China Auto Sector

2023 Outlook: A critical year for long-term survival

OUTPERFORM (Maintain)

We project China's passenger-vehicle (PV) wholesale volume to decline 7% YoY in 2023, more optimistic than other brokers. Despite huge volatility for the auto industry post stimulus measures, we believe more negatives have been priced in now than 2018. We think 2023 could be a critical year for many automakers given a possible sharp sales decline for internal-combustion engine (ICE) vehicles. We may see a clearer picture of who will still survive in the long term after 2023.

- **We expect PV retail and wholesale volume to decline 6% and 7% YoY in 2023.** Although we were the first on the Street to warn a possible price war back in Aug 2022, our 2023 retail sales volume forecast appears to be more positive than other brokers, as we believe some investors could overestimate the pre-buying effect from the purchase-tax cuts. We project PV exports to rise 13% YoY in 2023E, partially offsetting the domestic decline. We expect China's ICE vehicle wholesale volume to fall 21% YoY in 2023E. We expect retail sales volume of traditional luxury brands to drop 8% YoY.
- **NEV 2023 outlook: Chinese dominance to continue with premium BEVs and higher PHEV penetration in lower-tier cities.** We project China's new-energy vehicle (NEV) retail sales volume to rise 38% YoY to 7.5mn units and wholesale volume to rise 31% YoY to 8.5mn units. We also expect battery supply condition to improve in 2023, which may lead to battery price cuts to lift automakers' margins. The NEV drivers in 2023 could come from premium models priced between RMB 200,000-300,000 and PHEVs from lower-tier cities. On the other hand, we expect Tesla (TSLA US, NR) to expand its sales network in lower-tier cities in a bid to maintain its capacity utilization rate.
- **Investment thesis, top picks.** We expect the year 2023 to be similar to 2018, as both years face sales weakness post the purchase-tax cuts. Therefore, we suggest range trading, which worked well in 2018, before we can identify long-term winners more easily. The difference between now and the end of 2017 is that more negatives have been priced in, which can be reflected by the recent share-price rebound. We still prefer leading NEV start-ups over incumbent automakers. Our top picks are Li Auto and Geely.

Valuation Table

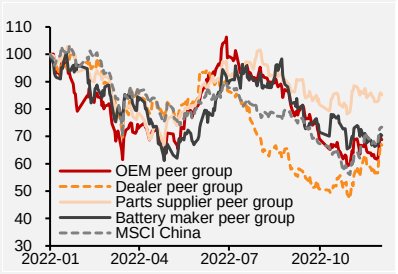
Name	Ticker	Rating	Mkt Cap (US$ mn)	TP (LC)	Up -side	P/E (x) FY23E	P/S (x) FY23E	ROE (%) FY23E
Xpeng	XPEV US	BUY	9,869	20	75%	N/A	1.5	(18.9)
Xpeng	9868 HK	BUY	8,643	78	99%	N/A	1.3	(18.9)
NIO	NIO US	BUY	22,220	25	90%	N/A	1.8	(49.8)
Li Auto	LI US	BUY	23,743	48	111%	170.3	1.8	2.3
Li Auto	2015 HK	BUY	21,734	186	130%	155.9	1.7	2.3
Geely	175 HK	BUY	14,972	17	42%	18.3	0.7	7.6
Great Wall	2333 HK	BUY	12,905	10	10%	11.3	0.6	10.6
Great Wall	601633 CH	BUY	40,522	40	28%	35.5	1.8	10.6
GAC	2238 HK	BUY	7,385	8	46%	5.7	0.4	8.8
GAC	601238 CH	BUY	17,800	17	39%	13.8	1.0	8.8
BYD	1211 HK	HOLD	71,631	218	14%	30.4	1.0	14.3
BYD	002594 CH	HOLD	108,156	248	-5%	45.8	1.5	14.3
Meidong	1268 HK	BUY	2,428	23	55%	8.0	0.4	37.6
EVA	838 HK	BUY	266	3	152%	4.0	0.3	16.0

Source: Company data, Bloomberg, CMBIGM estimates. Note: Market data as of 4 Dec 2022

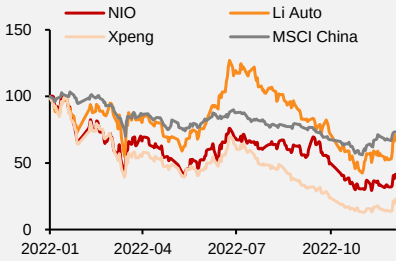
China Auto Sector

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

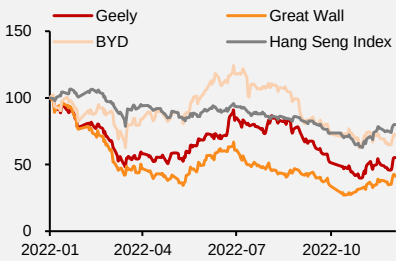
DOU Wenjing, CFA
(852) 6939 4751
douwenjing@cmbi.com.hk



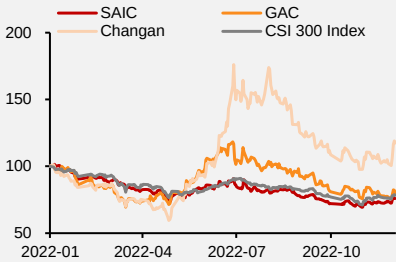
Source: Bloomberg, CMBIGM



Source: Bloomberg, CMBIGM



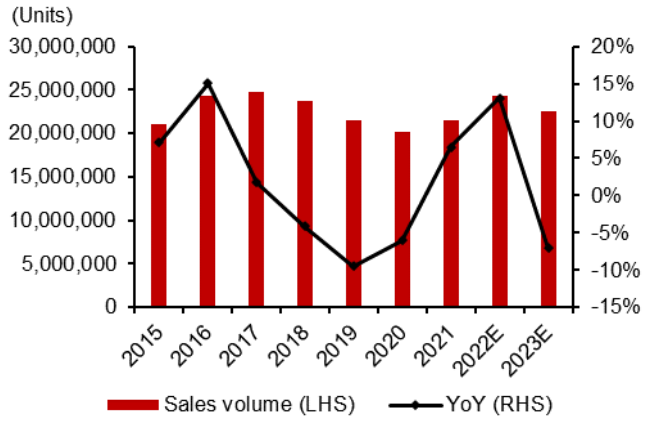
Source: Bloomberg, CMBIGM



Source: Bloomberg, CMBIGM

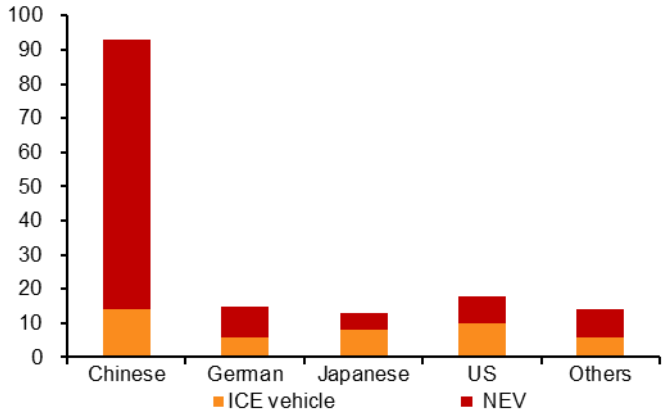
Focus Charts

Figure 1: China PV wholesale volume



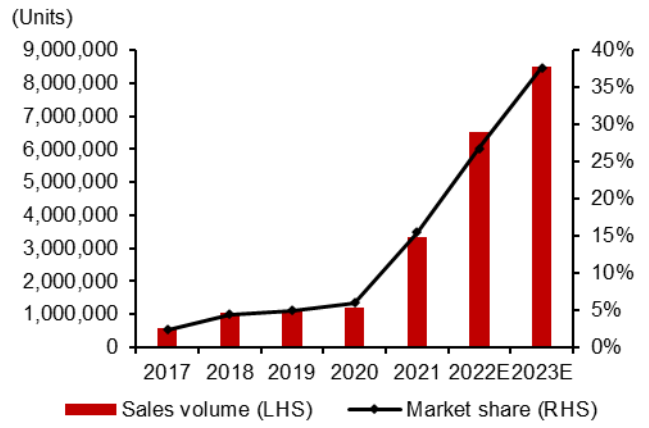
Source: CAAM, CMBIGM estimates

Figure 2: No. of new models by brand origin in 2023



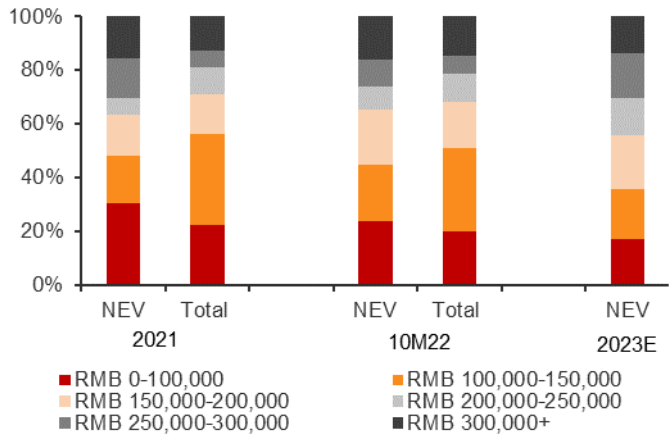
Source: Company data, CMBIGM

Figure 3: China's NEV wholesale and market share



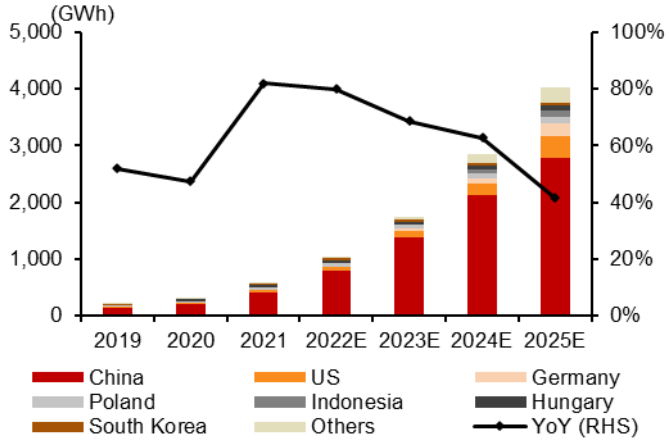
Source: CAAM, CMBIGM estimates

Figure 4: NEV wholesale breakdown by MSRP range



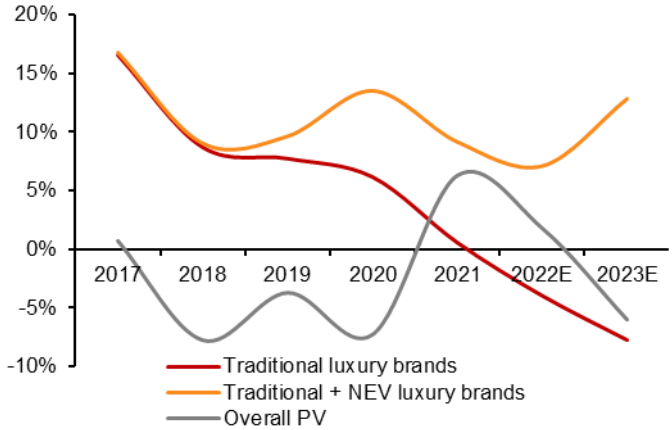
Source: CAAM, CMBIGM estimates

Figure 5: Battery makers' capacity expansion plans around the world



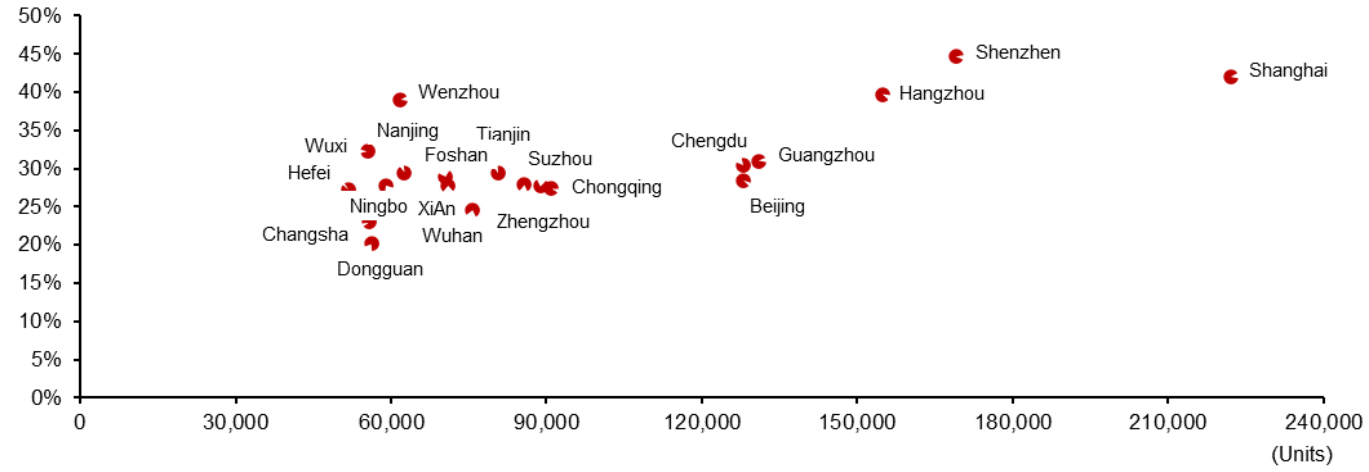
Source: Company Data, CMBIGM estimates

Figure 6: Retail sales YoY growth for traditional luxury brands, overall luxury brands and overall PV



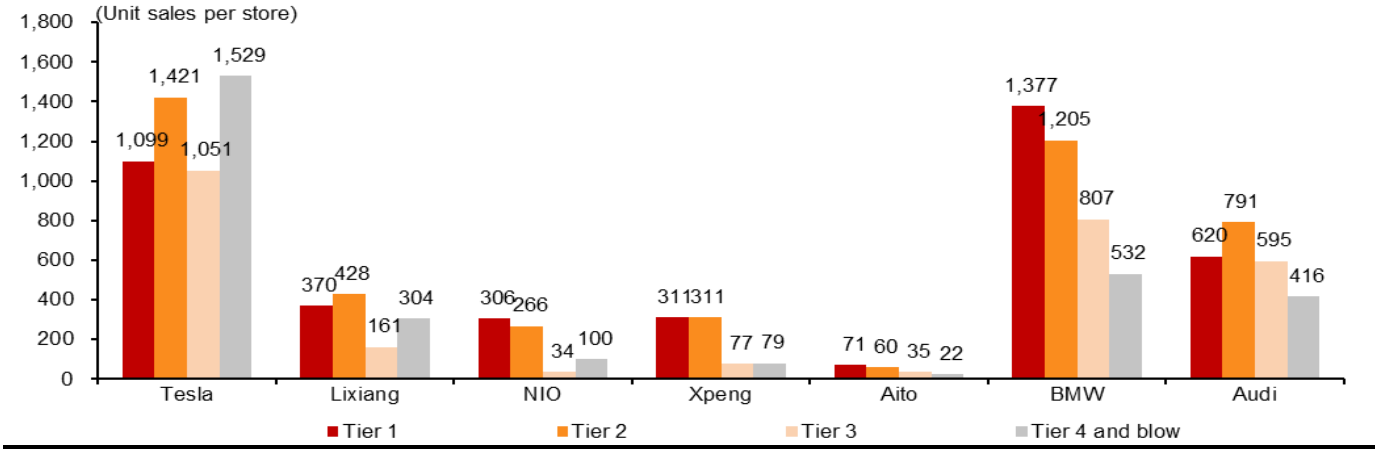
Source: CATARC, CMBIGM estimates

Figure 7: NEV retail sales volume in top 20 cities with corresponding NEV market share (10M22)



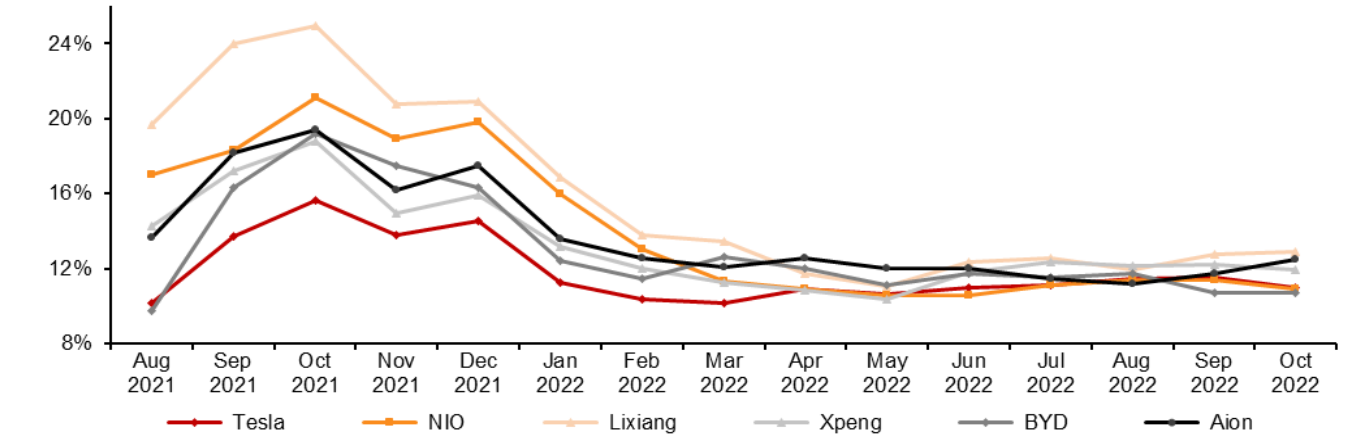
Source: CATARC, CMBIGM

Figure 8: Unit sales per store on average for different brands in different city tiers (10M22)



Source: CATARC, Company data, CMBIGM

Figure 9: Conversion ratio from leads to store visit for each brand



Source: Thinkercar, CMBIGM

Contents

Focus Charts 2

Share Price Performance and Investment Thesis 5

Two-year outperformance ended in 2022 5
Industry beta could be more crucial than stock selection in 2023 8

Industry 2023 Outlook: Post-Stimulus Weakness, Exports 10

Retail sales volume: -6% YoY in 2023 amid purchase-tax cuts expiry 10
Wholesale volume: -7% YoY amid surging exports 11
Chinese-brand market share: Likely exceed 50% on NEV boom 13
Luxury car: Premium NEV up, traditional luxury down 19
Our forecast for China's long-term auto demand 23

China NEV 2023 Outlook: Chinese Dominance Continues 25

Global NEV in a nutshell: China is still leading in market size, growth and products 25
We expect battery supply to improve in 2023 and price to drop by 2024 30
Limited dent on PHEV sales amid Shanghai green license cancellation 31
NEV vehicle size preference: more larger, premium models in 2023 33
NEVs could dominate vehicles sold at RMB 250,000-300,000 in 2023 35
NEV drivers in 2023: Premium models in high-tier cities, PHEVs in low-tier cities 37
Leading indicators also imply intensifying competition 40
China's long-term NEV forecast: To exceed 50% by 2025 43

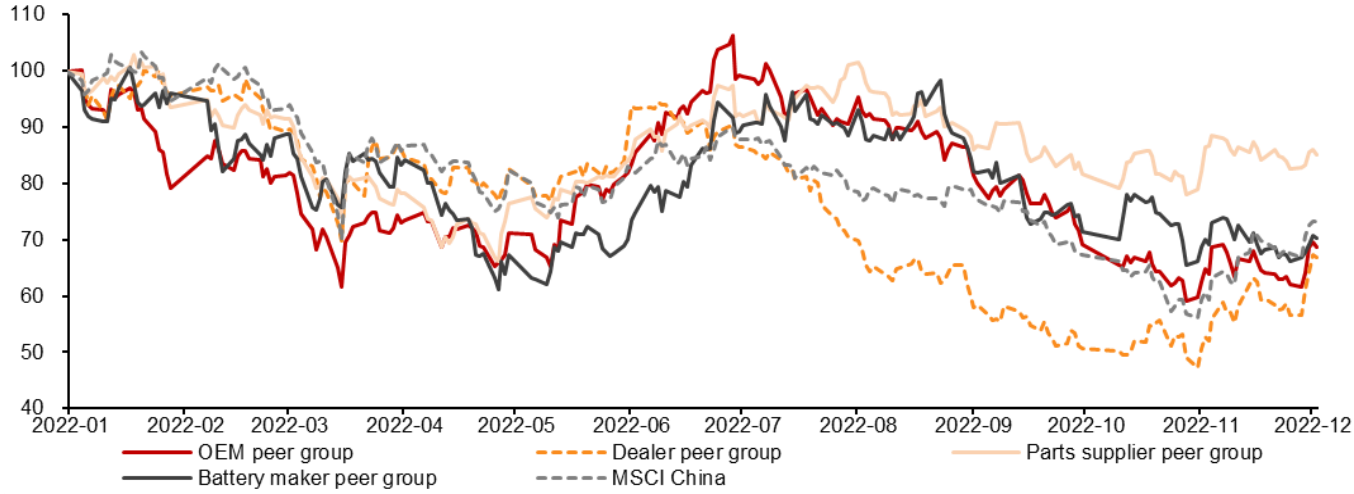
Appendix: Major Brands' Discounts at Dealers 44

Share Price Performance and Investment Thesis

Two-year outperformance ended in 2022

We have created four market cap-weighted peer groups to review the share performance in 2022 for different players along the automotive supply chain. OEMs, dealers and battery makers underperformed the MSCI China by 3-7% YTD, whereas parts suppliers outperformed by 12% YTD. We published a report in Sep 2022, expecting a short-lived share price rebound for automotive players. Such rebound came a bit later than we had expected, but helped OEMs, dealers and battery makers to narrow the gap with the benchmark. Despite different patterns throughout the year, the peer groups of OEMs, dealers and battery makers are likely to end the year with very similar annual returns.

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



Source: Bloomberg, CMBIGM

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), Seres (601127 CH, NR), and BAIC (1958 HK, NR).

Dealer peer group consists of Zhongsheng (881 HK, NR), Meidong 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), Gotion High-Tech (002074 CH, NR), Farasis (688567 CH, NR), Sunwoda (300207 CH, NR) and CALB (3931 HK, NR).

