.1	0.2
Current ratio (x)	1.0	1.0	1.4	1.3	1.3
Receivable turnover days	172	136	135	135	135
Inventory turnover days	87	91	88	90	90
Payable turnover days	123	150	140	145	145
Profitability (%)					
ROE	2.9	7.5	4.6	7.6	9.6
ROA	0.8	2.1	1.5	2.8	3.4
Per share data (RMB)					
EPS	0.50	1.47	1.18	2.57	3.52
DPS	0.06	0.15	0.18	0.39	0.53

Source: Company data, CMBIS estimates

Geely Automobile (175 HK)

ICE leader, NEV follower

Initiate with HOLD. Our target price of HK$ 21.00, based on 20x FY22E P/E. Geely has been selling the most Chinese-brand PVs since 2017 but missing its original annual sales volume targets since FY18. While its parent was busy with consolidating different platforms for ICE vehicles in the past few years, ICE market started to shrink and its peers, particularly Great Wall, also established manufacturing platforms and explored new subsegments. Geely's BEV attempt with the Geometry brand was not successful and such experience is of little use to Zeekr which targets tech-savvy consumers but relies heavily on suppliers for its cutting-edge technologies. Rich resources at its parent are still helpful for the listco but we are of the view that a drastically-changing industry needs founders to be more hands-on for strategic decisions.

- **Headwinds for both ICE and NEV.** Our forecasts show that Great Wall's PV sales volume may surpass Geely's in FY23E, if Geely is not to unveil more new models from FY22E. Geely's NEV market share has also declined for two years with its Geometry brand shifting to more low-end BEVs. Lynk & Co is the bright spot for sales increase and brand premiumization.
- **A strong start for Zeekr but without sustainable differentiators.** Please refer to page 40 and 46 for our detailed analysis on Zeekr's consumer perception and AD technologies. It appears to us that Zeekr was a hasty decision to mimic start-ups' smart NEV strategy. Its heavy reliance on suppliers for AD and other technologies could put it on risk in the medium term.
- **Solid hybrid technology but a bit late into the game.** Please refer to page 32-36 for our detailed analysis for hybrid technologies at Geely and its peers. However, its first GHS2.0 HEV and PHEV are scheduled to go on sale in Mar and Jun 2022, respectively, much later than BYD and Great Wall.
- **Valuation/Key risks.** Our target price is based on 20x FY22E P/E, in line with its average forward 12-month P/E in 2021 and our target valuation of 21x for Great Wall. We estimate that mild sales growth could not lift Geely's net profit significantly during FY22-23E amid its lingering burden from depreciation and amortization. We expect consensus to be cut post FY21 earnings. Key risks to our rating and target price include lower or higher sales volumes and gross margins than we expect, uncertainties in either direction for Zeekr and sector re-rating or de-rating.

Earnings Summary

(YE 31 Dec)	FY19A	FY20A	FY21E	FY22E	FY23E
Revenue (RMB mn)	97,401	92,114	100,297	125,390	135,200
YoY growth (%)	(8.6)	(5.4)	8.9	25.0	7.8
Net income (RMB mn)	8,190	5,534	5,875	8,789	11,237
EPS (RMB)	0.89	0.56	0.58	0.88	1.12
YoY growth (%)	(34.8)	(32.4)	6.2	49.6	27.8
P/E (x)	19.8	29.8	27.9	18.6	14.8
P/B (x)	3.0	2.6	2.4	2.1	1.9
Yield (%)	1.9	1.2	1.0	1.5	2.0
ROE (%)	16.5	9.4	8.9	12.0	13.7
Net gearing (%)	Net cash	Net cash	Net cash	Net cash	Net cash

Source: Company data, Bloomberg, CMBIS estimates

HOLD (Initiation)

Target Price	HK$ 21.00
Up/Downside	+5.0%
Current Price	HK$ 20.00

China Auto Sector

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Stock Data

Mkt Cap (HK$ mn)	213,393
Avg 3 mths t/o (HK$ mn)	1,105
52w High/Low (HK$)	36.45/17.34
Total Issued Shares (mn)	10,018