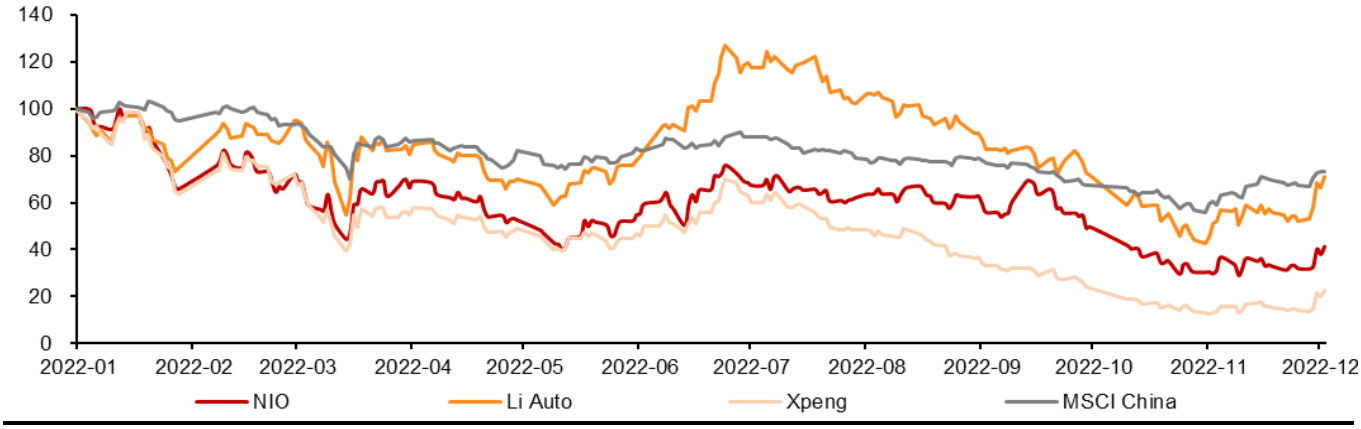
The dealer peer group, which mainly sells traditional luxury brands, underperformed all other groups YTD, especially from Jun 2022, as the purchase-tax cut only benefits vehicles priced below RMB 300,000. In addition, the tightened rebates from OEMs and competition from premium NEV models lead to investors' concerns about dealers' both profitability and valuation.

The OEM peer group underperformed other groups from the beginning of 2022 until May 2022 amid price hike of raw materials, especially for batteries. The purchase-tax cut boosted the share price of the OEM peer group from Jun 2022. We published a report in Aug 2022, warning of possible price war for both ICE and NEVs, despite the best Jun, Jul and Aug wholesales volume in China's history. The share price of the OEM peer group was almost halved from the peak at the end of Jun 2022 to the trough at the end of Oct 2022.

The parts suppliers were the most resilient among all automotive groups in 2022. They started to outperform from Jul 2022, as investors believe the inventory restocking would benefit parts suppliers more than other players.

Looking into individual automakers, the share prices of the NEV trio were the most volatile among all the Chinese automakers. The share price performance during the first 11 months of 2022 is ranked as: Li Auto > NIO > Xpeng (vs Xpeng > Li Auto > NIO in 2021). Xpeng's lowest gross margin among the NEV trio and weak sales volume for the *P5* resulted in its share price underperformance in 1H22. Investors' deteriorating expectation for the new *G9* and slower-than-expected development of autonomous driving technologies, along with Tesla's vehicle price cuts, have led to Xpeng's even worse underperformance during Aug-Nov 2022. In contrast, Li Auto's new flagship model *L9* and NIO's new medium-size sedan *ET5* have been well received by consumers. Li Auto led the YTD sales volume with the fewest number of models. Xpeng and NIO are also the worst share-price performers among all major Chinese OEMs in the first 11 months of 2022.

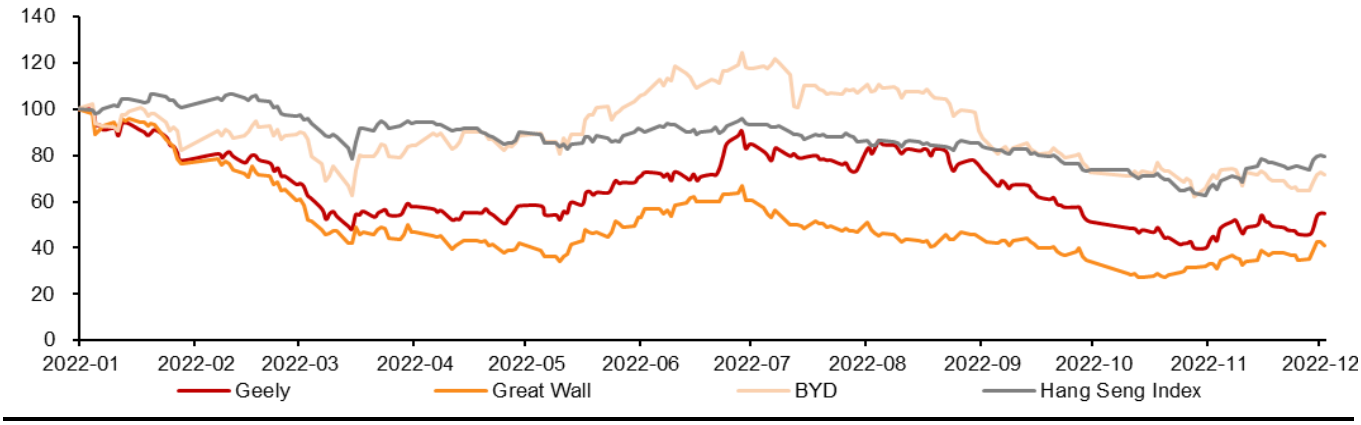
Figure 11: Share prices of NIO, Li Auto and Xpeng, vs MSCI China (normalized on 31 Dec 2021)



Source: Bloomberg, CMBIGM

The share performance divergence of three H-share non-SOE automakers continued in 2022. BYD is likely to retain the best performer in 2022 among the three, aided by its strong NEV sales volume growth of over 200% YoY. Geely outperformed Great Wall in 2022, thanks to Zeekr's improving sales volume. Yet it still underperformed the Hang Seng Index YTD. Great Wall was the worst performer among the three, as its sales volume significantly missed its sales target and many new models have been delayed.

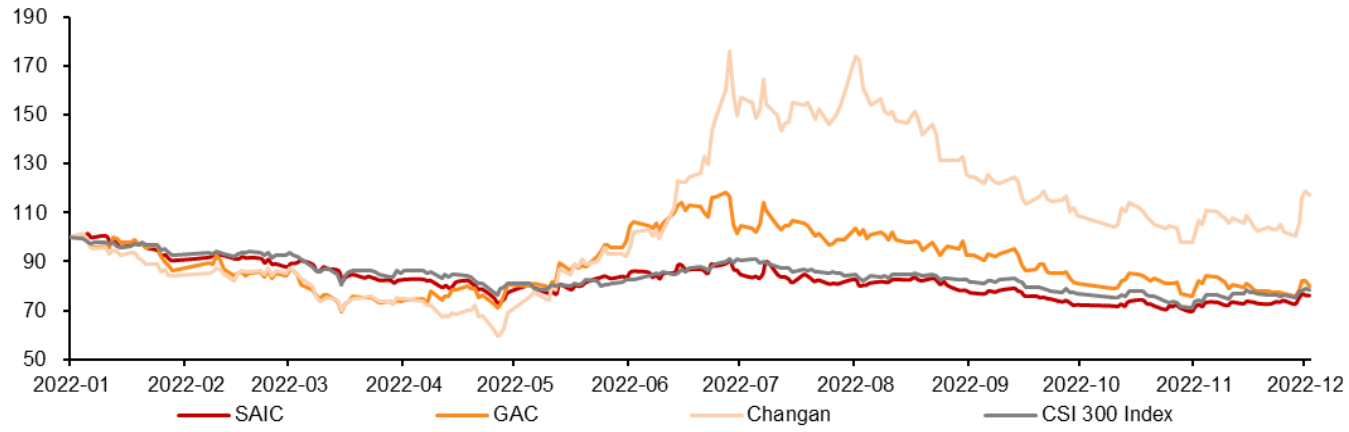
Figure 12: Share prices of BYD, Great Wall and Geely, vs Hang Seng Index (normalized on 31 Dec 2021)



Source: Bloomberg, CMBIGM

Looking at three A-share SOE automakers, SAIC's share price performance was largely in line with CSI 300 Index throughout the entire 2022, after consistently underperforming the benchmark in 2021. Aion's high-than-expected sales volume, along with the resilient earnings from GAC's joint ventures, has helped GAC's share price outperform the benchmark for most of the time during the year. Changan's share price was the most volatile among the three with underperforming the benchmark the most during Jan-May 2022 and significantly outperforming the benchmark since Jun 2022, aided by purchase-tax cut, NEV market share gain and more premium NEV brand launches.

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



Source: Bloomberg, CMBIGM

Industry beta could be more crucial than stock selection in 2023

Only Changan largely outperformed the benchmark YTD among the nine major automakers noted above, which partially underscores the challenges that the automotive industry faces amid macro uncertainties, especially with the sales weakness after the stimulus measures. The share price correlation between different automakers was also high in 2022. We believe the recent share price rebound could mean the majority of the short-term negatives may be priced in, although it could be short-lived.

We expect 2023 to be similar to 2018, as both years face sales weakness post purchase-tax cuts. The difference is investors still expected industrywide sales volume growth at the beginning of 2018 while the consensus now for 2023 is a sales-volume decline. Every automaker would strive for higher sales volume under such circumstances in 2023, which could make sales volume forecasts for each automaker even more difficult. The picture could be clearer towards the end of 2023, as we may see which automakers are about to be out of market.

We suggest range trading, which worked well in 2018, before we can identify long-term winners more easily. Once the picture becomes clearer, share price rally for the players who remain in the market could be more sustainable.

Battery price drop, stimulus measures could be positive catalysts in 2023

Apart from monitoring regular metrics such as sales volume, inventories and discounts, we believe a possible battery price drop in 2023 could be a positive catalyst for the automotive industry. We expect battery raw-material surplus in 2023, details of which will be discussed in the NEV outlook section in this report. That could result in possible battery price cuts to boost automakers' profitability. We also cannot rule out the possibilities of stimulus measures again in 2023, in a bid to revive China's economy.

Investors turned to parts suppliers and dealers during 2018-19 when China's PV sales volume declined, as dealers enjoyed the outperformance from luxury brands and parts suppliers could enjoy a more certain trend amid the industry development. Parts suppliers outperformed other peer groups in 2022, underscoring our argument in Jan 2022 that Chinese parts suppliers could benefit from electrification and digitalization as automakers develop software R&D in house. In our view, 2023 could be slightly different and more complicated than 2018. Dealers still face sales volume and profitability uncertainties as traditional luxury brands still lag in launching competitive NEV models in 2023. Many megatrends have been factored in parts suppliers' share prices including battery makers, as the valuation gap between parts suppliers and OEMs has been larger than that in 2018.

Top picks: Li Auto, Geely

As our coverage mainly consists of OEMs, our top picks also focus on this space. We believe Meidong is still best positioned in the dealer space given its exposure in Porsche and superior management capabilities. We still prefer leading NEV start-ups than incumbent automakers given their current NEV products.

While the NEV trio all has more than RMB 30bn net cash to support them throughout 2024, We are of the view that Li Auto probably has a higher chance to be a long-term winner based on current model rollouts. Li Auto is likely to finish 2022 with the highest sales volume among the NEV trio only with two models. With at least two new models in 2023, we expect Li Auto to turn profitable in FY23E, the earliest among the NEV trio. The key concern probably lies in how severe the sales cannibalization would be between the *L9*, *L8* and *L7*. Investors may also pay attention to its first BEV (battery electric vehicle) model launch in 2023.

We recently upgraded Geely from Hold to BUY due to Zeekr's progressive improvement and possible PHEV sales boom. With lessons learnt from the *Xingyue L* and *Emgrand L* PHEVs, we expect Geely's two new PHEVs in 1H23 to be more successful. We are of the view that BYD's 2/3 market share in the PHEV segment is not sustainable and Geely is likely to be one of the automakers to grab market share from BYD. We expect Zeekr to almost double its sales volume in FY23E, aided by a compact SUV model.

Industry 2023 Outlook: Post-Stimulus Weakness, Exports

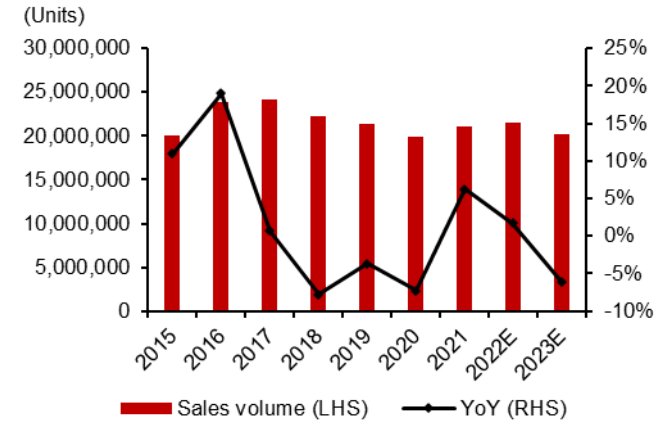
Retail sales volume: -6% YoY in 2023 amid purchase-tax cuts expiry

We project China's PV retail sales volume to fall 6% YoY from 21.45mn units in 2022E to 20.16mn units in 2023E. Although it is difficult to forecast Nov and Dec 2022 figures amid the current uncertainties in a bid to quantify the pre-buying effect, we estimate the purchase-tax cuts for ICE vehicles pulled demand of about 590,000 units ahead into this year, or 2.7% of our projected PV retail sales volume in 2022. We have taken this factor into consideration for our 2023 sales volume forecast. If there were no purchase-tax cuts, we would have projected 1% YoY decline for the retail sales volume in 2023.

Although we were the first on the Street to warn a possible price war in the next six months back on 15 Aug 2022, our 2023 retail sales volume forecast appears to be more positive than other brokers. We believe the main reasons are the low base and the scale of pre-buying effect.

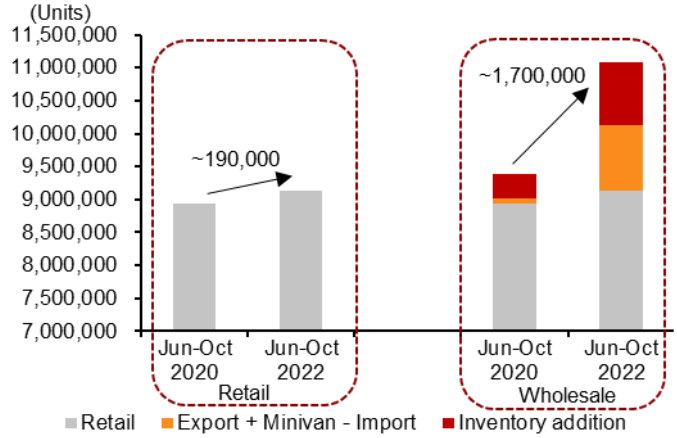
1) China's PV retail sales volume fell 7.8% YoY from all-time high of 24.09mn units in 2017 to 22.22mn units in 2018, as a similar round of purchase-tax cuts ended before 2018. Now we project 2022 retail sales volume to be 21.45mn units, 11% lower than China's all-time high annual retail sales volume. Our projected 2023 retail sales volume is at a similar level as in 2015 and 2020 when stimulus measures were needed and the COVID-19 started, respectively.
2) We are of the view that some investors may overestimate the additional demand created by the purchase-tax cuts. Aggregated retail sales volume during Jun-Oct 2022 (the purchase-tax cuts started from 1 Jun 2022) only rose 2.1% compared with that during Jun-Oct 2020 when the demand started to recover after the COVID lockdowns without nationwide stimulus measures. On the other hand, aggregated wholesale volume during Jun-Oct 2022 rose 18.1% compared with that during Jun-Oct 2020. The gap was mainly from the surging exports and inventory restocking. We calculate that about 0.96mn units (or about half a month) of inventories were added into dealers' showrooms during Jun-Oct 2022.

Figure 14: China PV retail sales volume



Source: CATARC, CMBIGM estimates

Figure 15: Retail vs wholesale in Jun-Oct 2022

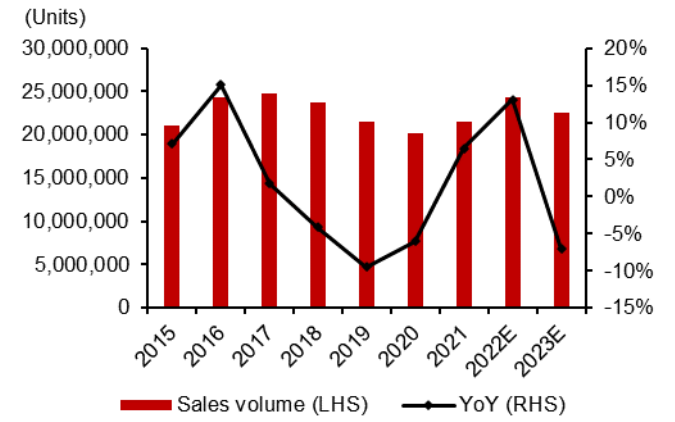


Source: CAAM, CATARC, CMBIGM estimates

Wholesale volume: -7% YoY amid surging exports

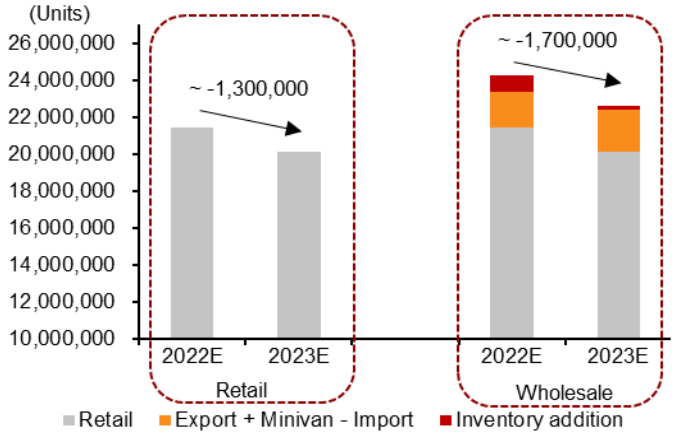
We project China's PV wholesale volume to fall 7% YoY from 24.29mn units in 2022E to 22.58mn units in 2023E, based on our assumption for retail sales volume of 20.16mn units. We also assume both import volume and minivan wholesale volume (excl. minivan exports) to drop mid-to-low single digit YoY to 0.75mn units and 0.27mn units in 2023, respectively. The difference between wholesale and retail sales volume mainly depends on exports and inventory changes.

Figure 16: China PV wholesale volume



Source: CAAM, CMBIGM estimates

Figure 17: Retail vs wholesale volume in 2022-23



Source: CAAM, CATARC, CMBIGM estimates

Export: The source of wholesale volume's resilience

We project China's PV exports to rise 13% YoY from 2.4mn units in 2022E to 2.7mn units in 2023E, as more Chinese automakers have been exploring overseas markets especially with their NEV models. We expect NEV exports to rise 29% YoY to 0.7mn units in 2023E.

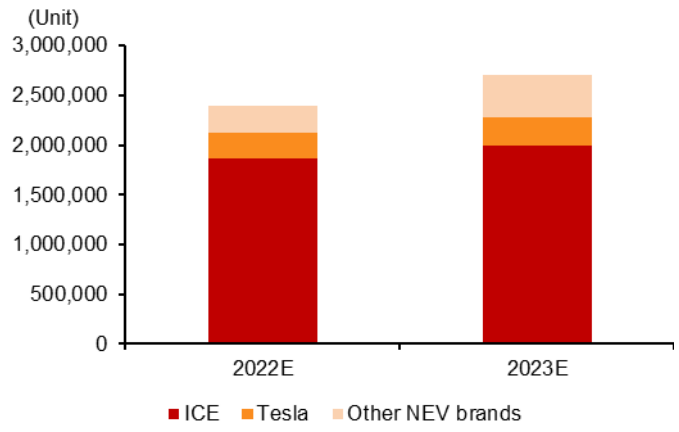
China exported about 0.42mn units of NEVs in the first 10 months of 2022, or 21% of total PV exports, slightly lower than NEV's 26% market share in the overall wholesale volume in the first 10 months of 2022. Tesla accounted for about half of China's total NEV exports. We project Tesla Shanghai's exports to rise only 4% YoY from 265,000 units in 2022E to 275,000 units in 2023E, as Tesla's Berlin plant ramps up in 2023. However, we expect Chinese automakers to export more NEVs in 2023, such as SAIC, BYD and Geely.

Inventory: We assume mild inventory restocking in 2023

Automakers have pushed 1.32mn units of new inventories into dealers' showrooms in the first 10 months of 2022, based on our calculations, the highest in history. We expect automakers to cut inventories by 0.4mn units in Nov and Dec 2022 combined, which would still make this year's inventory restocking as the highest in history. In our view, should automakers cut more inventories in Dec 2022, they may face less severe challenges in 2023.

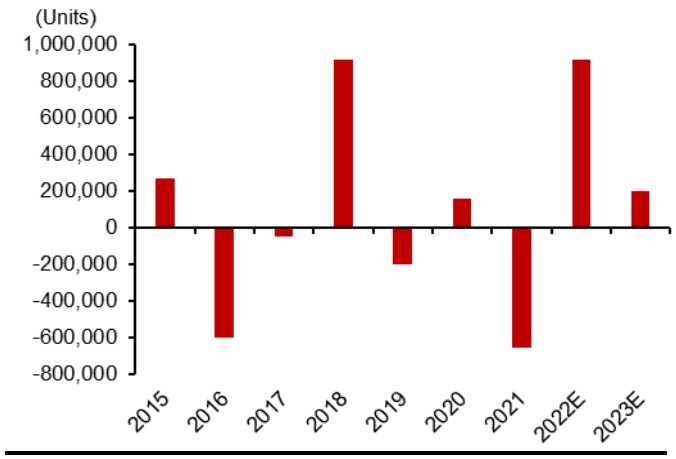
Although inventory changes at dealers depend on quite a few factors, we do not expect automakers to cut inventories during tough times, as they usually use dealers as cushion to stabilize production until dealers cannot take any more inventories. Therefore, we project industrywide inventory restocking of 0.2mn units in 2023E.

Figure 18: Our forecast for PV export breakdown



Source: CAAM, CMBIGM estimates

Figure 19: Our est. inventory changes at dealers

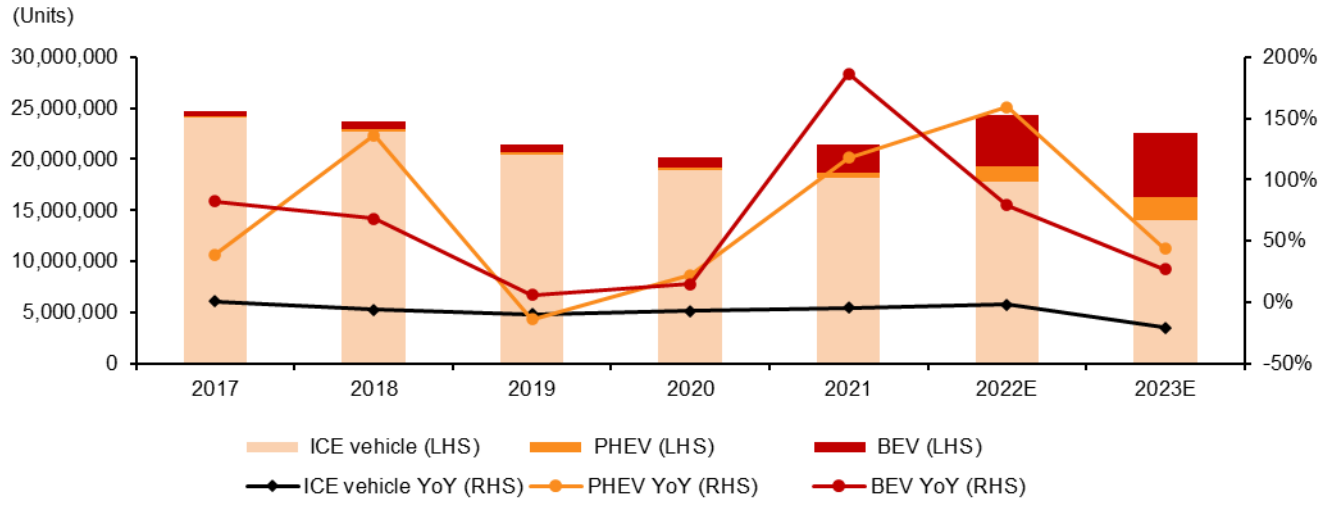


Source: CAAM, CATARC, CMBIGM estimates

Accordingly, we project China's PV wholesale volume to fall 7% YoY to 22.58mn units, which appears to be more resilient than forecasts from other brokers, mainly supported by exports and inventory addition.