Source: Bloomberg

Shareholding Structure

Li Shufu	43.2%
Others	56.8%

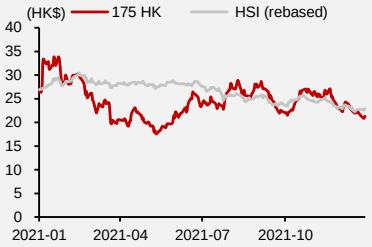
Source: HKEx

Share Performance

	Absolute	Relative
1-mth	-7.6%	-6.0%
3-mth	-3.2%	-0.5%
6-mth	-12.2%	4.5%

Source: Bloomberg

12-mth Price Performance



Source: Bloomberg

Auditor: GrantThornton

Investment Thesis and Company Overview

Market share leader vs sales target underachiever

Geely has been selling the most Chinese-brand passenger vehicles since 2017, aided by its 3rd-generation models (mainly the *Boyue*) and the spillover effect to its 2nd-generation models such as the *Emgrand GL* and *GS*. On the other hand, Geely has been missing its original annual sales volume targets for four consecutive years, due in large to its over-reliance of old models, in our view. The 2nd-generation models still accounted for 44% and 26% of Geely's total wholesale volume (including Zeekr and Lynk & Co) in FY20 and FY21, respectively. The 2nd- and 3rd-generation models combined accounted for 83% and 68% of Geely's total sales volume in FY20 and FY21, respectively. Note that the first 4th-generation model, the *Lynk & Co 01*, went on sale from Nov 2017.

In Mar 2021, Geely launched a new BEV brand, Zeekr, in a bid to compete with NEV start-ups. While investors think that Zeekr is probably the closest to start-up brands for now, we are of the view that it is still a bit early to conclude how far it could go given Geely's unclear AD strategy. The legacy burden from its aggressive production capacity expansion and R&D capitalization during FY17-19 could continue to drag down its earnings. We have not seen the inflection point yet.

Figure 126: Geely's market share and sales mix by different product generations

		FY16	FY17	FY18	FY19	FY20	FY21	FY22E
Geely's Total Sales Volume (Units)		**765,970**	**1,247,116**	**1,500,838**	**1,361,560**	**1,320,217**	**1,328,029**	**1,580,000**
Market Share in PV Segment		**3.2%**	**5.0%**	**6.3%**	**6.4%**	**6.5%**	**6.2%**	**6.8%**
Original Sales Volume Targets (Units)		600,000	1,000,000	1,580,000	1,510,000	1,410,000	1,530,000	1,650,000
Target Met or Not		√	√	×	×	×	×	×
Sales Volume Breakdown (units)								
Product Generations	**Major Models**	**FY16**	**FY17**	**FY18**	**FY19**	**FY20**	**FY21**	**FY22E**
1.0 Gen	King Kong, Panda, etc.	89,580	54,111	26,682	3,289	0	0	0
2.0 Gen (FE, GE Platform)	Vision Series	203,402	363,211	502,093	342,820	271,497	130,776	70,000
	Emgrand Series	320,999	514,037	519,587	363,911	295,867	182,541	75,000
	Geometry	0	0	0	23,272	12,858	29,402	95,000
3.0 Gen (KC/NL, CV, BMA Platform)	Boyue, Borui	151,989	309,745	265,069	235,014	243,438	219,562	231,000
	Binyue, Binrui, ICON, 4th-Gen Emgrand	0	0	66,993	206,907	211,753	290,803	409,000
	Jiaji, Haoyue	0	0	0	31,674	64,208	48,389	30,000
4.0 Gen (CMA, SPA, SEA Platform)	Xingyue, Xingrui	0	0	0	26,607	45,140	200,033	290,000
	Lynk & Co	0	6,012	120,414	128,066	175,456	220,516	300,000
	Zeekr	0	0	0	0	0	6,007	80,000
Sales Proportion								
1.0 Gen		12%	4%	2%	0%	0%	0%	0%
2.0 Gen		68%	70%	68%	54%	44%	26%	15%
3.0 Gen		20%	25%	22%	35%	39%	42%	42%
4.0 Gen		0%	0%	8%	11%	17%	32%	42%

Source: Company data, CAAM, CMBIS estimates

Is the ICE manufacturing technology still that important?

The success of the *Boyue* and *Borui* probably made Geely overemphasize the importance of platform-based manufacturing, especially as its parent company and Volvo Cars jointly developed a global leading platform CMA for ICE vehicles. Geely launched a new brand Lynk & Co in 2017 and expanded production capacity aggressively during FY17-19, in an anticipation of exponential sales growth aided by the 3rd- and 4th-generation products. Given the complicated and subtle relationships between the listco, its parent and Volvo

Cars, the Geely brand adopted the BMA (a simplified platform based on CMA) platform in 2018 and introduced CMA in 2019 (the *Xingyue* as the first model). The parent company has also consolidated the ICE powertrains for all the brands including Volvo.

All such efforts did not turn into strong sales. We attribute it to a few possible reasons.

1) The company overemphasized its manufacturing technologies but overlooked the design and marketing efforts for the young generation, whereas Changan and Great Wall found target audience for their different models during that time.

2) The rise of its ASP outpaced its brand image improvement. We are of the view that Geely's CMA- and BMA-based products are significantly better than its previous KC- and FE-based models. However, it is possible that a large portion of Geely's target consumers acknowledged the product improvement but went for more affordable old-generation models.

3) While the *Binrui* and *Binyue* were originally designed to replace the *Emgrand* and *Vision* series, management finally decided to lower the retail prices for the *Emgrand* and *Vision* models and kept them on sale along with the *Binrui* and *Binyue*. That has led to sales cannibalization.

4) All the above three reasons may have underscored our guess that management was struggling about model launches from different platforms and even lost direction. It is rare to us that it took the Geely brand 18 months to roll out a second CMA-based model (the *Xingrui*) after its launch of the first CMA model (the *Xingyue*) in the same plant.

Now with all the ICE businesses realigned and consolidated, it comes to the new dilemma: focusing on ICE vehicles with its leading manufacturing technologies or shifting to smart BEVs? Both are not easy, in our view.

Can Geely retain the sales-volume crown?

Although Geely prioritizes market share, which is its requisite goal set in its latest share option scheme, the competition has been heightened now. Geely has set its FY22E sales-volume target of 1.65mn units, including Lynk & Co, Zeekr and Geometry. Great Wall sets a similar target for its PV sales for FY22E (1.90mn units including pickup trucks, which could imply about 1.65mn units for PVs). We project FY22E wholesale volumes of 1.56mn units and 1.47mn units for Geely and Great Wall, respectively. Based on our forecasts, Great Wall's PV sales volume could surpass Geely's in FY23E, aided by a plethora of attractive new models penetrating new subsegments including the *Tank* and *Ora* brands. We are of the view that Geely is still well positioned in the ICE and even the hybrid markets, as long as it can roll out more and attractive new models. Again, we have not seen it yet.

Market-share oriented mindset led to deteriorating NEV brand image

The market-share oriented mentality has probably resulted in its deteriorating NEV brand image. Geely's NEVs appeared to be on the right track during FY17-19, as its NEV market share rose from less than 5% in FY17 to more than 7% in FY19. However, more than 60% of its NEVs were sold as ride-hailing fleets in FY19. Now Geely's NEV market share has fallen to less than 3% despite that it claimed its *Geometry A* was 'the best BEV model in the Eastern Hemisphere' during its launch ceremony in Apr 2019.

Now the Geometry brand has started to focus on small BEVs, following the success of the *Wuling Hongguang Mini*. We did an exercise in 2020 to estimate the bill of materials (BOM) difference between the *Xpeng G3*, the *BYD Yuan* and *Geely Geometry C*. We found that Geely's cost control capability was the best among the three. Therefore, we suspect that

the problems for Geometry probably lie in product positioning and marketing efforts. Now with more automakers focusing on mini and small BEVs, Geely's plan to almost triple Geometry's sales volume in FY22E looks a bit too aggressive to us.

Zeekr: A strong start but without sustainable differentiators

We are of the view that Geely's experience in Geometry is of little use to Zeekr which targets tech-savvy consumers. It appears to us that Geely started Zeekr almost from scratch with new teams, as Geely lacks new mobility tech expertise. Zeekr delivered about 6,000 units of the *001* model since its debut in Oct 2021. Geely targets 70,000 units of Zeekr deliveries in FY22E. As noted on page 40 of this report, we think that Zeekr is perceived somewhere in between traditional and start-up brands, based on the comments that we have compiled from Yiche and Dongchedi. It is still traditional characteristics–appearance and driving experience–that attract consumers the most.