From the powertrain perspectives, NEV is to be the driver for China's auto sales again. We forecast China's NEV wholesale volume to rise 31% YoY from 6.5mn units in 2022E to 8.5mn units in 2023E, details of which will be discussed in the NEV outlook section of this report. Our industrywide and NEV forecasts imply that China's ICE wholesale volume is to decline 21% YoY in 2023E.

Figure 20: China PV wholesale volume breakdown by powertrain

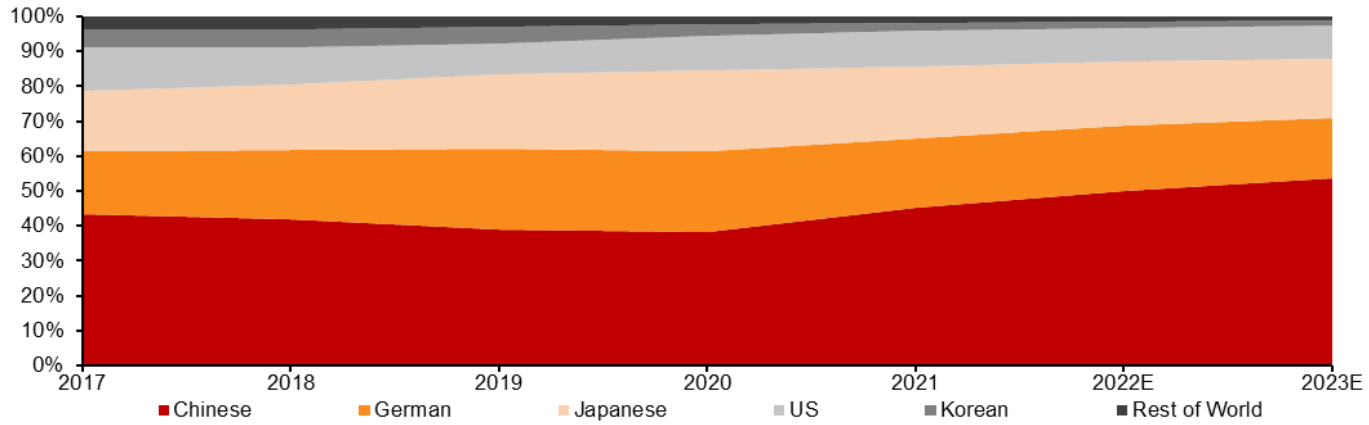


Source: CAAM, CMBIGM estimates

Chinese-brand market share: Likely exceed 50% on NEV boom

We expect Chinese brands to continue gaining market share for three years in a row in 2023 to about 54.0%, from 49.5% in the first 10 months of 2022 and 45.1% in 2021, on a wholesale volume basis. We had projected market share gain for Chinese brands in 2022 but still underestimated such gain. We now expect Chinese brands' market share to be close to 50% for 2022E, the highest at least since 2009, largely aided by NEVs. Excluding NEVs, Chinese brands only accounted for about 38.1% market share in the first 10 months of 2022, down from 39.3% in 2021.

Figure 21: PV market share by brand origin in China



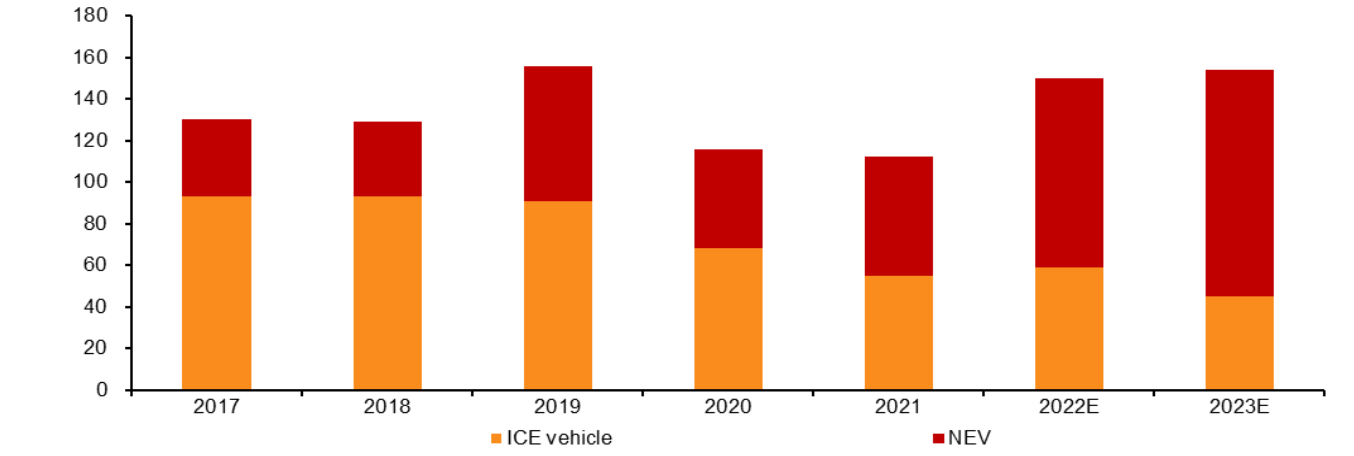
Source: CAAM, CMBIGM estimates

Model pipeline: Foreign brands' electrification still lagging

Based on the data we have compiled, there will be about 154 new model launches in 2023E, slightly higher than 150 in 2022E. What the chart below does not show is that we estimate there would be 40 new model launches in 4Q22, which would have large sales volume impact in 2023. The number of new model launches in 2022E should be about 8% lower than our prior forecast made in Jan 2022, mainly due to the pandemic resurgence. Some new models scheduled in 2022 have been delayed into 2023.

New NEV models or models with the NEV powertrain available should account for about 70% of total new models in 2023, based on our estimates, higher than 60% in 2022E.

Figure 22: No. of new model launches in China

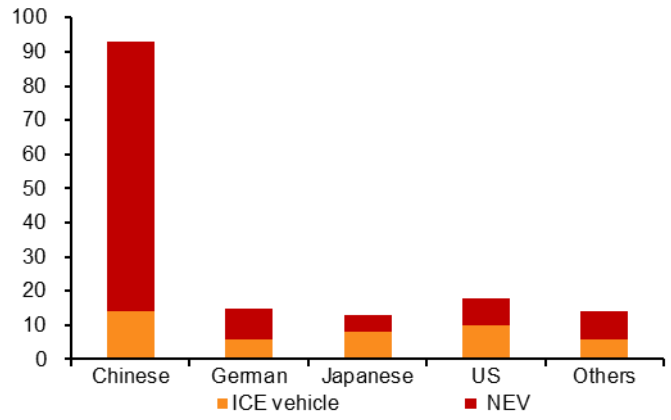


Source: CAAM, CMBIGM estimates

Despite greater portion of NEV models in their new model pipeline in 2023 (50% in 2023E vs 42% in 2022E), the number of foreign-brand new NEV models in 2023E is only about 30 (vs 80 Chinese-brand new NEV models), based on our estimates. We are of the view that the upcoming foreign-brand new NEV models in 2023 could still be less competitive than Chinese brands.

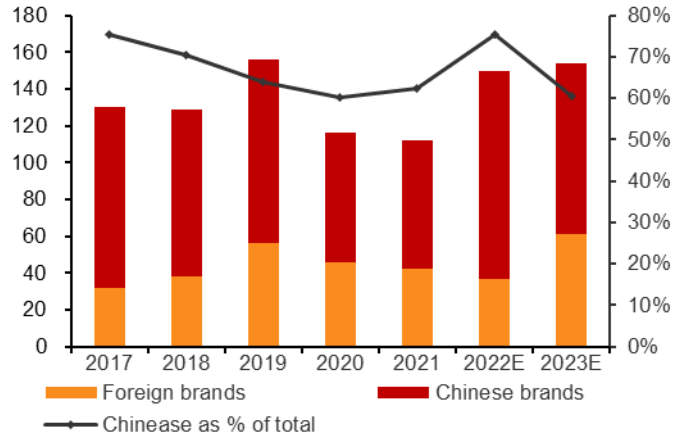
On the other hand, we estimate 60 foreign-brand new model launches in 2023, the highest in history, including some important models such as the Mercedes *E Class*, *GLC*, BMW *X1*, Audi *A4*, Honda *Accord*, etc. This is one of the reasons why we expect foreign-brand ICE wholesale volume to fall 19% YoY in 2023, slightly outperforming Chinese-brand ICE's 23% YoY decline on our estimates.

Figure 23: No. of new models by brand origin in 2023



Source: Company data, CMBIGM

Figure 24: No. of new models by brand origin

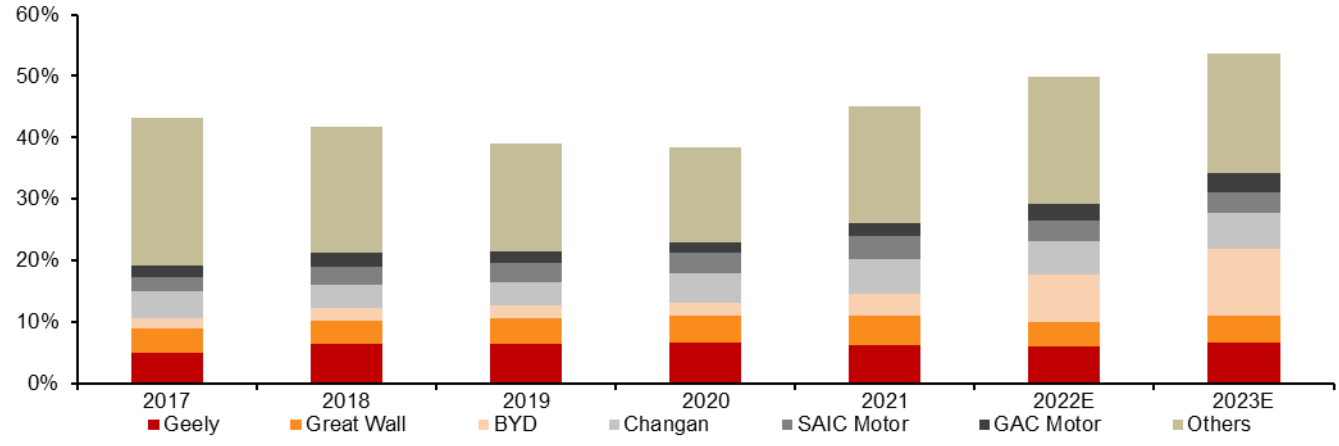


Source: Company data, CMBIGM

Chinese brands: More NEVs, more premium models

Chinese brands' market share increase during 2021-22 was mainly driven by BYD, GAC Aion and some NEV start-ups including NIO, Li Auto, Xpeng, Neta and Leap. Some traditional automakers such as Geely and Great Wall lost market share during 2021-22 due to their lagging in NEVs. 2023 could be critical for both automakers as whether their new PHEV models and more premium BEV models could help them gain market share.

Figure 25: Chinese brands' market share in China (wholesale volume basis) by OEM

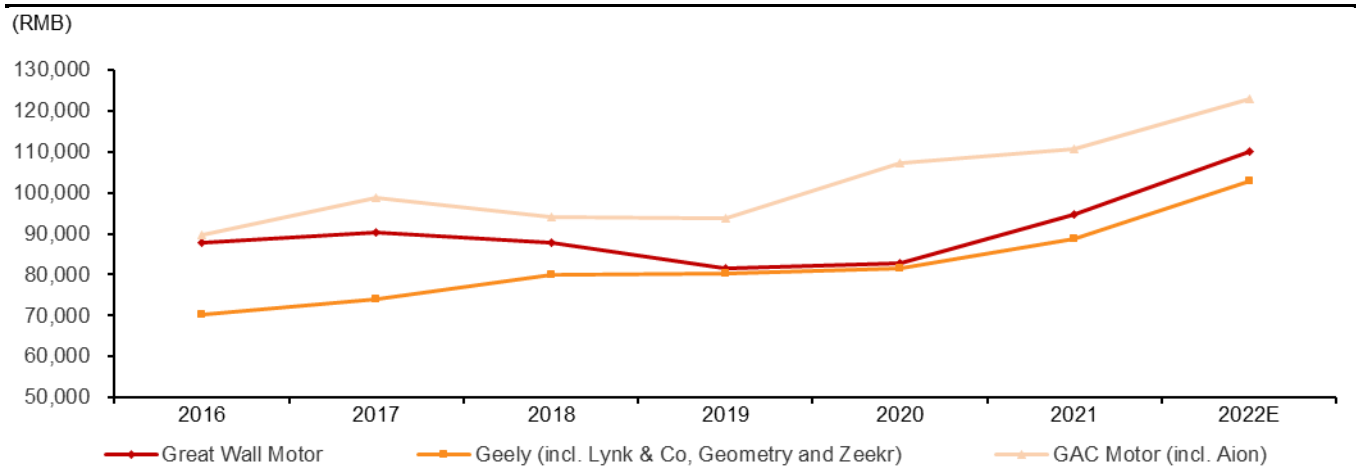


Source: CAAM, CMBIGM estimates

The market share gain for Chinese brands also came from larger and higher priced models amid NEV boom. 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. The average selling prices (ASP) rose YoY in 2017 for Great Wall, Geely and GAC Motor but declined YoY during 2018-19 for Great Wall and GAC Motor. Chinese automakers started another round of brand upmarket around 2020, by launching more expensive NEV brands, such as Geely's Zeekr and GAC's Aion, or by utilizing their competitive edge to create new demand in the previously niche segment, such as Great Wall's Tank. ASPs at all three Chinese automakers rose YoY in 2021 and such increases could be more apparent in 2022.

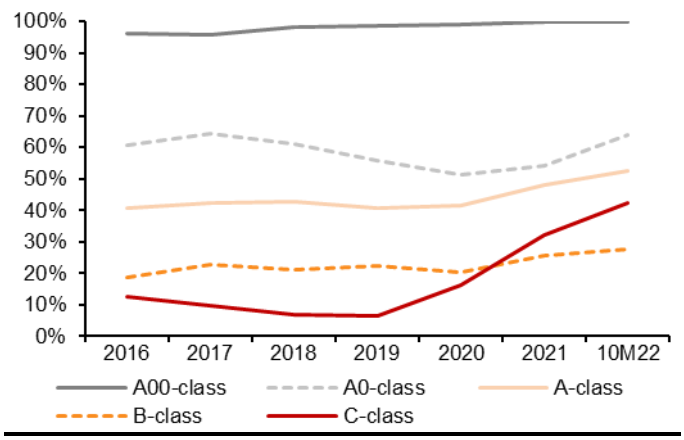
Figure 26: ASP changes at Great Wall, Geely and GAC Motor



Source: Company Data, CMBIGM estimates

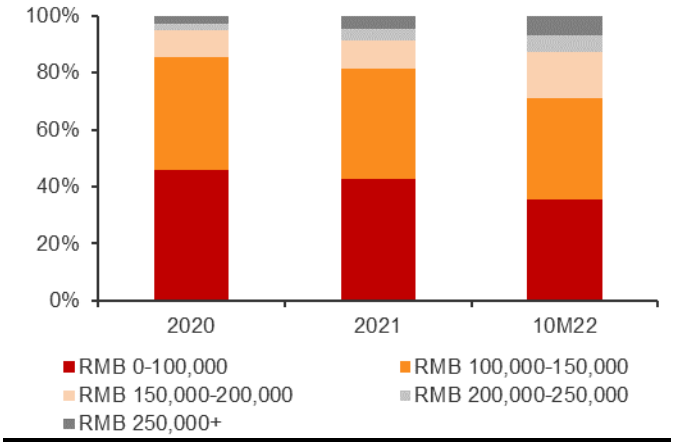
Industrywide data also underscores such trend, as Chinese-brand market share gain during 2021-22 came from larger and more expensive cars, which could make such market share gain more sustainable. Chinese brands' market share in the B-class and C-class segments widened from 20% and 16% in 2019 to 28% and 42% in the first 10 months of 2022, respectively, aided by the BYD *Han*, *Tang*, *Li One*, *Zeekr 001*, *Tank 300*, Xpeng *P7*, etc. Within Chinese brands, sales volume of models priced above RMB 150,000 accounted for 29% in the first 10 months of 2022, vs 15% in 2020. Note that manufacturers' suggested retail prices (MSRPs) are used for such calculations in this report, but not the actual transaction prices.

Figure 27: Chinese brands' market share in each sub-segment, on a wholesale basis



Source: CAAM, CMBIGM

Figure 28: Chinese brands' wholesale volume breakdown by price



Source: CPCA, CATARC, CMBIGM

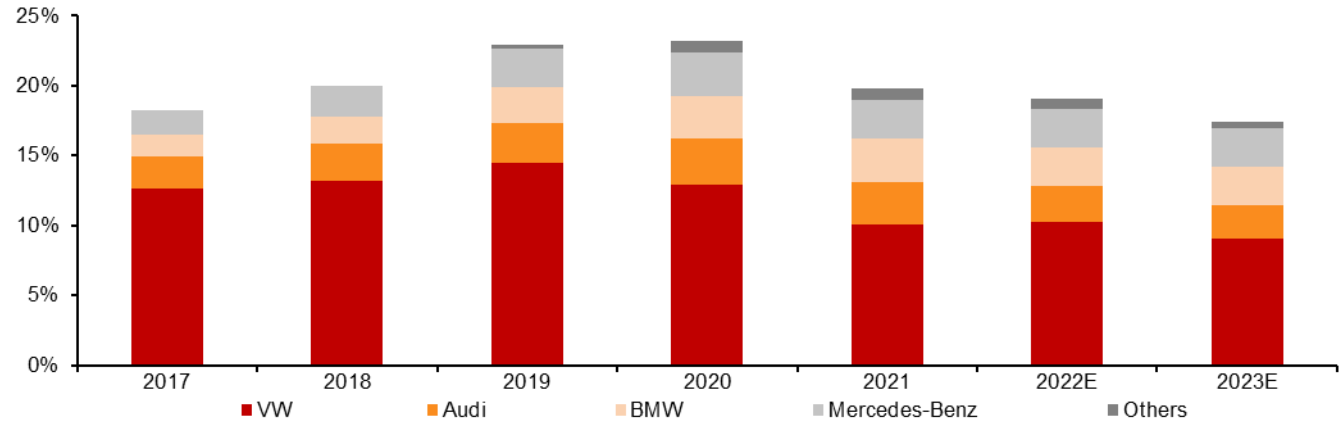
German brands: VW may benefit the most from purchase-tax cut in Jun-Dec 2022

Despite the luxurious brand image, German brands' market share in China has been declining since 2021 and we expect such trend to continue in 2022-23. We estimate that the market share for German brands may narrow by 0.7 ppt YoY to 19.1% in 2022E, better than our prior expectation made at the beginning of 2022, partly aided by the purchase-tax cut. We project German brands' market share to further drop to 17.2% in 2023 following the pre-buying effect at the end of 2022.

The German "Big Three" (Mercedes-Benz, BMW and Audi) all underperformed the overall market in terms of wholesale volume for their locally-produced models during the first 10 months of 2022, due to a lack of competitive NEV models. In fact, wholesale volume of models priced above RMB 250,000 (MSRP) accounted for about 21% of the overall market in the first 10 months of 2022, up from 19% last year, based on our estimates.

Although the "Big Three" have accelerated their NEV launches, many Chinese consumers are shunned by the high prices, which could be reflected by Mercedes-Benz's recent price cuts on its NEV models. Therefore, we expect Mercedes-Benz, BMW and Audi's market shares to all narrow slightly YoY in 2023, as Chinese premium NEVs are likely to continue grabbing market share from traditional luxury brands.

Figure 29: German brands' market share in China (wholesale volume basis)



Source: CAAM, CMBIGM estimates

We believe the VW brand should benefit the most from the purchase-tax cut during Jun-Dec 2022, given its large sales volume and most of its models are entitled to the purchase-tax cut, as shown in the table below. Therefore, we project VW's market share to improve slightly from 10.1% in 2021 to 10.3% in 2022E, better than our prior expectation. However, such market share regain could be short-lived, especially as some of the demands in 2023 are pulled ahead. We expect its market share to narrow 1.4 ppts YoY to 8.9% in 2023 amid its aging ICE models and unsuccessful NEV models so far in China.

Figure 30: Our estimated No. of ICE PVs sold in 2021 with price ≤ RMB 300,000 and engine ≤ 2.0L, by OEM

Rank	OEM	No. of ICE PVs sold in 2021 with price ≤ RMB300k and engine ≤ 2.0L	As % of total ICE sales volume	Rank	OEM	No. of ICE PVs sold in 2021 with price ≤ RMB300k and engine ≤ 2.0L	As % of total ICE sales volume
1	FAW VW	1,471,950	85%	16	FAW Car	341,815	92%
2	Geely	1,246,001	100%	17	GAC Motor	319,913	100%
3	SAIC VW	1,172,577	99%	18	BMW Brilliance	311,310	51%
4	SAIC GM	1,144,659	91%	19	Beijing Benz	269,604	49%
5	Changan	1,030,630	100%	20	Changan Ford	184,940	87%
6	Dongfeng Nissan	1,015,348	97%	21	Dongfeng Yueda Kia	151,544	99%
7	Great Wall	911,772	100%	22	BYD	136,348	100%
8	GAC Honda	767,609	100%	23	Changan Mazda	123,319	94%
9	Chery	757,950	100%	24	JAC	117,953	100%
10	Dongfeng Honda	732,229	99%	25	Dongfeng Liuzhou	108,642	100%
11	FAW Toyota	670,477	82%	26	Volvo Asia Pacific	107,001	82%
12	GAC Toyota	659,352	81%	27	Dongfeng Sokon	99,966	100%
13	SAIC PV	658,997	100%	28	Dongfeng PV	89,586	100%
14	SAIC-GM-Wuling	571,934	100%	29	Beijing Motor	60,401	96%
15	Beijing Hyundai	356,227	100%	30	GAC Mitsubishi	51,224	78%

Source: CPCA, CMBIGM estimates

Japanese brands: Sales of small-size models are dented more than expected by Chinese NEVs

We estimate Japanese-brand market share to fall 2.4 ppts YoY to 18.3% in 2022E, much weaker than our prior forecast of a market share gain made at the beginning of 2022, as we probably underestimated the dent for Japanese brands from NEVs.