Zeekr positions itself as a high-tech auto brand while it relies heavily on suppliers for its cutting-edge technologies such as autonomous driving and electrochromic glass. We have elaborated Geely's approach and mindset in the AD development in detail on page 46. Relying too much on suppliers could be disadvantageous for automakers as suppliers provide generic solutions to all automakers and software iteration could be much slower than automakers' in-house development. While Great Wall enabled its L2+ functions in Nov 2021, the *Zeekr 001*'s OTA is still up in the air. The *Zeekr 001*'s infotainment system appears to be a bit mediocre based on consumers' current feedback. We think that Geely is a follower in the AD and smart cockpit development, which could be a risk for its long-term development.

The success of Lynk & Co could help Zeekr brand building

Lynk & Co is one of a few bright spots for Geely in the past two years. Although investors were over excited when the brand was launched in 2017, Lynk & Co so far is the most successful auto brand going upmarket at traditional automakers, in our view. We project Lynk & Co's sales volume to rise 36% YoY to 300,000 units in FY22E (in line with the company's target) and 350,000 units in FY23E. Therefore, we think that one of the advantages that Zeekr has (while other traditional Chinese automakers do not) is Geely's experience in building a relatively premium brand from scratch.

Solid hybrid technology but a bit late into the game

As we explained in detail on page 32-36 titled '*Hybrid technology comparison: Who's the best*', the latest hybrid technology at Geely (GHS2.0) adopts the P1 + P3 architecture with a 3AT gearbox, which potentially increases costs compared with BYD's P1 + P3 system with a reducer but provides better power torque. Given Geely's superb cost control capabilities, we are of the view that Geely's HEVs and PHEVs could be competitive. However, its first GHS2.0 HEV is scheduled to go on sale in Mar 2022 and the first GHS2.0 PHEV is expected to be on Jun 2022. BYD's DM-i PHEVs went on sale at the beginning of 2021 and Great Wall's Lemon DHT PHEV was launched in Nov 2021.

Parent's resources are helpful but more decision-making is needed

The acquisition of Volvo Cars by Geely's parent in 2010 laid out the foundation for Geely's current success. It copied such strategy in a bid to cope with the evolving industry, including acquiring stakes at Daimler, Proton, Lotus, Volvo AB and Terrafugia (flying car). It has also incubated start-ups like Caocao for ride hailing and ECARX for smart cockpit (and a joint venture with ARM China for chip design), and explored new industries such as satellite. A few years ago, we thought such rich resources could benefit the listco more than peers and gave management an earlier sign of where the industry may head toward. However, it

appears to us that such investments have not created strong synergy yet. Management also attempted to consolidate Volvo Cars into the listco in 2020 in a bid to create synergy but failed. On the other hand, leading NEV start-ups have funded tremendous amount of cash from the capital market with their high valuation, which helps them to compete with traditional giants in the R&D investments.

We think its parents' rich resources are still helpful for Geely now. However, we are of the view that the lessons learnt from a drastically changing industry is not only that it needs pioneers, but also that it needs founders to be more hands-on for strategic decisions.