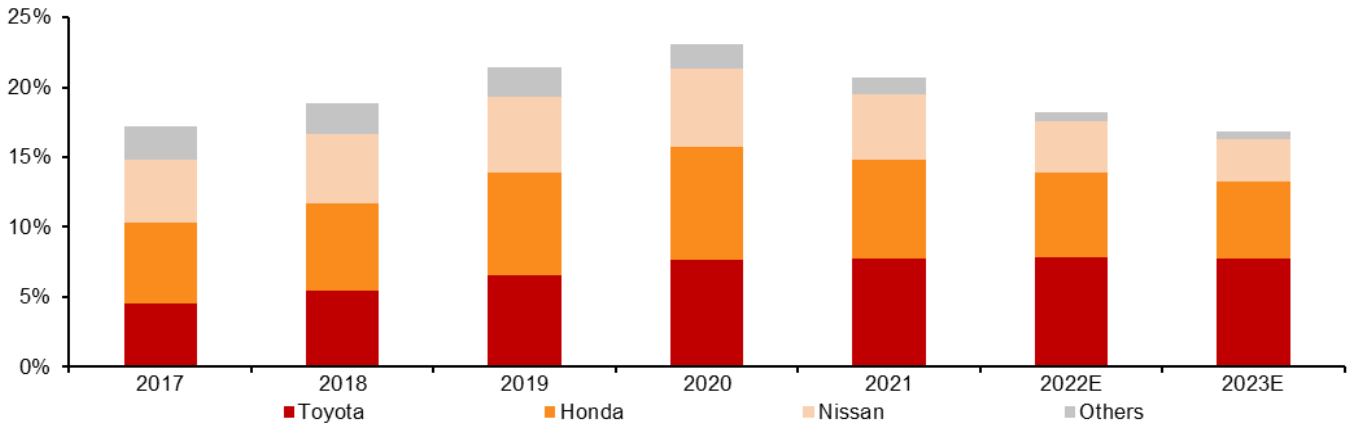
We did expect a market share shrink for Nissan on its management saga, but the decline has been sharper than we had expected, mainly due to sales collapse from small-size models, such as the *X-Trail*, *Tiida* and *Kicks*. The *Sylphy*, which accounts for about half of Nissan's sales volume in China, fell 9% YoY in terms of wholesale volume in the first 10 months of 2022, still underperforming the 9% YoY growth for the compact-car sub-segment during the same period. We are of the view that the aging *Sylphy* (launched in Jul 2019) may face more challenges from NEVs in 2023.

Honda's sales volume in China in 2022 was below our expectation, largely due to aging *Breeze* and the dent from NEVs on its small-size models such as the *XR-V*, *Vezel* and *Fit*. In our view, despite a plethora of possible new models, along with the new-generation *CR-V* launched in Sep 2022, Honda could face more challenges from NEVs in 2023. We project Honda's market share to decrease 0.6 ppt YoY to about 5.5% in 2023.

Toyota is probably best positioned among Japanese brands, or even among all foreign mass-market brands now, in our view. Wholesale volume at GAC Toyota is still on track to achieve its original target of 1mn units in 2022, while FAW Toyota is a bit behind this year due to sales volume decline for the *Corolla* and a lack of a *Sienna* sister model. Similar to Nissan and Honda, small-size models significantly underperformed. Wholesale volume for Toyota's small SUVs including *IZOA* and *C-HR* fell 54% YoY in the first 10 months of 2022. Sales volume for small cars including *Yaris* and *Vios* decreased 13% YoY during the same period. Still, Toyota and VW could be the only two foreign brands to gain market share in China in 2022E. Looking into 2023, we believe Toyota is better positioned than VW, aided by new model launches in 2022, including *Sienna*, *Frontlander / Corolla Cross and Venza / Harrier*. Therefore, we expect Toyota's market share to be flat YoY at 7.8% in 2023. Lagging in electrification is the common issue for all Japanese players, including Toyota. Toyota debuted the *bZ4x* EV in Apr 2022 but the delivery only starts at the end of 2022.

Based on our channel checks, Toyota plans to launch another four NEV models in China by 2025 (could be four NEV models each at GAC Toyota and FAW Toyota). Should Toyota continue to be slow in electrification, it could face more headwinds in 2024.

Figure 31: Japanese brands' market share in China (wholesale volume basis)



Source: CAAM, CMBIGM estimates

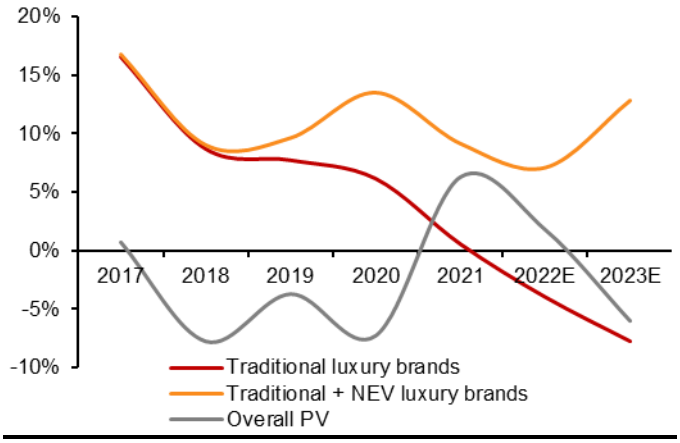
Luxury car: Premium NEV up, traditional luxury down

We divide luxury-auto segment into two categories to better reflect the industry landscape changes: traditional luxury and NEV luxury, as premium NEV models have already contributed a significant portion to high-end vehicle sales. Our defined NEV luxury brands include Tesla, NIO, Lixiang, Xpeng, Zeekr, Aito, Denza, HiPhi, Great Wall's SL, JIDU, BYD's Yangwang, Avatar, Voyah, IM and Polestar. As more than 20% of traditional luxury cars in China are still imported and about 1/3 of Tesla Shanghai's production is exported, we use retail sales volume to reflect such demand more precisely.

Although retail sales volume of traditional luxury brands has been underperforming the overall PV market since 2021, Figure 32 clearly shows that vehicle consumption upgrade has never halted in China, as the overall luxury segment, including premium NEV brands, has been consistently outperforming the overall PV market.

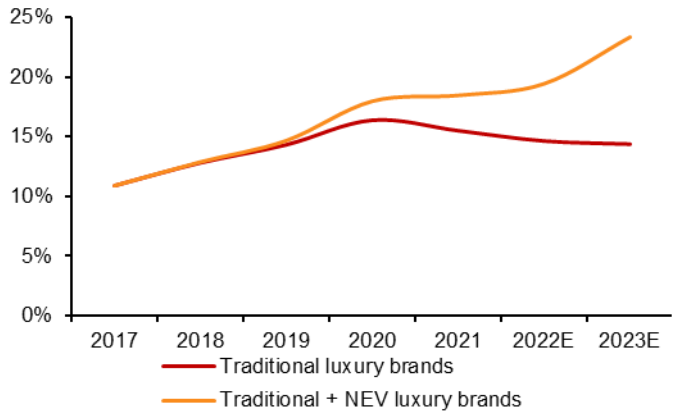
We expect such trend to continue in 2022-23. We project the overall luxury auto retail sales volume to rise 13% YoY in 2023, significantly better than the overall PV market's 6% YoY decline and traditional luxury brands' 8% YoY drop. That means we expect the overall luxury brands (including NEV luxury) to account for 23% of China's total retail sales volume in 2023, whereas traditional luxury brands' market share may drop to about 14.4% next year. In other words, retail sales volume of NEV luxury brands could account for almost 40% of total luxury brands in 2023, based on our estimates.

Figure 32: Retail sales YoY growth for traditional luxury brands, overall luxury brands and overall PV



Source: CATARC, CMBIGM estimates

Figure 33: Market shares for overall luxury brands and traditional luxury brands in China



Source: CATARC, CMBIGM estimates

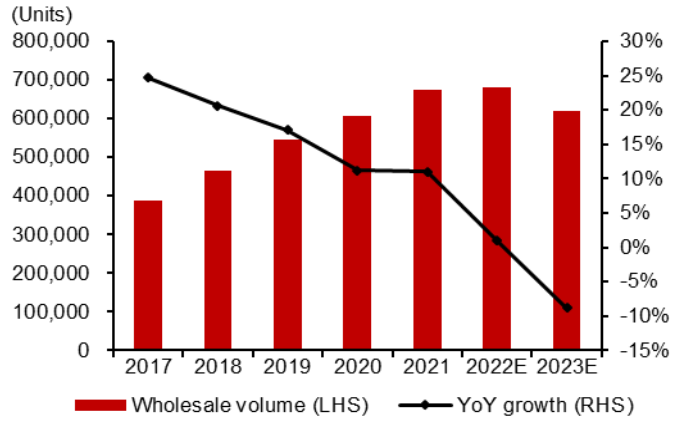
BMW: NEV champion among traditional luxury brands

BMW may lose the luxury-car sales crown to Mercedes-Benz in 2022, although their sales volume gap in the first 10 months of 2022 was only about 12,000 units. The production localization of the *X5* has not offset the sales declines from other models. The weaker-than-our-expected sales volume at BMW in 2022 should be related to the automaker's tightened incentives to dealers from the beginning of 2022, which could be reflected by its discounts at dealers. Although BMW started to provide subsidies for dealers from 4Q22 to boost sales, we project BMW's retail sales volume to decline 4% YoY to 790,000 units in 2022.

We project BMW's retail sales volume to decline 8% YoY in 2023 and wholesale volume at BMW Brilliance to drop 9% YoY in 2023 amid the aging *3-Series* and *5-Series*, although we expect BMW to increase incentives to dealers next year.

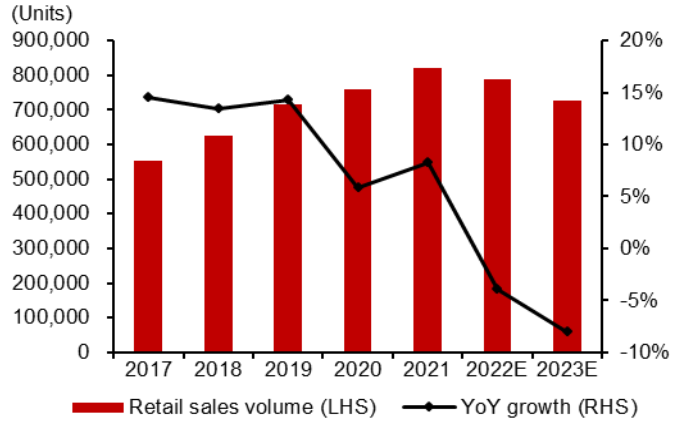
We expect BMW to retain the NEV sales crown among the German "Big Three" in 2022 and 2023. Although Mercedes-Benz *E Class* PHEV grabbed market share from BMW *5-Series* PHEV in 2022, BMW *i3* and *iX3* BEVs lifted its NEV sales. We expect BMW-Brilliance's NEV wholesale volume to rise by 15% YoY to about 93,000 units in 2023.

Figure 34: BMW-Brilliance's wholesale volume



Source: CAAM, CMBIGM estimates

Figure 35: BMW's retail sales volume in China



Source: CATARC, CMBIGM estimates

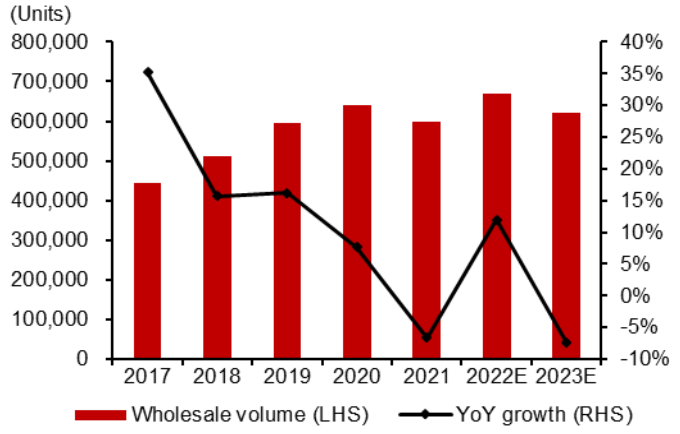
Mercedes-Benz: New *GLC* and *E-Class*

Beijing Benz is still on track to achieve our wholesale-volume forecast of 670,000 units made at the beginning of 2022, aided by the *C-Class* and *GLC*. The sales growth from the *C-Class* was in line with our expectation given its new-generation rollout in 2H21, whereas the aging *GLC*'s performance was more resilient than we had expected, largely due to much wider discounts at dealers.

The redesigned *GLC* and *E-Class* are scheduled to roll out during 4Q22-2023, which makes us project Beijing Benz's wholesale volume to drop by 7% YoY to about 620,000 units in 2023. We also expect Mercedes-Benz's retail sales volume, including imports, to decline 6% YoY in 2023.

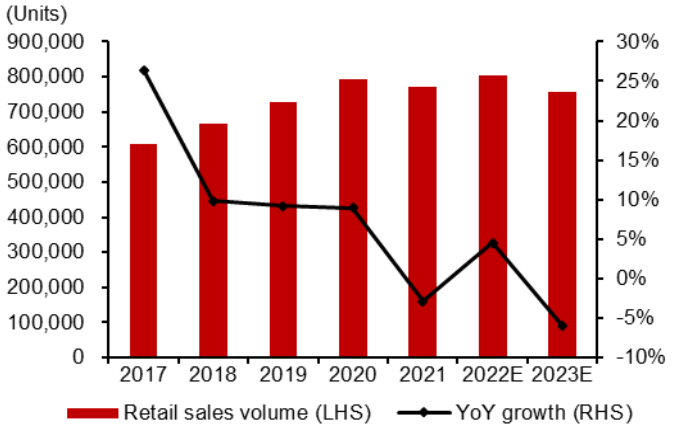
Beijing Benz launched three BEV models, *EQA*, *EQB* and *EQE*, in the past 12 months, none of which are well received by Chinese consumers so far. The automaker cut retail prices for its BEV models recently, which, in our view, may be of little help to its sales. We expect Beijing Benz's NEV sales volume to rise 80% YoY to 79,000 units in 2023, mainly because of its *C-Class PHEV* launched in Sep 2022.

Figure 36: Beijing Benz's wholesale volume



Source: CAAM, CMBIGM estimates

Figure 37: Mercedes' retail sales volume in China



Source: CATARC, CMBIGM estimates

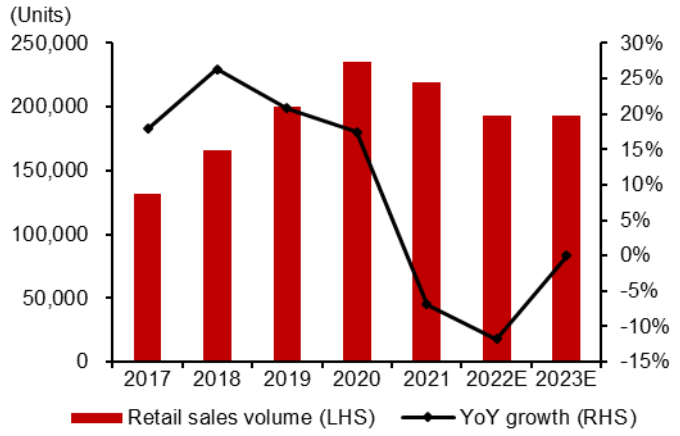
Lexus: Can the new *RX* sustain sales volume in 2023?

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.

Lexus is likely to experience its second year of sales-volume decline in China in 2022. Unlike the first sales decline in 2021 which was caused by chip shortage, we believe the sluggish demand should outweigh supply shortage in 2H22 for Lexus in China. Lexus' strong model cycle started from 2017 has probably come to an end amid the aging *ES*. The redesigned *NX* launched at the end of 2021 did not lift Lexus' sales volume this year. Apart from its supply issue in 1H22, we believe the dent from NEVs and product cannibalization from Toyota's new SUV models could play more important roles for the *NX*'s sales miss.

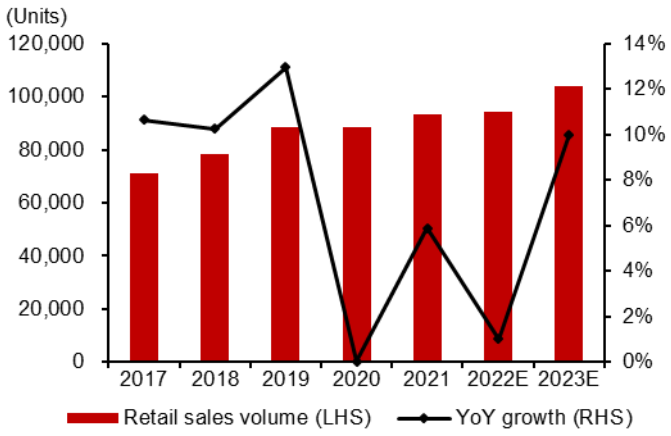
The new-generation RX is planned to be rolled out in 2023, which could be key to Lexus' sales volume next year. We project Lexus' sales volume to be flat YoY at about 190,000 units in 2023 in China.

Figure 38: Lexus's retail sales volume in China



Source: CATARC, CMBIGM estimates

Figure 39: Porsche's retail sales volume in China



Source: CATARC, CMBIGM estimates

Porsche: The only major traditional luxury brand to see sales growth in 2023 on our estimates

Porsche may be best positioned among traditional luxury brands when facing competition from NEVs, thanks to its more luxurious brand image and better received *Taycan BEV* than those BEVs at Mercedes-Benz and BMW. That probably gives Porsche a longer transition time toward electrification.

We estimate Porsche's retail sales volume to be largely flattish YoY in 2022, dragged down by sales decline of the *Macan*, yet still outperforming most traditional luxury brands in China. We project Porsche's retail sales volume to grow 10% YoY to over 100,000 units in 2023, partly aided by upcoming new *Macan BEV.*

Figure 40: China passenger-vehicle wholesale volume forecasts by OEM / brand

	Sales Volume in 2021 (units)	Sales Volume in 2022E (units)	Sales Volume in 2023E (units)	2023E YoY (%)	2022E Market Share (%)	2023E Market Share (%)
Chinese OEMs	**9,647,766**	**12,091,000**	**12,183,000**	**0.8%**	**49.8%**	**54.0%**
Geely	1,329,252	1,460,500	1,500,000	2.7%	6.0%	6.6%
Great Wall Motor	1,047,987	984,000	1,000,000	1.6%	4.1%	4.4%
Changan	1,222,459	1,320,000	1,320,000	0.0%	5.4%	5.8%
SAIC-GM-Wuling	1,265,847	1,250,000	1,000,000	-20.0%	5.1%	4.4%
SAIC	800,767	840,000	800,000	-4.8%	3.5%	3.5%
BYD	730,093	1,850,000	2,450,000	32.4%	7.6%	10.9%
GAC Motor	447,284	660,000	680,000	3.0%	2.7%	3.0%
Chery	867,629	1,230,000	1,100,000	-10.6%	5.1%	4.9%
Dongfeng	485,456	575,000	455,000	-20.9%	2.4%	2.0%
FAW	374,665	390,000	330,000	-15.4%	1.6%	1.5%
BAIC	121,599	125,000	95,000	-24.0%	0.5%	0.4%
JAC	159,530	178,000	110,000	-38.2%	0.7%	0.5%
NIO	92,921	128,000	230,000	79.7%	0.5%	1.0%
Li Auto	90,491	128,000	215,000	68.0%	0.5%	1.0%
Xpeng	98,155	120,000	180,000	50.4%	0.5%	0.8%
Weltmeister	44,157	40,000	35,000	-12.5%	0.2%	0.2%
Neta	69,674	160,000	180,000	12.5%	0.7%	0.8%
Leap Motor	44,378	115,000	130,000	13.0%	0.5%	0.6%
Jinkang Seres	41,440	81,000	140,000	72.8%	0.3%	0.6%
German Brands	**4,258,574**	**4,635,000**	**3,890,000**	**-16.1%**	**19.1%**	**17.2%**
VW	2,165,162	2,500,000	2,000,000	-20.0%	10.3%	8.9%
Audi	643,500	620,000	550,000	-11.3%	2.6%	2.4%
BMW	673,608	680,000	620,000	-8.8%	2.8%	2.7%
Mercedes-Benz	598,204	670,000	620,000	-7.5%	2.8%	2.7%
Jetta	178,100	165,000	100,000	-39.4%	0.7%	0.4%
Japanese Brands	**4,438,792**	**4,436,967**	**3,805,000**	**-14.2%**	**18.3%**	**16.9%**
Honda	1,525,442	1,480,000	1,250,000	-15.5%	6.1%	5.5%
Toyota	1,656,053	1,900,000	1,750,000	-7.9%	7.8%	7.8%
Nissan	1,001,949	890,000	690,000	-22.5%	3.7%	3.1%
Mazda	164,415	110,000	85,000	-22.7%	0.5%	0.4%
Mitsubishi	66,006	38,000	21,000	-44.7%	0.2%	0.1%
Acura	5,762	1,667	-	-100.0%	0.0%	0.0%
Infiniti	8,697	4,300	2,000	-53.5%	0.0%	0.0%
Suzuki	10,468	13,000	7,000	-46.2%	0.1%	0.0%
American Brands	**2,163,106**	**2,325,000**	**2,145,000**	**-7.7%**	**9.6%**	**9.5%**
Buick	828,630	730,000	580,000	-20.5%	3.0%	2.6%
Chevrolet	269,258	300,000	200,000	-33.3%	1.2%	0.9%
Cadillac	233,119	210,000	170,000	-19.0%	0.9%	0.8%
Ford	270,494	265,000	200,000	-24.5%	1.1%	0.9%
Lincoln	88,527	90,000	65,000	-27.8%	0.4%	0.3%
Tesla	473,078	730,000	930,000	27.4%	3.0%	4.1%
Korean Brands	**523,948**	**400,000**	**270,000**	**-32.5%**	**1.6%**	**1.2%**
Hyundai	360,565	260,000	180,000	-30.8%	1.1%	0.8%
Kia	163,383	140,000	90,000	-35.7%	0.6%	0.4%
Others	**378,079**	**403,000**	**287,000**	**-28.8%**	**1.7%**	**1.3%**
Skoda	56,000	50,000	25,000	-50.0%	0.2%	0.1%
PSA	95,143	130,000	80,000	-38.5%	0.5%	0.4%
Renault	83	-	-	N/A	0.0%	0.0%
Volvo	172,235	170,000	140,000	-17.6%	0.7%	0.6%
Jaguar	18,229	20,000	14,000	-30.0%	0.1%	0.1%
Land Rover	36,389	33,000	28,000	-15.2%	0.1%	0.1%
Total	**21,468,351**	**24,293,000**	**22,580,000**	**-7.1%**	**100.0%**	**100.0%**

Source: CAAM, CMBIGM estimates

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;

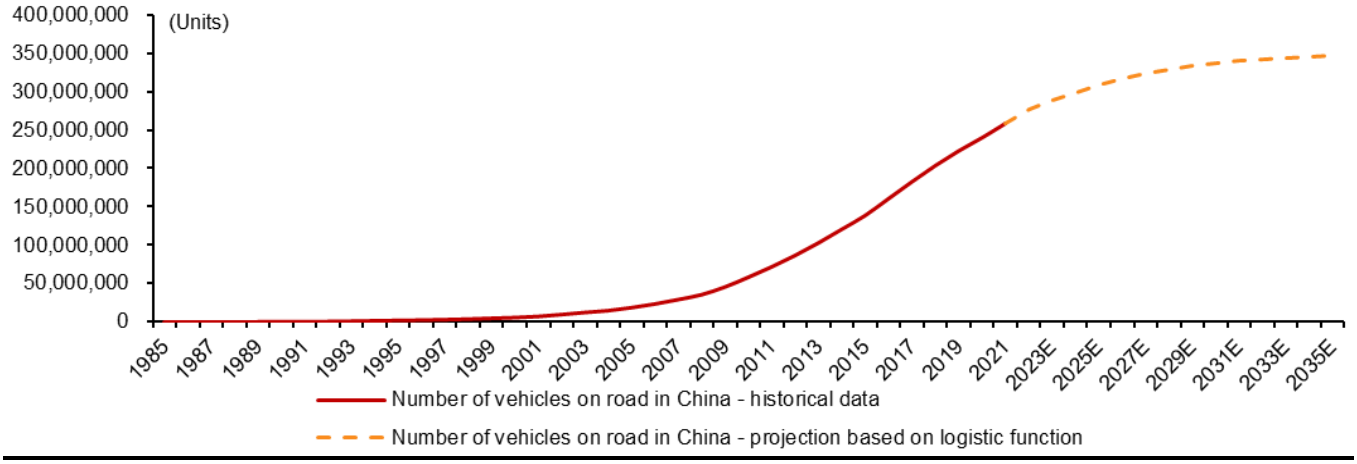
r = the steepness of the curve;

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 1985-2022 (2022 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 = 351mn, t_0 = 2,016.7 and r = 0.24, based on the best-fit curve.