Financial Analysis

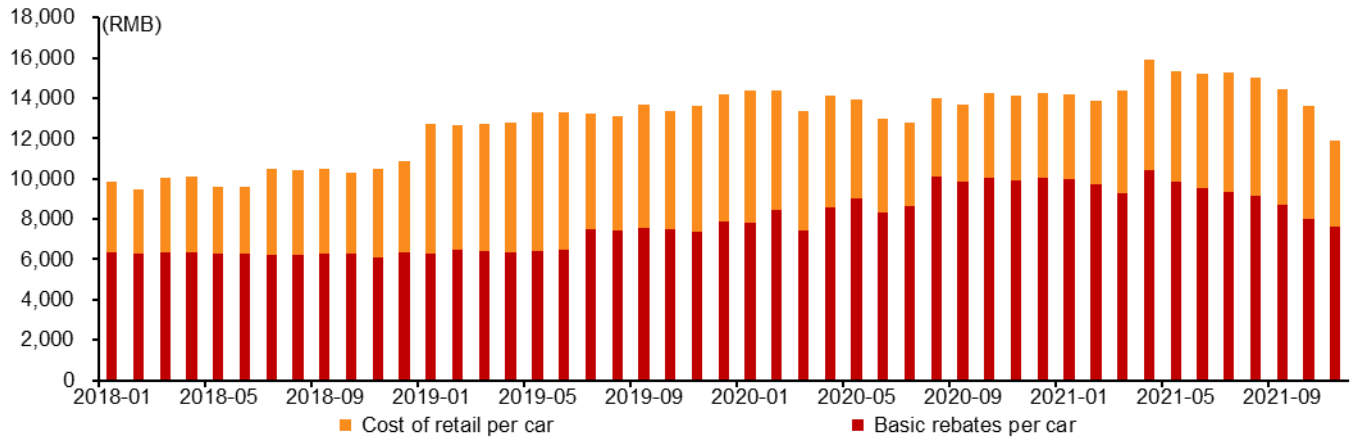
Lack of new models in FY22E

We project Geely's sales volume to rise 19% YoY or about 250,000 units to 1.58mn units in FY22E, aided by the *Xingyue L*, *Zeekr 001*, *Lynk & Co 09* and small Geometry BEVs. We are more pessimistic about Geometry than the company, as we think its plan to triple the volume is too aggressive. We believe all such volume increases have been anticipated by investors and priced in. We forecast a sales volume of 80,000 units for Zeekr, even higher than the company's guidance. Compared with Great Wall, Geely lacks attractive new models in FY22E for potential upside surprise.

Rising incentive costs to dealers

We have compiled Geely's rebate policies and estimated its incentive costs paid to dealers every month in the past few years. Despite supply constraints in 2021, we estimate incentive costs to dealers per vehicle in FY21E rose by about RMB 600 compared to FY20 and RMB 4,300 compared with FY18. That could probably indicate the diminishing product competitiveness in the past few years.

Figure 127: Our estimated Geely's incentive costs to dealers per vehicle



Source: Company data, CMBIS estimates

Lingering burden from depreciation and amortization

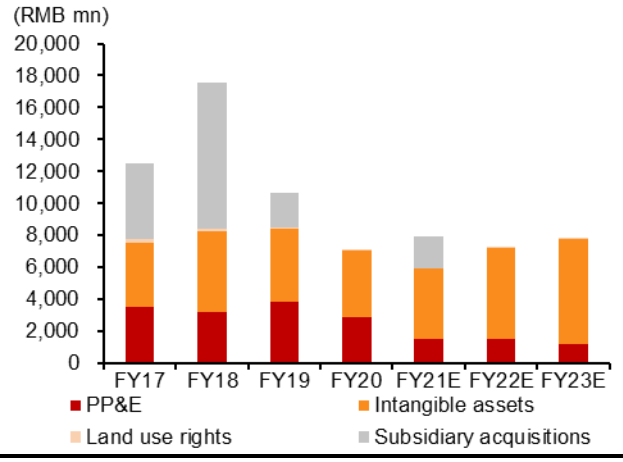
Geely capitalized RMB 12.5bn, 17.6bn, 10.7bn and 7.1bn for PP&E, intangible assets, land use rights and subsidiary acquisitions combined in FY17-20, respectively. It also spent RMB 2.5bn for the acquisition of the Changxing plant in May 2021. The depreciation and amortization of these investments have not ended, and we believe that some investors could have underestimated such costs.

The depreciation of PP&E per vehicle rose from about RMB 600 in FY17 to about RMB 2,000 in FY20 amid similar sales volumes in these two years. The increase in depreciation contributed about 36% of net profit YoY decrease per vehicle in FY20. We are of the view that the contract manufacturing of the *Xingyue L* and *Zeekr 001* at the parent's plants in Xi'an and Hangzhou Bay, respectively, could be a temporary solution to lift its margins in the short term.

While Geely could trim PP&E investments significantly in the short term by utilizing the current idle capacity or contract manufacturing at the parent's plants, it is more difficult to curb the R&D amortization costs, as now automakers are in a race to invest in smart NEVs. Unlike Great Wall and BYD which expensed at least half of its R&D investments every year,

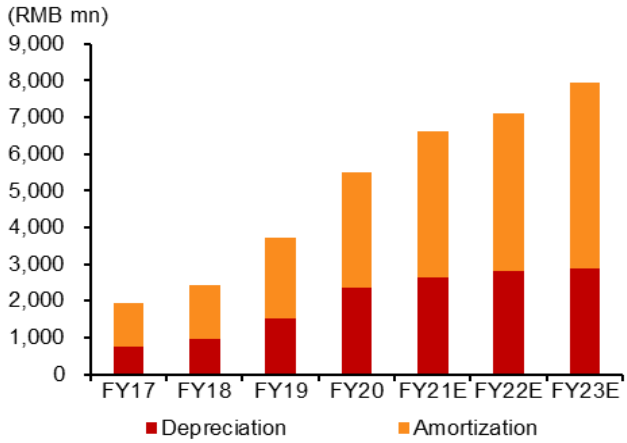
Geely capitalized about 88% of total R&D invested during FY17-20, which becomes higher amortization costs in the following years.