Figure 41: Projection on number of vehicles on road in China based on logistic function



Source: CAAM, CATARC, NBS, CMBIGM 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: 23.4-25.0mn based on our model

Based on our model, China's steady-state number of PVs on the road is about 351mn, or 250 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 23.4-25.0mn units (351mn x 6.7% or 351mn x 7.1%).

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

If we assume our model is precise enough, an annual replacement demand of 23.4-25.0mn 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%. 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.

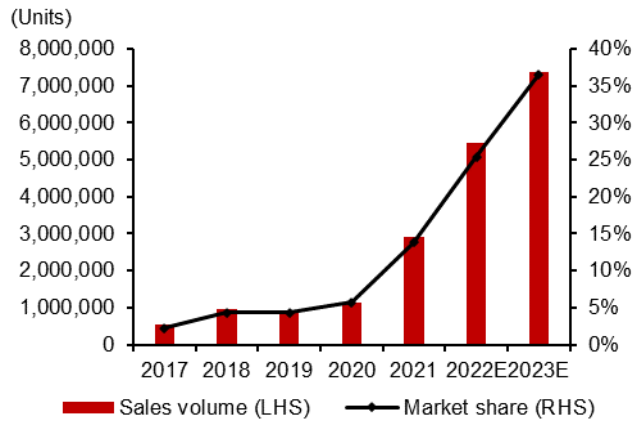
Another year of brand divergence: Quite a few brands to post decade-low sales volume in 2023

Sales volume growth difference usually becomes larger among different brands when the overall market falls, like what happened in 2018-19. Such trend could occur again in 2023, in our view. In fact, we expect quite a few brands to post decade-low sales volume in China in 2023, which could include big names like VW, Nissan and Buick. We see little chance for low-tier brands, such as Hyundai, Kia, PSA, Skoda, Mazda and Mitsubishi to come back after their sales plunge during 2018-19. Now the second round of the survival game has started and the key to the next round lies in electrification. 2023 could be critical for many automakers including those old giants, as they usually need at least one product cycle to figure out the right products. Therefore, they have to accelerate the launches of their first-generation NEV products.

China NEV 2023 Outlook: Chinese Dominance Continues

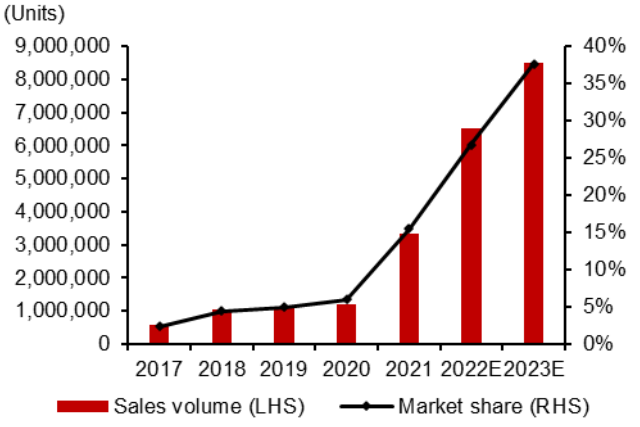
We project China's passenger NEV retail sales volume to rise 38% YoY from 5.4mn units in 2022E to 7.5mn units in 2023E, which implies NEV market share of 37% in 2023E, up from 25% in 2022E. We project China's passenger NEV wholesale volume to rise 31% YoY to 8.5mn units in 2023E, assuming NEV export of 0.7mn units and inventory restocking of 0.3mn units next year. While Tesla contributed about half of China's NEV exports in the first 10 months of 2022, we expect Chinese brands to be the driver for our projected 29% YoY growth of China's NEV exports next year, when Tesla Berlin plant ramps up.

Figure 42: China's NEV retail sales and market share



Source: CATARC, CMBIGM estimates

Figure 43: China's NEV wholesale and market share

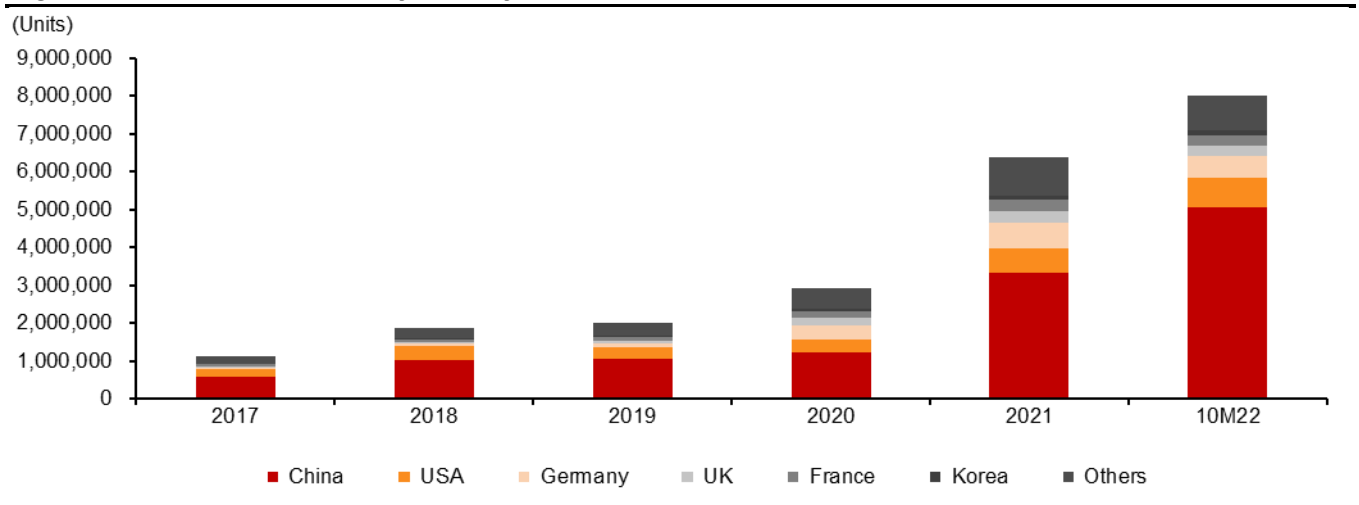


Source: CAAM, CMBIGM estimates

Global NEV in a nutshell: China is still leading in market size, growth and products

In the first 10 months of 2022, global NEV (BEV, PHEV and fuel-cell electric vehicle (FCEV) only) sales volume rose 68% YoY to 8mn units, according to Marklines. China accounted for 63% of global NEV sales and its 110% YoY growth in the first 10 months was still the highest among top 10 countries in the world in terms of NEV sales volume. Europe accounted for 23% of global NEV sales volume and the US took up 10% in the first 10 months of 2022.

Figure 44: NEV sales volume by country



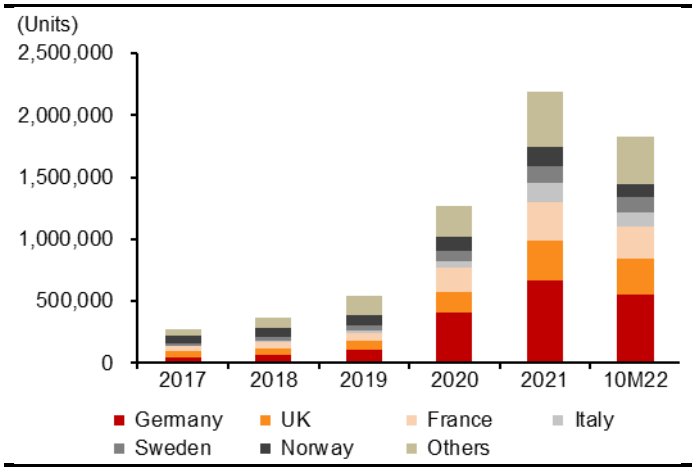
Source: Marklines, CMBIGM

Europe: NEV sales growth slows amid overall market decline and policy driven

NEV sales volume in Europe only rose 7% YoY in the first 10 months of 2022, trailing the growth in China and the US, partially due to its overall sales volume decline of 15% YoY during the same period. The NEV market share in Europe widened from 14% in 2021 to 17% in the first 10 months of 2022.

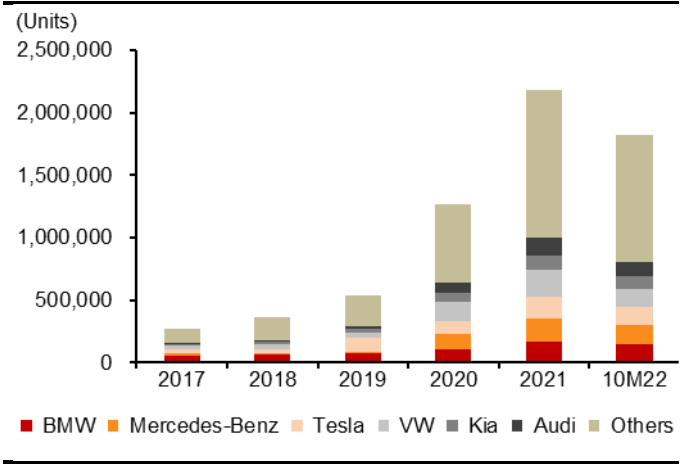
We believe that the NEV development in Europe this year underscored our argument in the report published on 13 Jan 2022: Good numbers on the surface do not tell the underlying story. In other words, we are of the view that the NEV boom during 2020-21 in Europe was mainly driven by policies and similar to China during 2017-18. Sales volume of VW's NEVs fell 24% YoY in the first 10 months of 2022, the most among major brands. BMW ranked the first in terms of NEV sales volume in Europe in the first 10 months of 2022, followed by Mercedes-Benz and Tesla. VW has fallen to the 4th position. In our view, Tesla could take the NEV sales crown in Europe in 2023 amid its Berlin plant's ramp-up.

Figure 45: NEV sales volume by country in Europe



Source: Marklines, CMBIGM

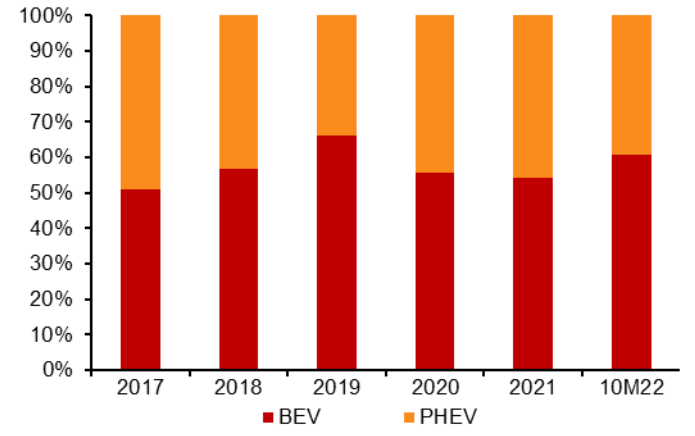
Figure 46: NEV sales volume by brand in Europe



Source: Marklines, CMBIGM

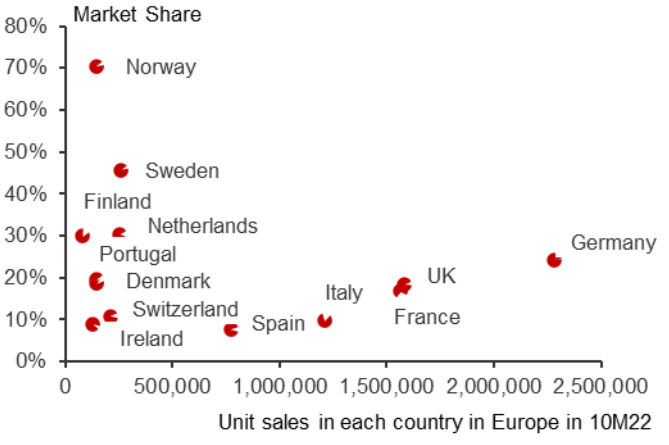
PHEVs accounted for 39% of total NEV sales volume in Europe in the first 10 months of 2022, down from 46% in 2021, as sales volume for some aging models, such as the Volvo *XC60*, *XC40* and Mercedes-Benz *GLC*, fell significantly. Such sales slowdown, along with lack of competitiveness in China and Tesla's local production, could push some European automakers to accelerate the launches of more competitive NEV models.

Figure 47: BEV and PHEV sales volume breakdown in Europe



Source: Marklines, CMBIGM

Figure 48: NEV market share in European countries in 10M22



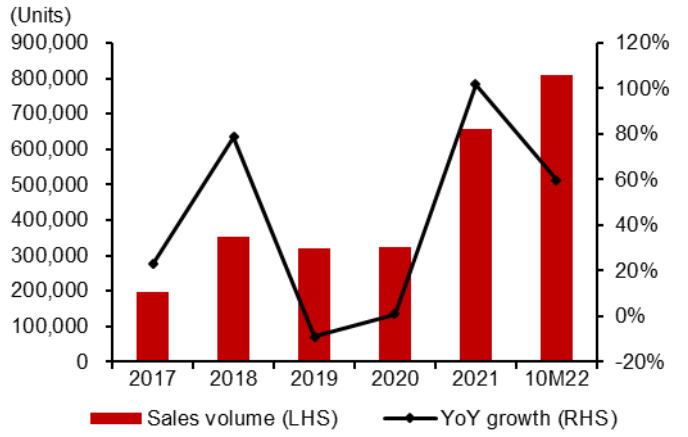
Source: Marklines, CMBIGM

NEV's market share was about 24% in the first 10 months of 2022 in Germany, the highest among the major markets in Europe, whereas Italy and Spain only had about 10%. Although NEV market share in all major markets in Europe rose in the first 10 months of 2022, another round of significant lift may need more competitive models.

US: IRA to boost NEV sales and secure battery supply chain

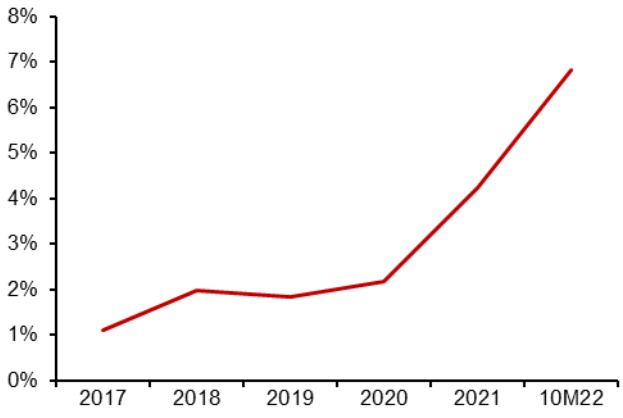
NEV sales volume in the US rose 60% YoY in the first 10 months of 2022, the second highest growth after China among the top 10 countries in terms of NEV sales volume, which helped the US to take up 10% of global NEV sales volume.

Figure 49: US NEV sales volume and YoY growth



Source: Marklines, CMBIGM

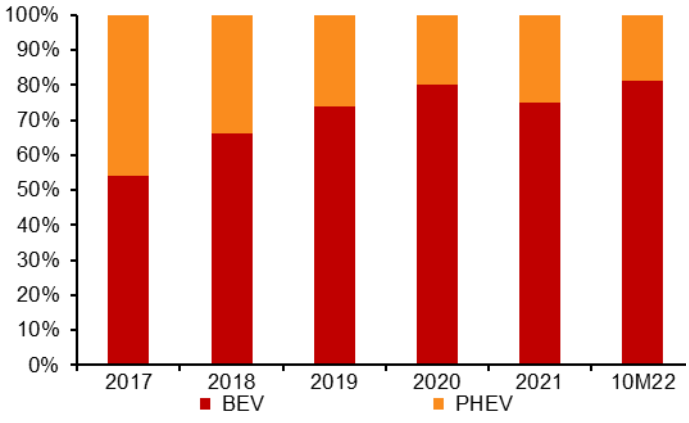
Figure 50: NEV's market share in the US



Source: Marklines, CMBIGM

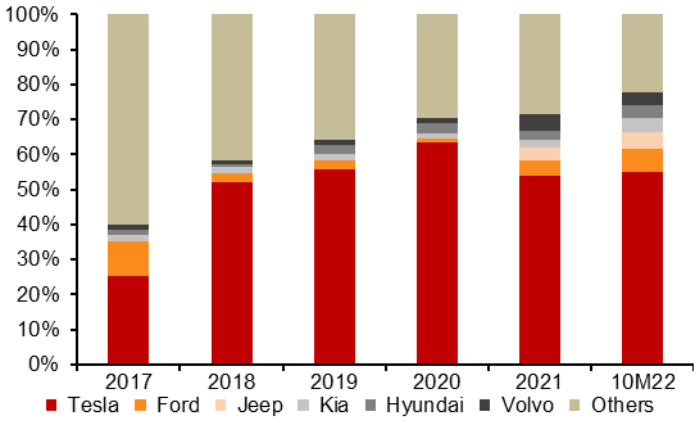
NEV's market share reached 6.8% in the US in the first 10 months of 2022, up from 4.2% of 2021. Among NEVs sold in the first 10 months of 2022, Tesla accounted for about 55%, similar to the level last year, whereas Toyota, Volvo, Chevrolet and VW lost market share to Ford, Jeep, Kia and Hyundai.

Figure 51: BEV vs PHEV market share in the US



Source: Marklines, CMBIGM

Figure 52: NEV market share by brand in the US



Source: Marklines, CMBIGM

The NEV sales volume growth has accelerated since the Biden Administration, and the US government wants more: the NEV supply chain security. The Inflation Reduction Act (IRA) enacted on 16 Aug 2022 has laid out detailed requirements for the NEV tax credit from 2023. The original tax credit cap of 200,000 NEVs sold at each automaker is to be removed from 1 Jan 2023 and a maximum US$7,500 tax credit is to be extended into 2032.

On the other hand, the following requirements need to be met in order for consumers to receive the tax credit (see the table below for details).

1) EVs' final assembly needs to be in North America and EV's MSRP cannot exceed a certain amount.
2) Battery critical minerals: 40% of total value of the critical minerals in the battery needs to be recycled in the US, or processed or extracted in the US or from countries with which the US has a Free Trade Agreement in 2023, and such threshold is to increase every year to 80% in 2027. From 1 Jan 2025, EVs cannot qualify for the tax credit if critical minerals in the batteries are processed, extracted or recycled by a "foreign entity of concerns" in which China is included.
3) Battery components: 50% of total value of the battery components needs to be manufactured or assembled in North America, and such threshold is to increase to 80% in 2027. From 1 Jan 2024, EVs cannot qualify for the tax credit if the battery components are manufactured or assembled by a "foreign entity of concerns" in which China is included.

Figure 53: Details of NEV tax credit based on the US IRA

	Battery critical minerals[1]	Battery components	Notes
Tax credit per NEV (US$)	3,750	3,750	Total 7,500
Requirements	Need to meet the following percentage thresholds, based on the percentage of the total value of the critical minerals in the battery that are recycled in the US; or processed or extracted in the US or from countries with which the US has a Free Trade Agreement	Need to meet the following percentage thresholds, based on the percentage of the total value of the battery components that are manufactured or assembled in North America	Effective for sales after 16 August 2022, no EV sales in the US will qualify for 30D credits unless their 'final assembly' is in North America.
Percentage thresholds			
			Effective 1 January 2023, the old 200,000 units per-OEM cap is removed.
Year 2023	40%	50%	Effective 1 January 2023, EVs are subject to adjusted gross income (AGI) and MSRP caps: 1) Taxpayers with modified AGIs exceeding US$150,000 (individual), US$225,000 (head of household) or US$300,000 (married joint return) are ineligible to claim the credit. 2) EVs with an MSRP exceeding US$80,000 (SUVs, vans, or pickup trucks), or US$55,000 (all other vehicles) are ineligible for the 30D credit.
Year 2024	50%	60%	Effective for EVs placed in service on or after 1 January 2024, EVs with a battery, the components of which are manufactured or assembled by a "foreign entity of concern"[2] do not qualify for any 30D tax credit.
Year 2025	60%	60%	Effective for EVs placed in service on or after 1 January 2025, EVs with a battery, the applicable critical minerals in which are extracted, processed or recycled by a "foreign entity of concern"[2] do not qualify for any 30D tax credit.
Year 2026	70%	70%	
Year 2027-2032	80%	80%	

Source: The US government, IRA, CMBIGM

Notes: 1: "Critical minerals" subject to this restriction are defined under new Internal Revenue Code section 45X, and include a long list of minerals, including lithium, nickel, and cobalt among many others.

2: "Foreign entity of concern" is defined in the Infrastructure Investment and Jobs Act of 2021, and includes any entity "subject to the jurisdiction or direction of a government of a foreign country that is a covered nation." Covered nations include China and Russia.

Although foreign automakers and governments are still negotiating with the US government to adjust these restrictive regulations, we believe the IRA could have an impact on the industry landscape in the long term. In the short term, automakers and battery makers may need to balance the tax credit and the additional costs from meeting these requirements. However, in the medium term, we believe automakers and battery makers would localize their production in order to secure their positions in the US market. Although it is difficult for us to quantify the impact for Chinese battery makers' global market share and profitability at the moment, we believe it could be a potential risk, as China now has a dominating position in the NEV supply chain.