Figure 128: Geely's capex, incl. acquisitions



Source: Company data, CMBIS estimates

Figure 129: Geely's D&A forecasts



Source: Company data, CMBIS estimates

Consensus may be cut again post FY21 earnings

Our net profit forecasts for FY21-23E are 12-15% lower than consensus. We project net profit in 2H21E to rise about 8% YoY to RMB 3.5bn, despite a sales volume YoY decrease of 12%. Consensus implies a 39% YoY increase in 2H21E net profit, which is too optimistic to us. Should 2H21E net profit miss consensus, consensus for FY22-23E could be cut again. We have estimated a 50% YoY increase for Geely's net profit in FY22E amid a 19% YoY rise in sales volume.

Figure 130: CMBI estimates vs consensus

	CMBI			Consensus			Diff (%)		
RMB mn	FY21E	FY22E	FY23E	FY21E	FY22E	FY23E	FY21E	FY22E	FY23E
Revenue	100,297	125,390	135,200	105,080	134,757	157,993	-4.6%	-7.0%	-14.4%
Gross Profit	17,110	21,580	23,804	17,795	23,631	28,774	-3.9%	-8.7%	-17.3%
Operating Profit	6,675	9,389	10,580	6,581	9,801	12,631	1.4%	-4.2%	-16.2%
Net profit	5,875	8,789	11,237	6,884	10,065	12,807	-14.7%	-12.7%	-12.3%
Gross Margin	17.1%	17.2%	17.6%	16.9%	17.5%	18.2%	0.1 ppt	-0.3 ppt	-0.6 ppt
Operating Margin	6.7%	7.5%	7.8%	6.3%	7.3%	8.0%	0.4 ppt	0.2 ppt	-0.2 ppt
Net Margin	5.9%	7.0%	8.3%	6.6%	7.5%	8.1%	-0.7 ppt	-0.5 ppt	0.2 ppt

Source: Bloomberg, CMBIS estimates

Valuation

Initiate with HOLD; TP of HK$ 21.00 (5% upside)

Our target price is based on 20x FY22E P/E, in line with Geely's average forward 12-month P/E in 2021, higher than its 5-year average forward 12-month P/E of 13x during FY17-21. Led by NEV start-ups, valuations for traditional automakers have been changed since 2H20 amid the increasing importance of software for future cars. The average forward 12-month P/E during 2013-1H20 for Geely was about 10x with the highest of 18x during the period. The average of forward 12-month P/E during 2H20-2021 jumped to 19x.

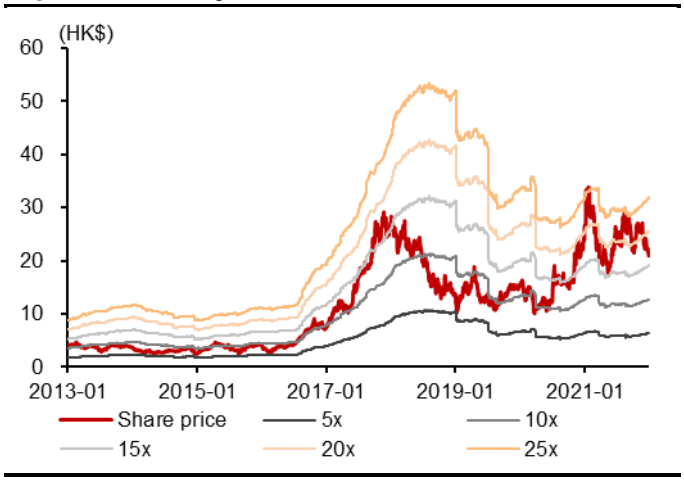
Among peers, Great Wall is currently trading at 15x FY22E P/E and our target valuation is 21x FY22E P/E. Our target price for Geely also implies 1.4x FY22E P/S, lower than the NEV trio's FY22E P/S.

Figure 131: Peers' valuation

Company	Ticker	Rating	Mkt Cap (US$ mn)	Price (LC)	TP (LC)	Up/Down -side	P/E (x)		P/S (x)		ROE (%)	
							FY21E	FY22E	FY21E	FY22E	FY21E	FY22E
Great Wall	2333 HK	BUY	30,449	25.70	36.00	40.1%	26.3	15.2	1.5	0.9	10.7	16.1
Great Wall	601633 CH	BUY	68,262	47.05	59.00	25.4%	58.9	34.1	3.3	2.1	10.7	16.1
GAC	2238 HK	BUY	10,909	8.20	10.50	28.0%	9.6	7.7	0.9	0.8	8.3	9.5
GAC	601238 CH	BUY	24,730	15.18	18.40	21.2%	21.7	17.5	2.1	1.8	8.3	9.5
BYD	1211 HK	HOLD	96,947	259.60	270.00	4.0%	178.1	82.3	3.1	2.3	4.6	7.6
BYD	002594 CH	HOLD	117,071	256.00	270.00	5.5%	215.1	99.4	3.7	2.8	4.6	7.6
Geely	175 HK	HOLD	25,705	20.00	21.00	5.0%	27.9	18.6	1.6	1.3	8.9	12.0
	Average						**76.8**	**39.2**	**2.3**	**1.7**	**8.0**	**11.2**

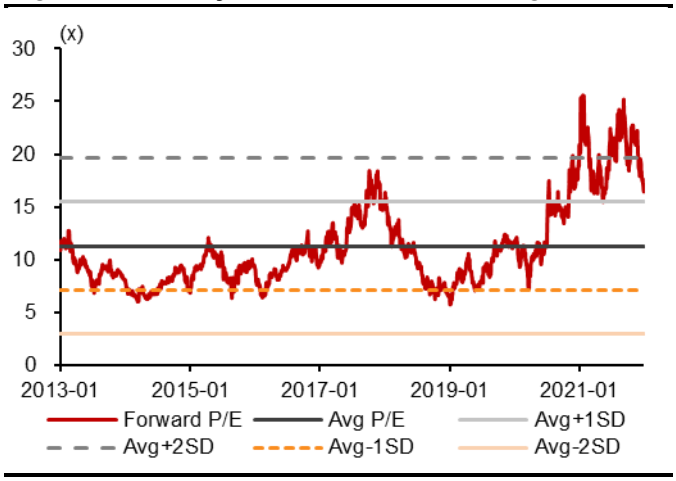
Source: Bloomberg, CMBIS

Figure 132: Geely's forward 12-m P/E band



Source: Company data, Bloomberg, CMBIS

Figure 133: Geely's forward 12-m P/E range



Source: Company data, Bloomberg, CMBIS

Financial Summary

Income statement

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
Revenue	**97,401**	**92,114**	**100,297**	**125,390**	**135,200**
Cost of sales	(80,485)	(77,377)	(83,188)	(103,810)	(111,396)
Gross profit	**16,917**	**14,737**	**17,110**	**21,580**	**23,804**
Selling exp.	(4,332)	(5,053)	(5,177)	(6,168)	(6,761)
Admin exp.	(5,122)	(5,754)	(6,397)	(7,163)	(7,643)
Other income	1,225	1,039	1,140	1,140	1,180
Operating profit	**8,687**	**4,969**	**6,675**	**9,389**	**10,580**
Share-based payments	(5)	(4)	(1,300)	(1,350)	(900)
Net finance costs	108	208	100	223	374
Profit share of asso.&JVs	664	875	1,252	1,711	2,613
Other non-oper exp.	183	392			
Pre-tax profit	**9,636**	**6,441**	**6,728**	**9,972**	**12,668**
Tax	(1,375)	(866)	(876)	(1,322)	(1,558)
Minority interests	(72)	(41)	23	139	127
Net profit	**8,190**	**5,534**	**5,875**	**8,789**	**11,237**