We expect battery supply to improve in 2023 and price to drop by 2024

Although some new lithium projects have been delayed for different reasons, lithium production in 2022 could still support better-than-our-expected global NEV sales. Therefore, we consider the supply constraint a less important factor when forecasting NEV demand in 2023.

Demand for lithium batteries in 2023

We forecast global NEV sales volume (including commercial vehicles) to rise about 28% YoY from 10.5mn units in 2022E to 13.5mn units in 2023E, as China's growth dominates the global landscape. The increment of 3mn NEVs translates into about 180GWh additional NEV battery demand, assuming 60kWh per vehicle on average.

Supply for lithium carbonate equivalent (LCE) in 2023

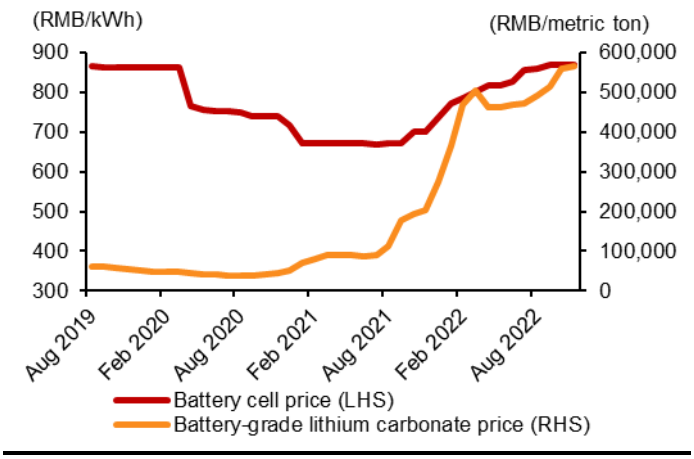
We estimate the global additional LCE capacity to be around 0.16-0.18mn metric tonnes (0.10-0.11mn metric tonnes from salt lakes of Atacama, Cauchari-Olaroz, etc., and 0.06-0.07mn metric tonnes from hard rock of Mt Finniss, Grota do Cirilo, etc.), excluding lithium recycling. We take similar risks in 2022 into consideration and lower our estimates to 0.15mn metric tonnes including recycling, which still translates into 250-300GWh lithium-ion batteries. We estimate additional demand for non-NEV lithium batteries to be limited. Therefore, we believe lithium supply in 2023 should be sufficient to support global EV demand in 2023.

We are of the view that lithium supply risk could be the highest among all important raw materials in NEV batteries in 2023, although we cannot rule out possibilities of supply shortage from other raw materials in anode, electrolyte, separator and copper foil.

Battery price drop could be a positive catalyst for NEV makers

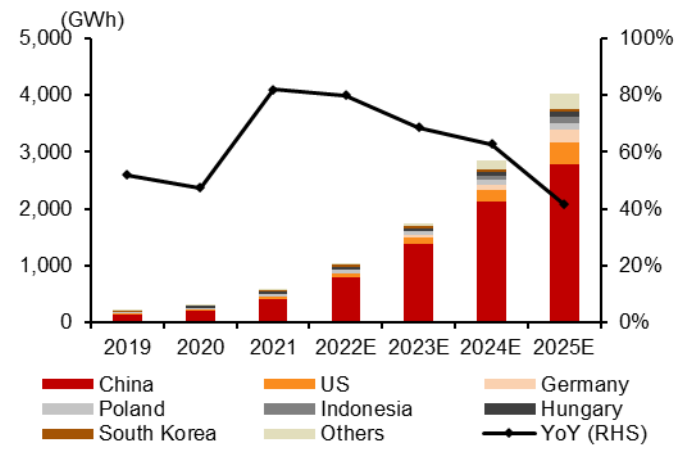
In our view, the battery supply condition in 2023 should be improved compared with 2022, especially as the macro uncertainties could lead to NEV sales miss in some important regions. That could lead to battery price stability or even decline in 2023. We have also compiled 17 battery makers' capacity plans by 2025. Battery capacity could increase 69% YoY in 2023E and another 63% YoY in 2024E, according to battery makers' capacity expansion plans. However, we project global NEV sales volume to rise 28% YoY in 2023E and the growth could be even slower in 2024E. Therefore, we expect battery surplus by 2024, which could result in significant battery price cuts.

Figure 54: NEV battery price trend



Source: Wind, RealLi Research, CMBIGM

Figure 55: Battery makers' capacity expansion plans

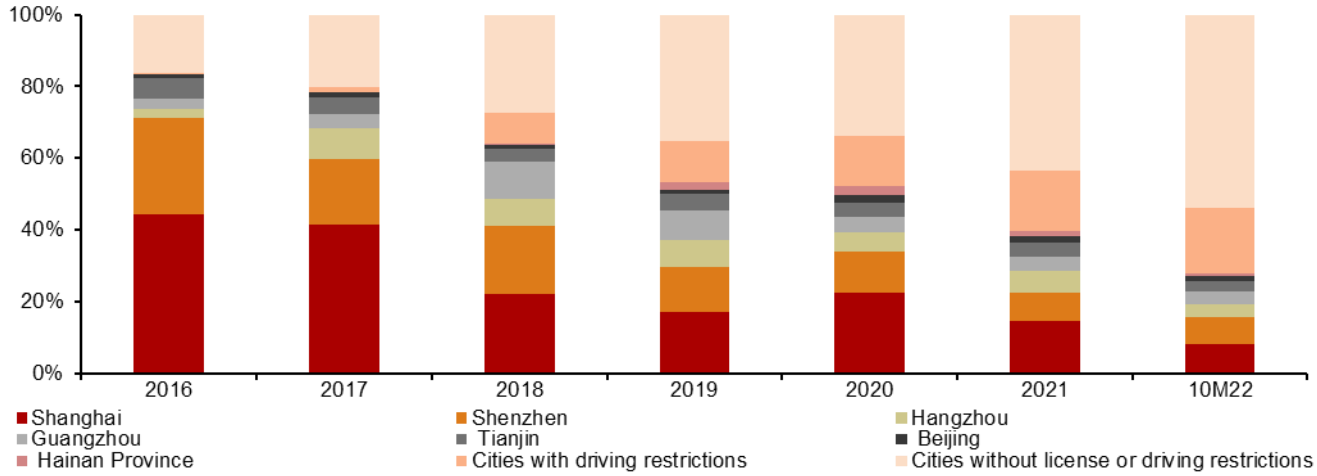


Source: Company Data, CMBIGM estimates

Limited dent on PHEV sales amid Shanghai green license cancellation

We project PHEV wholesale volume in China to rise 45% YoY in 2023E, outpacing BEV's growth, despite Shanghai's green license cancellation for PHEVs from 2023. PHEV retail sales volume in China rose 151% YoY in the first 10 months of 2022, driven by cities without ICE new-vehicle registration caps. PHEV retail sales volume in Shanghai rose 21% YoY in the first 10 months of 2022 and the city accounts for about 8% of nationwide PHEV sales volume. We project PHEV sales volume in Shanghai to drop about 70% YoY in 2023 as Shanghai is to cancel NEV green licenses for PHEVs from 2023, which, however, would only dent the nationwide PHEV sales volume by about 3%.

Figure 56: China's PHEV retail sales volume breakdown

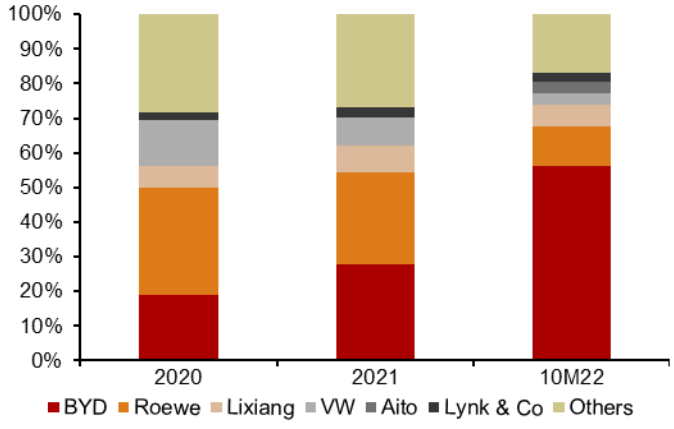


Source: CATARC, CMBIGM

BYD's PHEV retail sales volume rose 168% YoY in Shanghai during the first 10 months of 2022, taking up 56% of the city's total PHEV retail sales volume, whereas most major brands posted sales volume YoY declines, including Roewe, VW, Buick and Toyota.

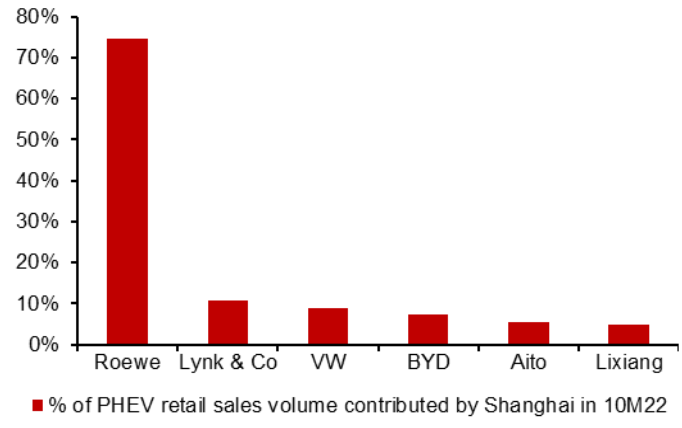
More than 70% of Roewe's PHEV retail sales volume came from Shanghai, the highest among all the brands. Shanghai only accounts for less than 10% of PHEV retail sales volume for other major brands including VW, BYD, Aito and Lixiang.

Figure 57: Major PHEV brands in Shanghai



Source: CATARC, CMBIGM

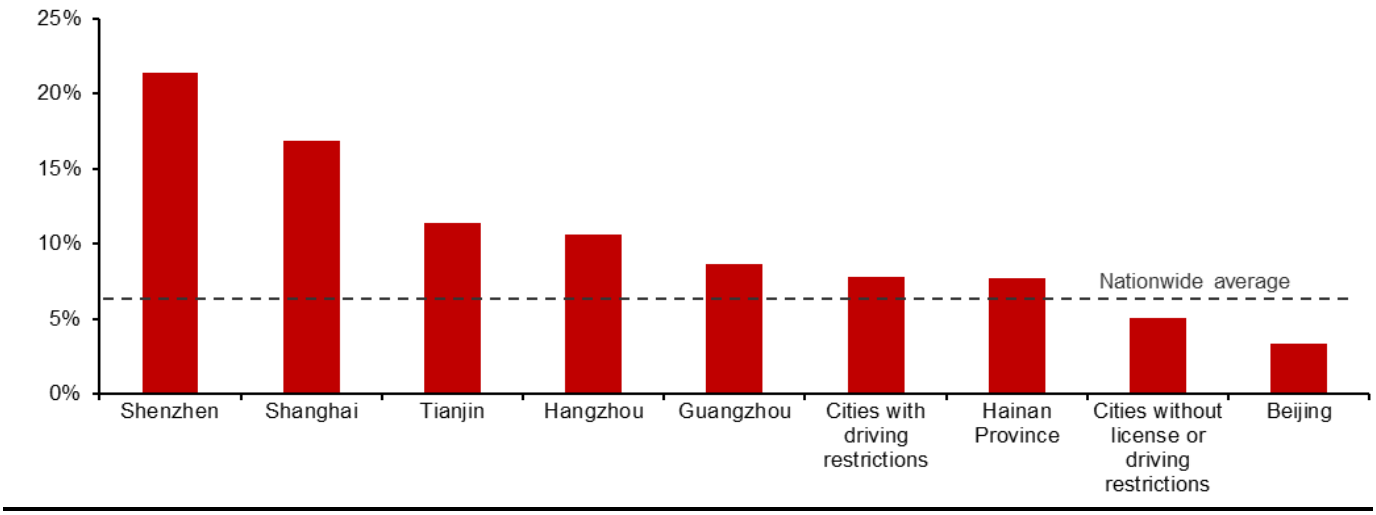
Figure 58: PHEV contribution from Shanghai



Source: CATARC, CMBIGM

Among the cities with ICE new-vehicle registration caps, Shenzhen has the highest PHEV penetration. About 21% of total PVs sold in the first 10 months of 2022 were PHEVs in Shenzhen, followed by Shanghai's 17%. Beijing had the lowest penetration of 3% during the same period, as PHEVs cannot enjoy the benefits of NEV green license in China's capital city.

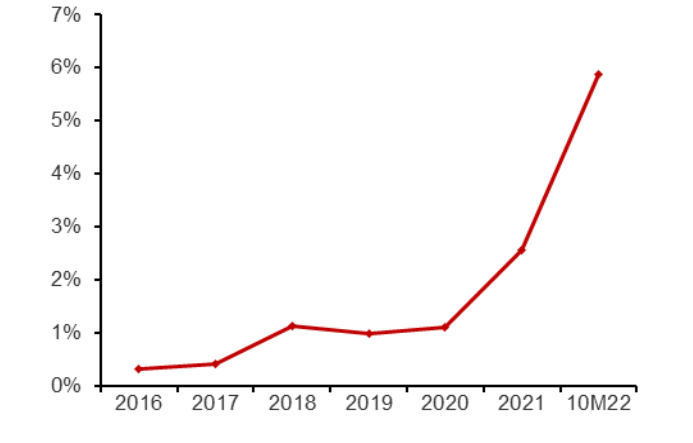
Figure 59: PHEV market share in different cities in 10M22



Source: CATARC, CMBIGM

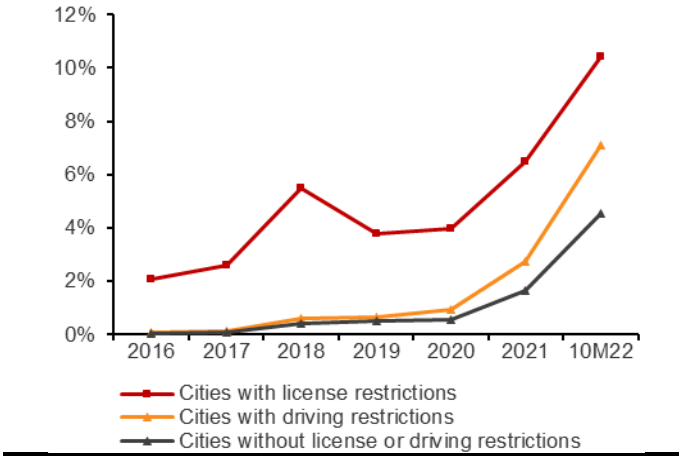
Nationwide PHEV market share on a retail sales basis jumped to almost 7% in the first 10 months of 2022, up from below 3% in the past years. We believe the boom was not driven by policies but new values to customers from long-range PHEVs, which could make such growth more sustainable.

Figure 60: PHEV market share in China (retail basis)



Source: CATARC, CMBIGM

Figure 61: PHEV market share in different city types

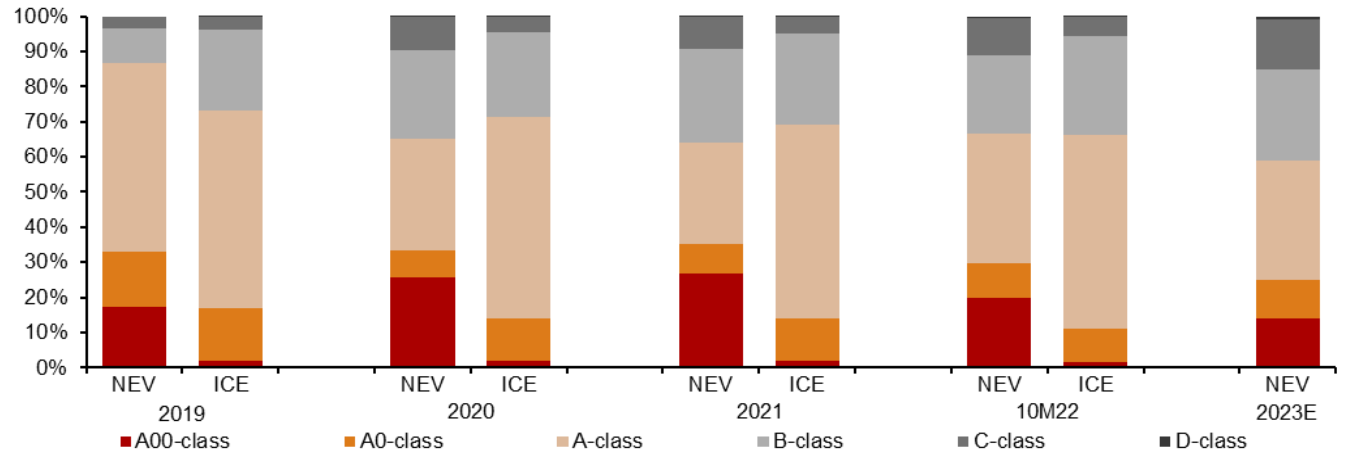


Source: CATARC, CMBIGM

NEV vehicle size preference: more larger, premium models in 2023

Among all the NEVs sold in 2021, A00-class (mini size), A-class (compact size) and B-class (medium size) accounted for about 27-29% each, very different from the overall market's landscape which is dominated by the A-class vehicles (50%). In the first 10 months of 2022, NEV preference has been converging into the overall market trend, as the A-class vehicles now take up about 37% of the total NEV wholesale volume, aided by BYD's *Qin Plus*, *Yuan Plus*, *Song* and *Aion S* and *Y*. On the other hand, A00-class vehicles only accounted for 20% of total NEV wholesale volume in the first 10 months of 2022, down from 27% in 2021.

Figure 62: NEV wholesale volume breakdown by vehicle size



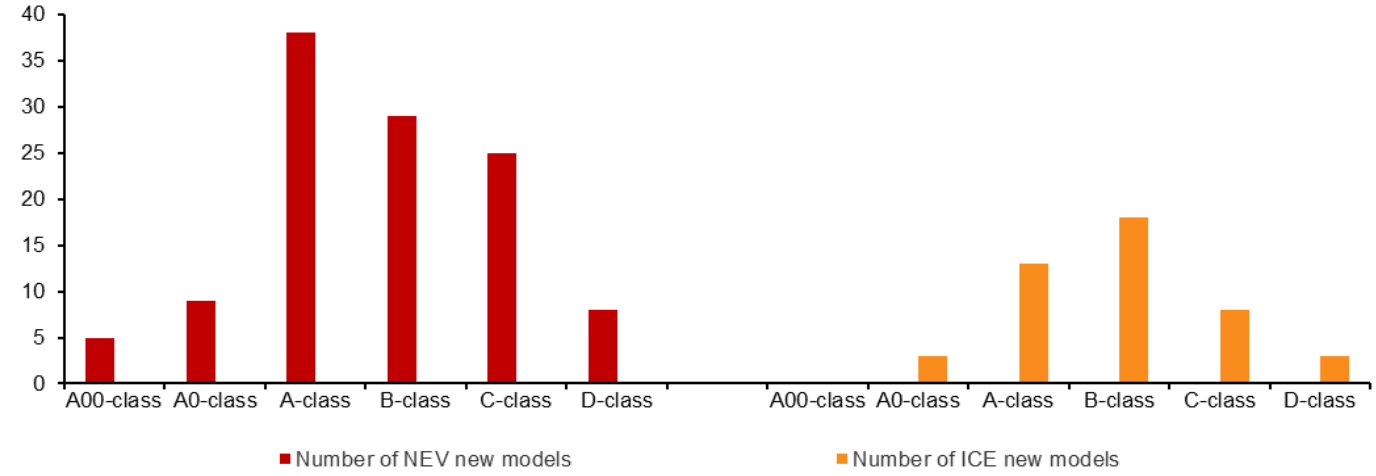
Source: CAAM, CMBIGM estimates

In our view, vehicle size preference in the NEV segment in the past was partially driven by a few competitive models, such as the *Wuling Hongguang Mini* (A00-class), Tesla *Model 3* and *Y* (B-class), and BYD *Qin* and *Song* (A-class). As more and more NEV models are on sale now, we are of the view that NEV vehicle size preference should be closer to the overall market, but slightly leaning towards larger and more premium vehicles, or mini-size NEVs, as most NEVs are replacement or additional purchases in families.

We expect B-class and C-class NEVs to gain market share in 2023, as many Chinese automakers have started to launch more premium models, including BYD, GAC Aion, Xpeng, Changan Deepal and Aito. We project B-class and C-class vehicles to account for 26% and 14% of total NEV wholesale volume in China in 2023E, up from 22% and 11% in 2022E, respectively.

Based on the data we have compiled, there will be more than 60 new NEV models with medium size or above from more than 40 brands in 2023. That, along with existing Tesla *Model 3* and *Y*, BYD *Han* and *Tang*, Li *L9*, *L8* and *L7*, NIO *ET7* and *ET5*, *Zeekr 001*, as well as Deepal *SL03*, could help larger and more premium NEVs gain market share.

Figure 63: 2023 new model pipeline breakdown by vehicle size



Source: Company data, CMBIGM estimates

NEVs could dominate vehicles sold at RMB 250,000-300,000 in 2023

NEVs priced RMB 200,000-300,000 to outpace in 2023 amid price cuts, new models

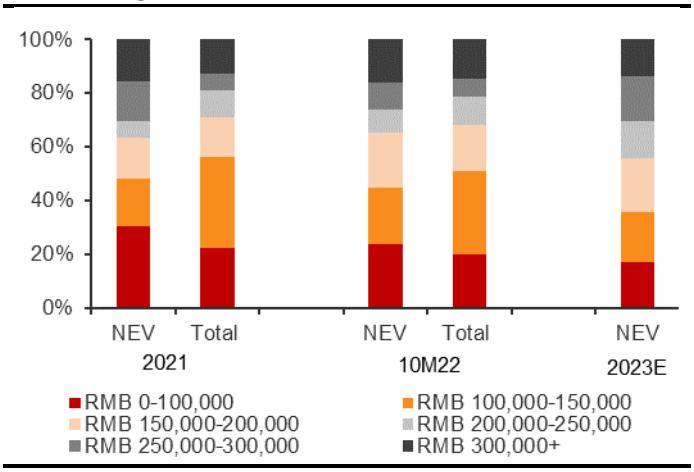
Although sales volume for A-class NEVs outpaced other sub-segments in the first 10 months of 2022, the average MSRP for NEVs (excluding subsidies) sold in China rose from RMB 172,000 in 2022 to RMB 182,000 in the first 10 months of 2022, based on our estimates.

2022 is a year that NEVs priced RMB 100,000-200,000 gain market share, aided by BYD and Aion. In the first 10 months of 2022, NEVs priced RMB 100,000-200,000 accounted for 42% of total NEV wholesale volume, up from 33% in 2021. NEVs priced below RMB 100,000 only took up 24% in the first 10 months of 2022, down from 31% in 2021.

In 2023, we expect NEVs priced between RMB 200,000-300,000 to gain market share, from 19% of total NEV wholesale volume in the first 10 months of 2022 to 30% in 2023E, mainly for two reasons.

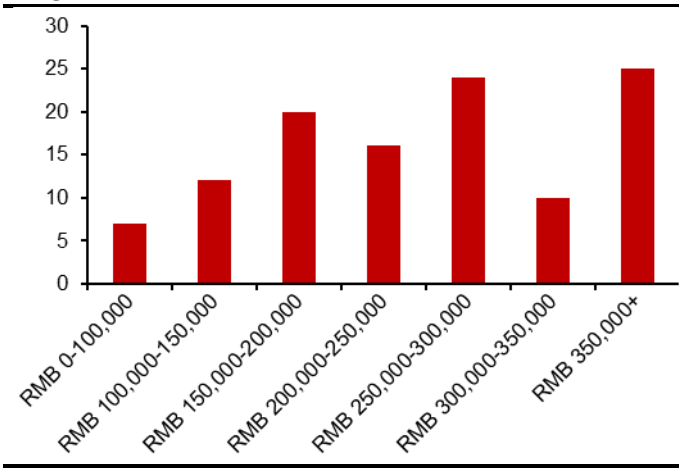
1) Retail price cuts: Tesla cut its MSRP in China for both *Model 3* and *Y* at the end of Oct 2022. We believe the majority of the *Model Y* sales will fall into the RMB 250,000-300,000 range in 2023. We expect more automakers to follow suit, in a bid to withstand the competition. As wholesale volume includes exports, Tesla's contribution to the price range of RMB 200,000-300,000 would be larger on a wholesale basis.
2) We expect about 40 new NEV models priced between RMB 200,000-300,000 to roll out during 4Q22-2023 to lift NEV sales in this price range, including Zeekr compact SUV, ORA *Flash Cat*, Xpeng B-class SUV, Aion B-class sedan and SUV, Lixiang's new BEV and BYD C-class sedan.

Figure 64: NEV wholesale volume breakdown by MSRP range



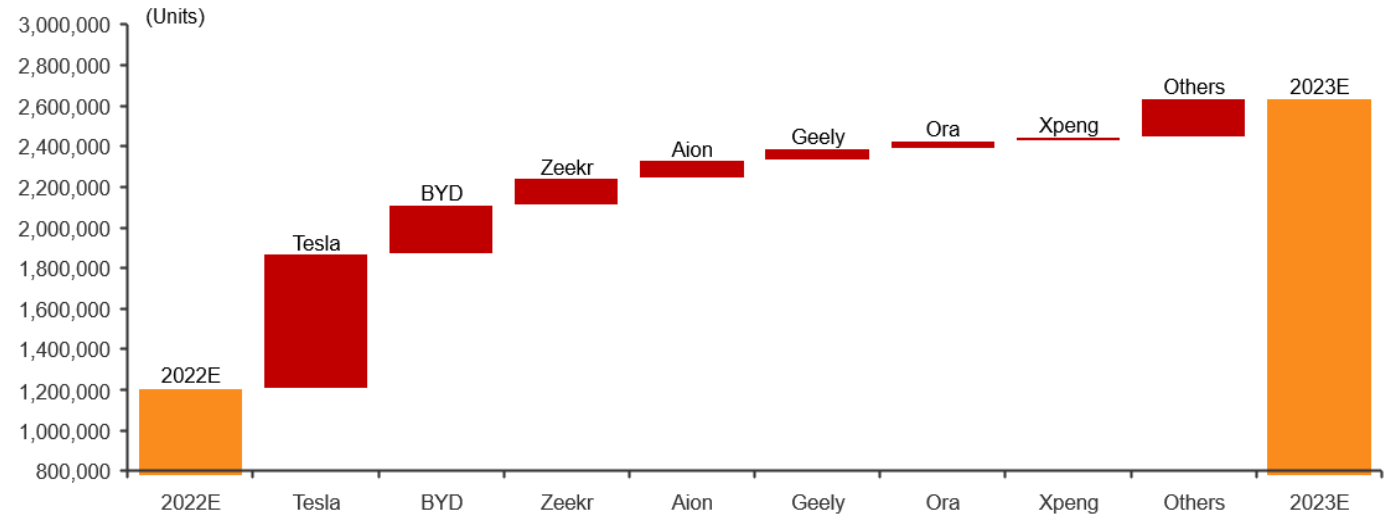
Source: CAAM, CMBIGM estimates

Figure 65: NEV new model pipeline in 2023 by MSRP range



Source: Company data, CMBIGM estimates

Figure 66: Wholesale volume contribution from major brands for NEVs priced RMB 200,000-300,000



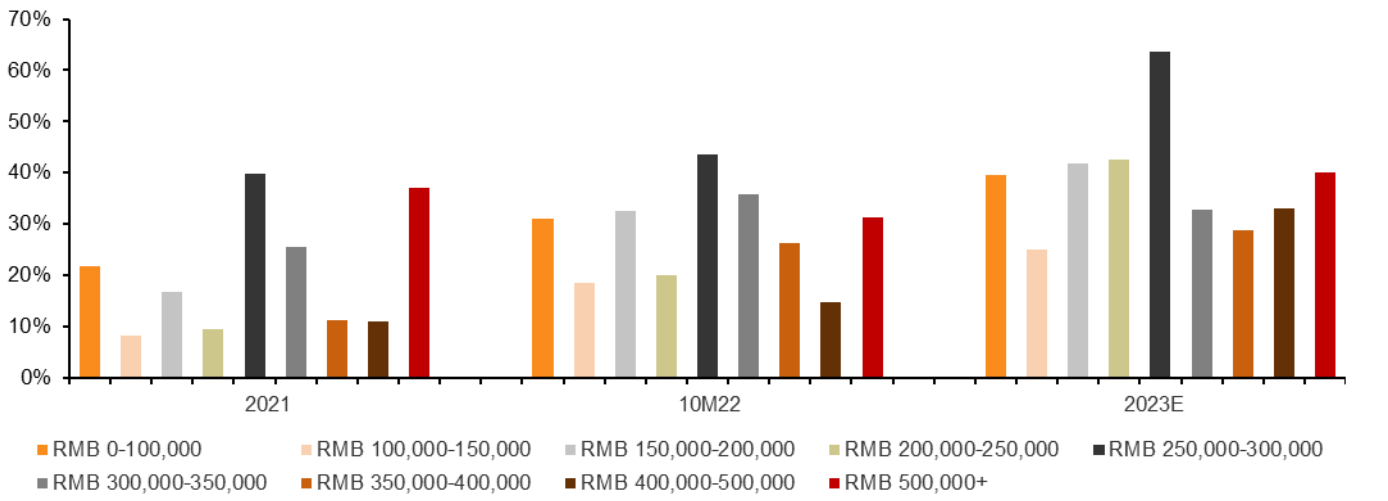
Source: CAAM, CMBIGM estimates

NEV market share by price range: NEVs to dominate segment priced RMB 250,000-300,000

Among all the PVs sold with MSRP between RMB 250,000-300,000 in China in the first 10 months of 2022, about 44% were NEVs on a wholesale basis, based on our estimates, the highest among all the price ranges. Tesla and BYD combined accounted for 60% of the NEV wholesale volume with MSRP between RMB 250,000-300,000. We expect NEVs to take up about 60% of total PVs sold with MSRP between RMB 250,000-300,000 in 2023, still the highest among all the price ranges.

We also expect NEVs with MSRP between RMB 200,000-250,000 to gain significant market share in 2023 to reach about 43%, higher than our estimated overall NEV market share of about 38%.

Figure 67: NEV market share by price range (wholesale basis)



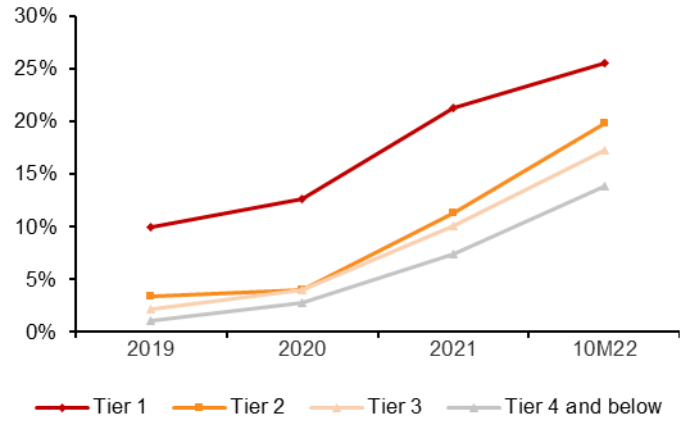
Source: CAAM, CMBIGM estimates

NEV drivers in 2023: Premium models in high-tier cities, PHEVs in low-tier cities

Tier-1 and -2 cities could still have room for premium BEVs

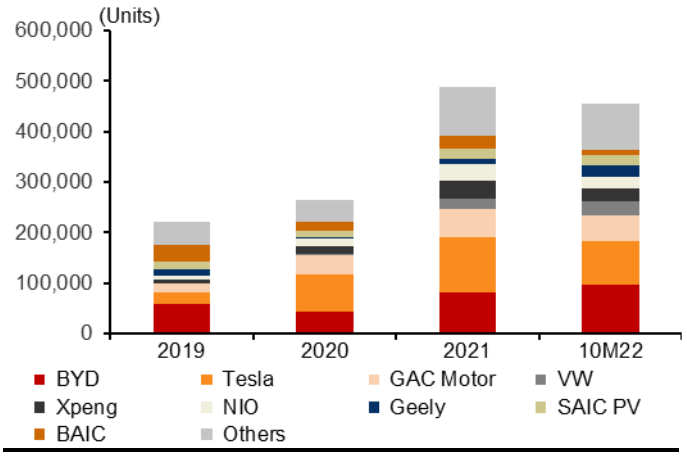
Tier-2 cities were the NEV driver in 2022, as their BEV market share rose almost 9 ppts from 11% in 2021 to 20% in the first 10 months of 2022, on a retail basis. Tier-2 cities have also become the most competitive and diversified market for BEVs in China, as the largest player BYD only accounted for 19% of total NEV retail sales volume in tier-2 cities, the lowest among all city tiers. The 2nd largest player in this market is premium NEV maker Tesla with market share of 15%, followed by a low-end EV maker SAIC-GM-Wuling with market share of 9%. The combined market share of the top 3 brands was only about 42% in the first 10 months of 2022, the lowest among all city tiers.

Figure 68: BEV market share in different city tiers (retail basis)



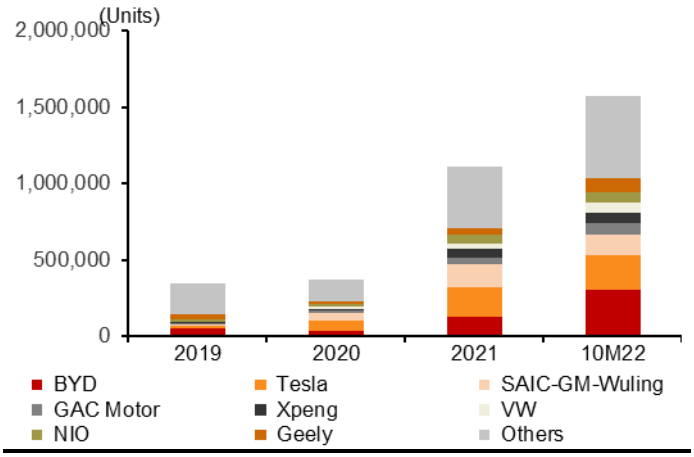
Source: CATARC, CMBIGM

Figure 69: BEV retail sales volume brekadown in tier-1 cities



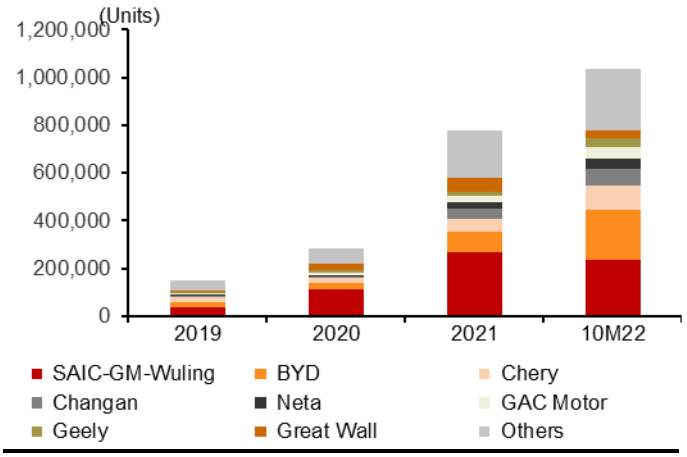
Source: CATARC, CMBIGM

Figure 70: BEV retail sales volume breakdown in tier-2 cities



Source: CATARC, CMBIGM

Figure 71: BEV retail sales volume breakdown in tier-3 cities and below

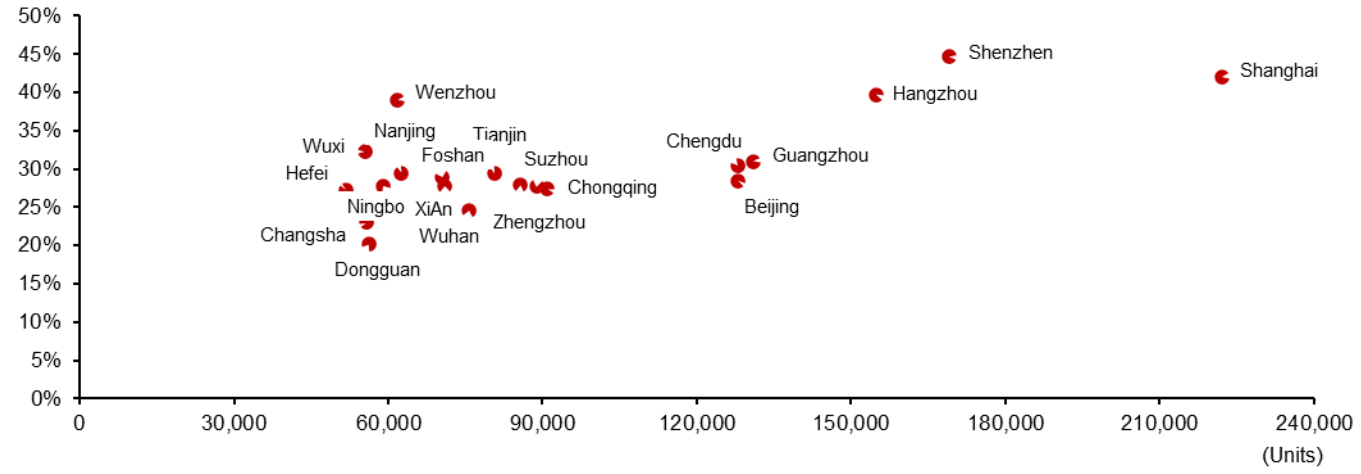


Source: CATARC, CMBIGM

BEV market share in tier-3 and -4 cities also rose quickly in 2022, mainly driven by mini-size BEVs. Mini-size BEVs accounted for 53% and 43% of total BEV retail sales volume in tier-3 and tier-4 cities, respectively. SAIC-GM-Wuling was the largest BEV player in both tier-3 and -4 cities in the first 10 months of 2022.

BYD surpassed Tesla to become the largest BEV player in tier-1 cities during the first 10 months of 2022, taking up 21% of the total BEV retail sales volume in tier-1 cities. About 45% of total retail sales volume in Shenzhen, BYD's headquarters, were NEVs in the first 10 months of 2022, the highest among major cities in China. We expect NEV sales volume to exceed ICE vehicles in Shenzhen in 2023. Tesla lost its market share in both tier-1 and -2 cities in the first 10 months of 2022, on a retail basis, compared with 2021.

Figure 72: NEV retail sales volume in top 20 cities with corresponding NEV market share (10M22)



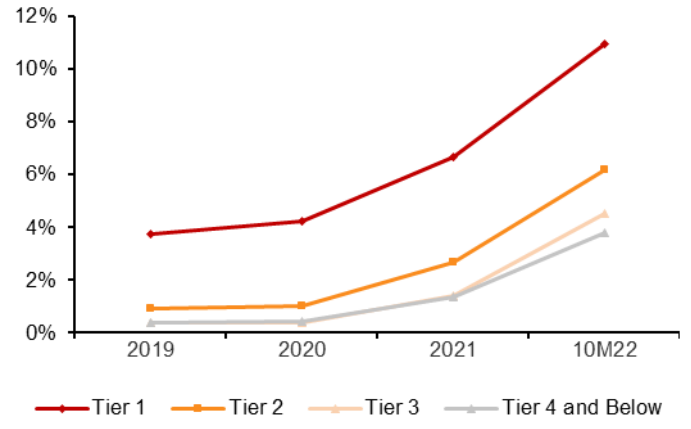
Source: CATARC, CMBIGM

The market share increase for BEVs in lower-tier cities in 2022 beat our expectation despite the majority of the models are mini BEVs. As Chinese automakers go upmarket with more premium BEV models in 2023, BEV market share gain in tier-1 and -2 cities could outpace lower-tier cities, in our view.

Lower-tier cities may outpace in PHEV sales growth

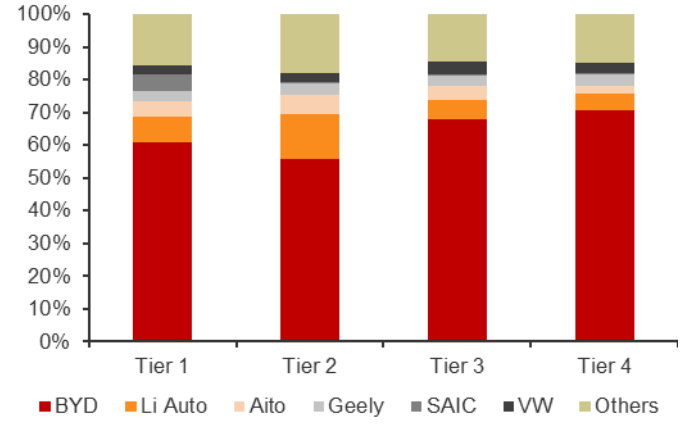
Unlike the BEV segment, PHEV market share in tier-1 cities rose the most among all city tiers, from 7% in 2021 to 11% in the first 10 months of 2022. PHEV market share in tier-4 cities and below only rose 3 ppts to 4% in the first 10 months of 2022. BYD dominates the PHEV segment across all city tiers, taking up 61%, 56%, 68% and 71% of the PHEV markets in tier-1, -2, -3 and -4 and below cities, respectively.

Figure 73: PHEV market share in different city tiers (retail basis)



Source: CATARC, CMBIGM

Figure 74: PHEV market share by brand in different city tiers in 10M22



Source: CATARC, CMBIGM

We are of the view that lower-tier cities have huge room for PHEV market share gain. As more automakers accelerate PHEV rollouts following BYD's success, PHEV sales growth in lower-tier cities could outpace that in tier-1 and -2 cities in 2023.

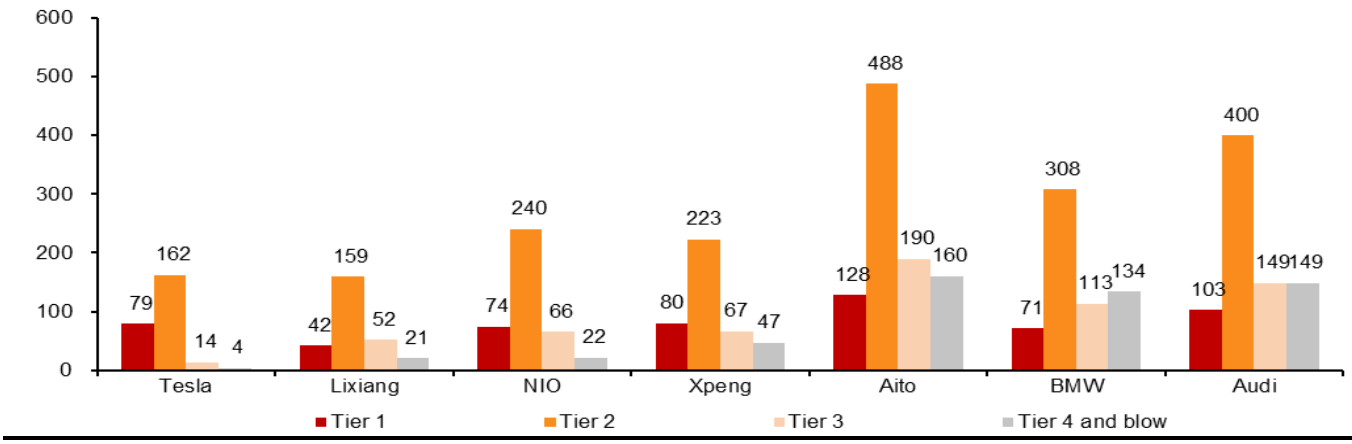
Tesla may explore lower-tier city to boost sales in 2023

Unlike most Chinese NEV makers which focus on launching PHEV and more premium BEV models in 2023, we believe Tesla should expand its footprint in lower-tier cities in China to boost sales, especially as it has lifted its Shanghai plant's annual capacity to about 1.1mn units and its exports from China may be flattish in 2023 amid the Berlin plant ramp-up.

About 94% of Tesla's retail sales volume in China came from tier-1 and -2 cities in the first 10 months of 2022, as Tesla only had 18 showrooms in tier-3 and below cities as of Nov 2022, based on the data we have compiled.

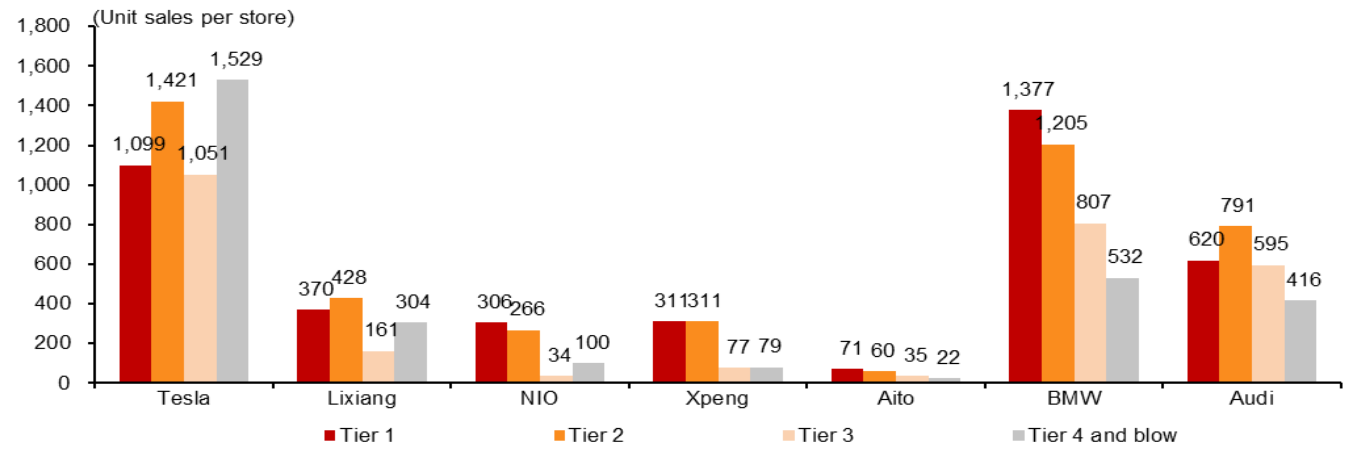
While Chinese NEV start-ups were busy with expanding sales network in lower-tier cities in 2022, Tesla accelerated its charging infrastructure in China. We believe Tesla may have to increase its sales volume in lower-tier cities in China from 2023 in a bid to maintain its high capacity utilization rate. That may come at a cost of lower store efficiency and vehicle price cuts. Tesla now has the significantly higher store efficiency and gross margin than its peers, which provides room for it to open more stores in small cities and continue to cut its vehicle prices. We believe Tesla would prioritize its manufacturing efficiency over other metrics in 2023.