Cash flow summary

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
Profit before taxation	**9,636**	**6,441**	**6,728**	**9,972**	**12,668**
Depreciation/amortization	3,733	5,491	6,599	7,100	7,950
Change in working capital	28	(8,947)	(4,483)	(515)	(632)
Others	(859)	(1,389)	(52)	(583)	(2,088)
Net cash from operating	**12,538**	**1,597**	**8,791**	**15,974**	**17,899**
Capex	(7,575)	(7,042)	(5,953)	(7,278)	(7,784)
Others	(3,216)	1,612	(746)	699	832
Net cash from investing	**(10,791)**	**(5,430)**	**(6,699)**	**(6,579)**	**(6,951)**
Share issuance	639	6,13			
Dividend paid	(2,821)	(2,121)	(1,635)	(1,631)	(2,624)
Others	3,945	(253)	(421)	(373)	(375)
Net cash from financing	**1,763**	**3,761**	**(2,002)**	**(1,994)**	**(2,999)**
Net change in cash	**3,510**	**(72)**	**91**	**7,401**	**7,949**
Cash at beginning of the year	15,7	19,2	18,9	19,0	26,4
Exchange difference	34	(232)	-	-	-
Cash at the end of the year	**19,281**	**18,977**	**19,067**	**26,469**	**34,418**

Balance sheet

YE 31 Dec (RMB mn)	FY19A	FY20A	FY21E	FY22E	FY23E
Current assets	**50,014**	**50,935**	**53,649**	**67,365**	**76,360**
Cash & equivalents	19,281	18,977	19,067	26,469	34,418
Account receivables	25,845	27,868	29,169	34,809	35,745
Inventories	4,821	3,691	5,014	5,688	5,799
Other current assets	67	399	399	399	399
Non-current assets	**57,914**	**59,881**	**61,723**	**63,576**	**65,837**
PP&E	27,070	26,574	27,270	25,852	24,147
Intangibles	17,640	18,653	19,080	20,494	21,948
Deferred income tax	866	970	970	970	970
Other non-current assets	12,33	13,68	14,40	16,26	18,77
Total assets	**107,928**	**110,816**	**115,372**	**130,941**	**142,197**
Current liabilities	**48,526**	**41,887**	**40,984**	**48,237**	**50,224**
Bank borrowings					
Account payables	47,873	41,516	40,614	47,866	49,854
Tax payable	616	340	340	340	340
Other current liabilities	37	30	30	30	30
Non-current liabilities	**4,477**	**4,716**	**4,740**	**4,814**	**4,834**
Bank borrowings	2,089	1,960	1,960	1,960	1,960
Long-term payables	2,060	2,335	2,360	2,433	2,453
Other non-current liabilities	327	421	421	421	421
Total liabilities	**53,003**	**46,602**	**45,725**	**53,050**	**55,058**
Share capital	168	180	180	180	180
Reserves	50,855	60,038	65,493	73,861	83,224
Non-controlling interests	489	582	561	437	322
Shareholders' equity	**54,436**	**63,631**	**69,086**	**77,454**	**86,817**
Total equity and liabilities	**107,928**	**110,816**	**115,372**	**130,941**	**142,197**

Key ratios

YE 31 Dec	FY19A	FY20A	FY21E	FY22E	FY23E
Sales mix (%)					
Automobile	94.3	91.0	88.2	92.1	91.9
Auto parts	5.3	7.6	10.0	6.4	6.7
Licensing of IP	0.4	1.4	1.8	1.5	1.5
Growth (%)					
Revenue	(8.6)	(5.4)	8.9	25.0	7.8
Gross profit	(21.4)	(12.9)	16.1	26.1	10.3
Operating profit	(39.9)	(42.8)	34.3	40.6	12.7
Net profit	(34.8)	(32.4)	6.2	49.6	27.8
Profit & loss ratio (%)					
Gross margin	17.4	16.0	17.1	17.2	17.6
Operating margin	8.9	5.4	6.7	7.5	7.8
Net profit margin	8.4	6.0	5.9	7.0	8.3
Balance sheet ratio					
Net cash/total equity (x)	0.3	0.2	0.2	0.3	0.4
Current ratio (x)	1.0	1.2	1.3	1.4	1.5
Receivable turnover days	98	115	110	105	100
Inventory turnover days	22	17	22	20	19
Payable turnover days	218	198	180	170	165
Profitability (%)					
ROE	16.5	9.4	8.9	12.0	13.7
ROA	8.2	5.1	5.2	7.1	8.2
Per share data (RMB)					
EPS	0.89	0.56	0.58	0.88	1.12
DPS	0.23	0.17	0.17	0.27	0.34

Source: Company data, CMBIS estimates

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