Figure 75: Number of showrooms for different brands in different city tiers (as of Nov 2022)



Source: Company data, CMBIGM

Figure 76: Unit sales per store on average for different brands in different city tiers (10M22)



Source: CATARC, Company data, CMBIGM

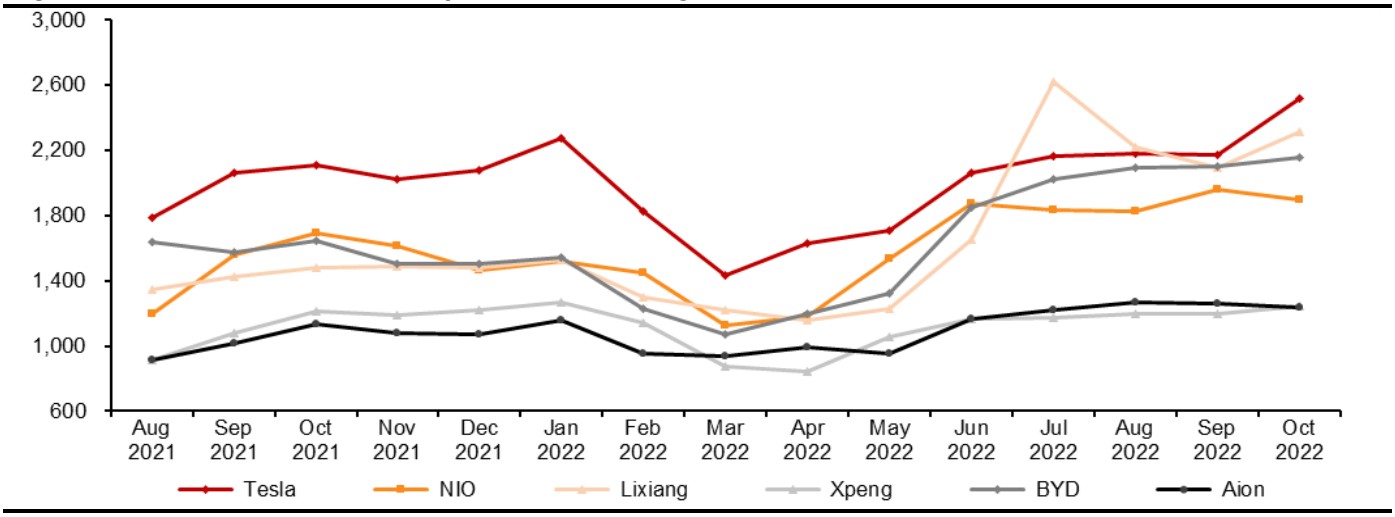
Leading indicators also imply intensifying competition

We have also examined some leading indicators, including leads, customer flow and new orders, for Tesla, NIO, Lixiang, Xpeng, BYD and Aion, based on data from a sample size of 96 stores (15-18 stores for each brand) in 15 major cities in China during Aug 2021-Oct 2022.

Online leads: NEVs are gaining popularity

Despite seasonality and economic uncertainties, online leads per store on average for these six NEV brands increased over the last 12 months. Lixiang, NIO and BYD have narrowed their gap with Tesla since Jun 2022, when they started to launch new models. Xpeng and Aion also posted slight increase in online leads, but the gap with the other four brands has become larger.

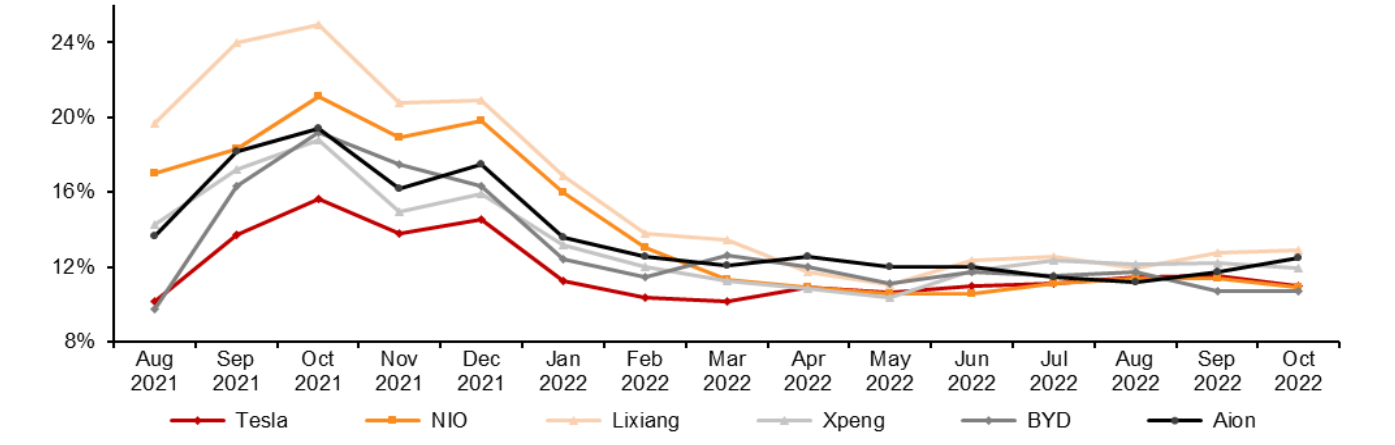
Figure 77: Number of online leads per store on average for each brand



Source: Thinkercar, CMBIGM

On the other hand, the conversion ratio from leads to store visit has been declining since Nov 2021. We are of the view that Chinese consumers would now look for more NEV brands to compare when deciding to buy a car. That could result in lower conversion ratio from leads to store visit. The conversion ratio has been close to each other (10-13%) among all six brands since Mar 2022, whereas Lixiang and NIO used to have higher conversion ratio than the other four brands prior to Mar 2022.

Figure 78: Conversion ratio from leads to store visit for each brand

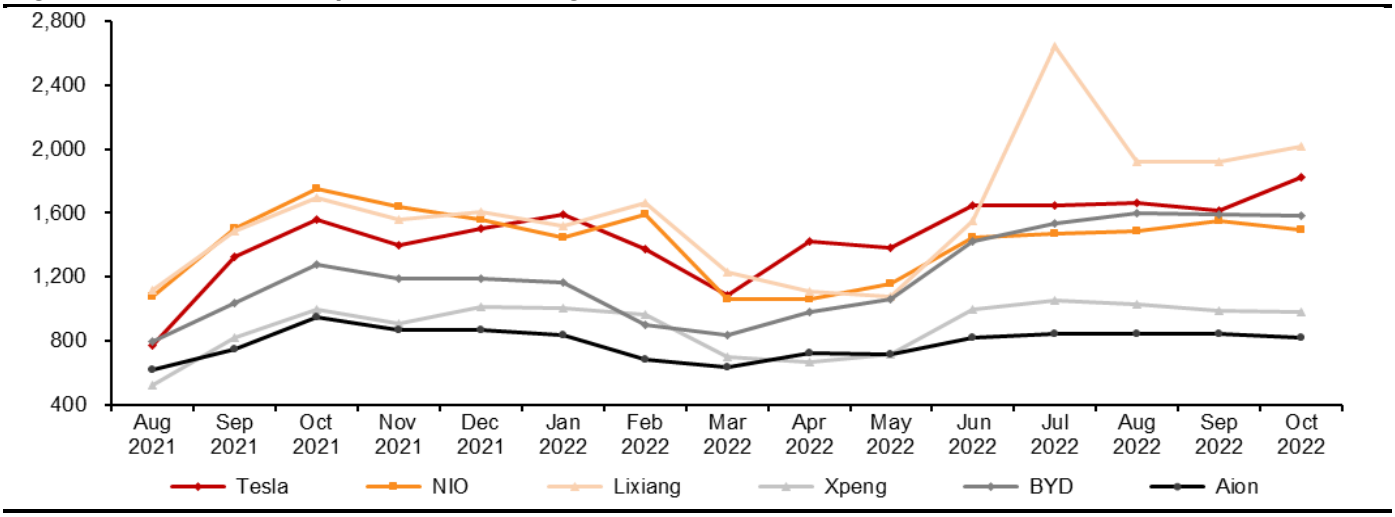


Source: Thinkercar, CMBIGM

Customer flow: Increasing as more Chinese consumers are interested in NEVs

Despite lower conversion ratio from leads to store visit, total customer flow for all six brands has increased in the past 12 months, mainly due to increasing visits not converted from leads. We believe that could be resulted from Chinese consumers' higher interests in NEV brands. BYD, Tesla and Lixiang posted the highest YoY increase in customer flow per store in the last three months. The launch of the *Li L9* has boosted the customer flow significantly, higher than other new models among the six brands.

Figure 79: Customer flow per store on average for each brand

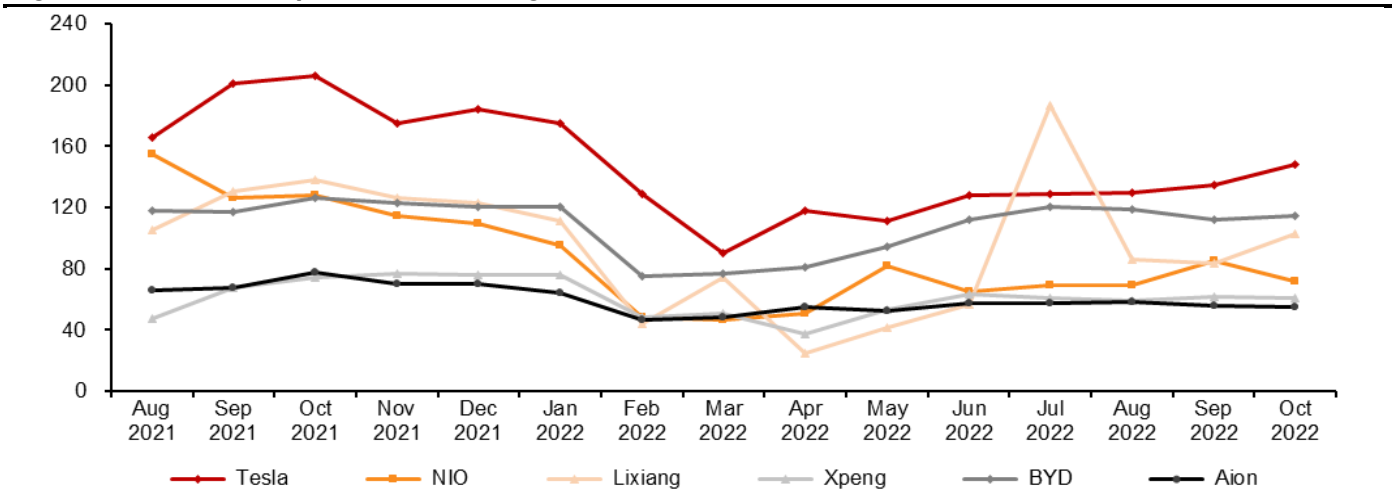


Source: Thinkercar, CMBIGM

New orders: Declining conversion ratio from store visit to order generation

Despite seasonality, new orders per store for each brand have been decreased slightly in the past 12 months. We attribute such declines to new store openings, heightened competition and macro uncertainties.

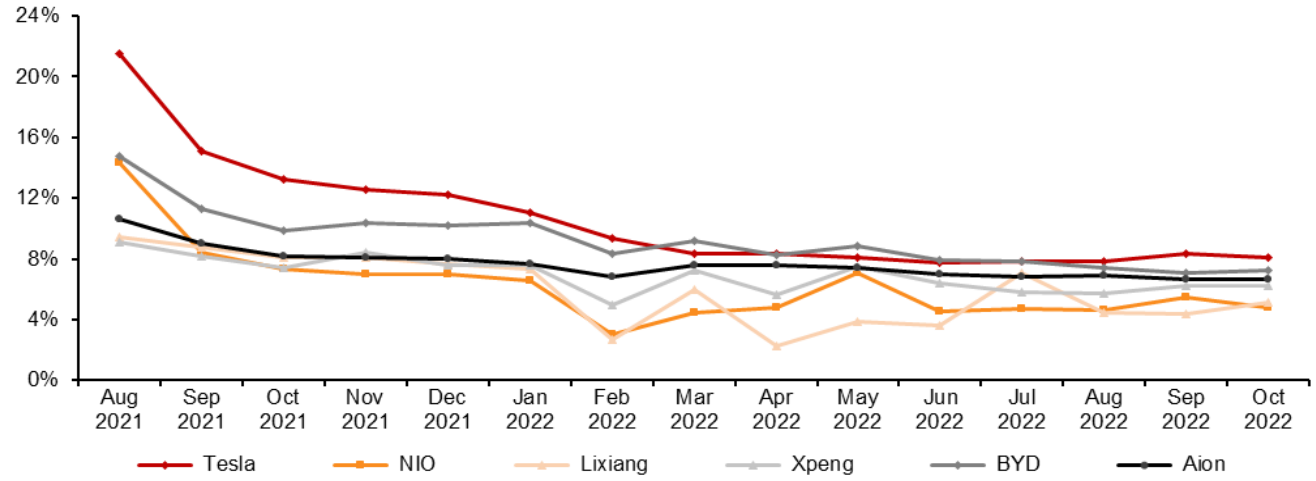
Figure 80: New orders per store on average for each brand



Source: Thinkercar, CMBIGM

Declining ratio from store visit to new order generation has also underscored the intensifying competition. The ratio decreased from 10-20% in Aug 2021 to only 5-8% now. Tesla's ratio declined the most, while such ratios for Lixiang, Xpeng and Aion have been relatively stable.

Figure 81: Conversion ratio from store visit to order generation



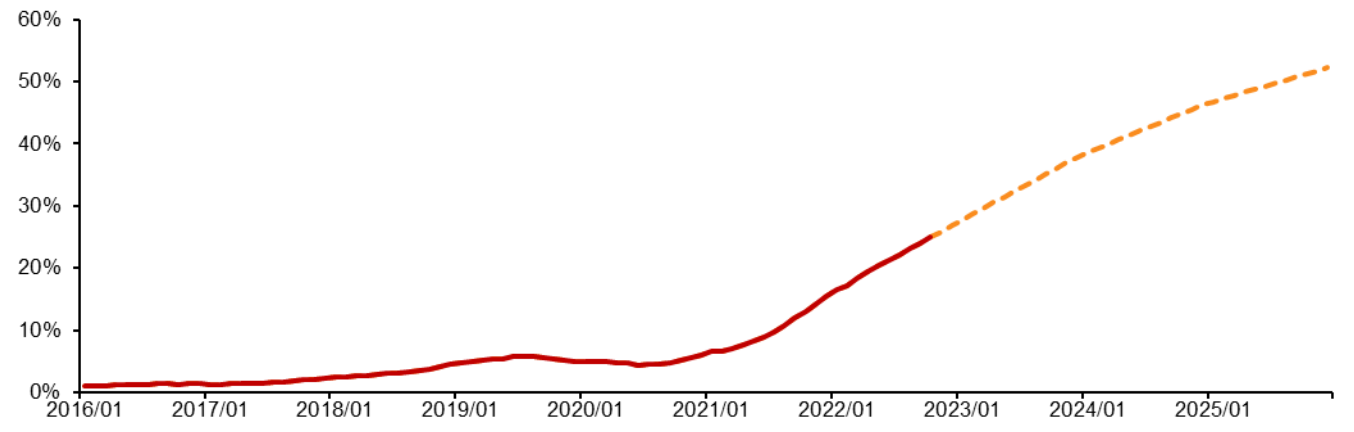
Source: Thinkercar, CMBIGM

China's long-term NEV forecast: To exceed 50% by 2025

China's NEV sales volume during 2021-22 exceeded our projection. More importantly, new values brought by NEVs to consumers has laid out foundation for NEVs to become mainstream of the market. We project NEV's market share to widen from 27% in 2022E to 38%/46%/52%, in 2023-25E, respectively, on a wholesale basis, assuming China's total PV wholesale volume to rise at a CAGR of 2% in the medium term.

Long-term forecasts always tend to extrapolate based on the historical patterns, which could be very different from actual results, when new factors come in. The key takeaway from the NEV boom during 2021-22 is that NEVs as the future mainstream of the auto industry become a consensus. We project slower sales volume growth during 2023-25 to factor in potential rising concerns about charging infrastructure and NEVs' residual value. Should there be another round of revolutionary technological changes, NEV penetration could accelerate again. The patterns also depend on regulatory requirements, such as timetable for phasing out ICE vehicle sales.

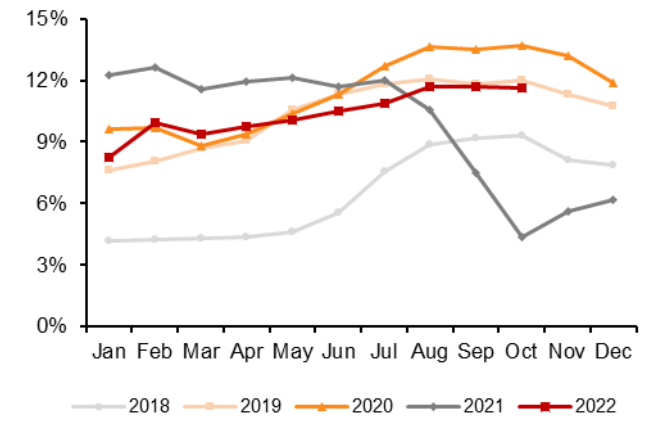
Figure 82: NEV market share forecasts for 2023-25E (on a trailing 12-month basis)



Source: CAAM, CMBIGM estimates

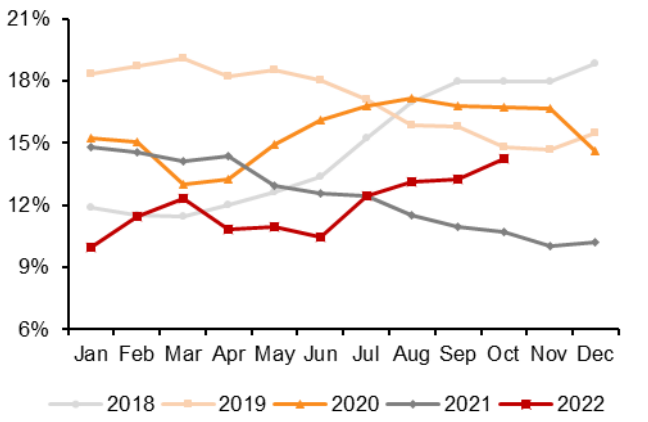
Appendix: Major Brands' Discounts at Dealers

Figure 83: Beijing Benz discounts at dealers



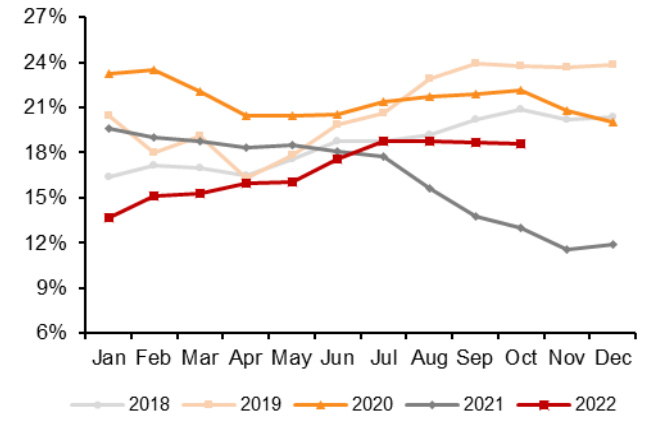
Source: ThinkerCar, CMBIGM

Figure 84: BMW Brilliance discounts at dealers



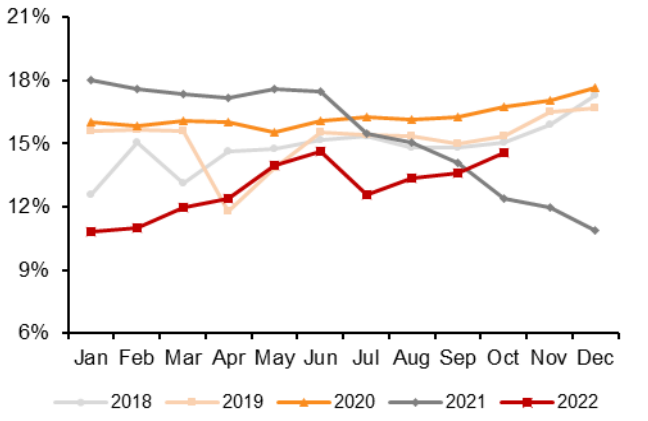
Source: ThinkerCar, CMBIGM

Figure 85: FAW Audi discounts at dealers



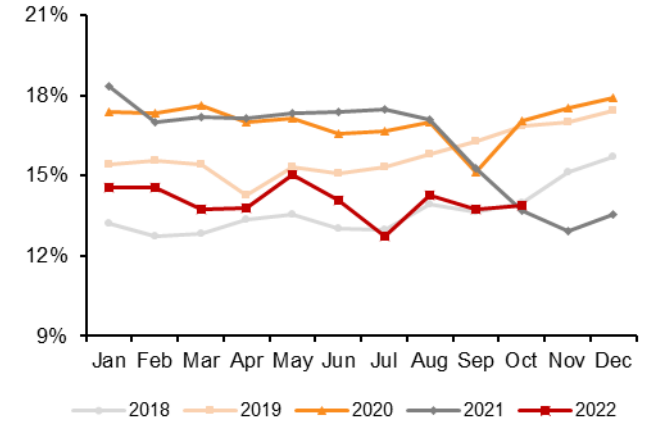
Source: ThinkerCar, CMBIGM

Figure 86: FAW VW discounts at dealers



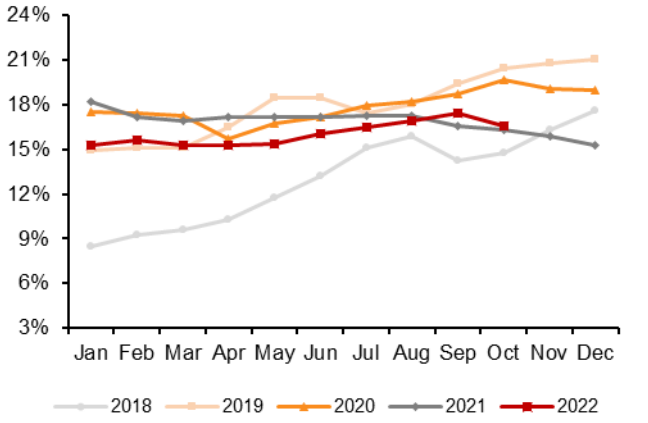
Source: ThinkerCar, CMBIGM

Figure 87: SAIC VW discounts at dealers



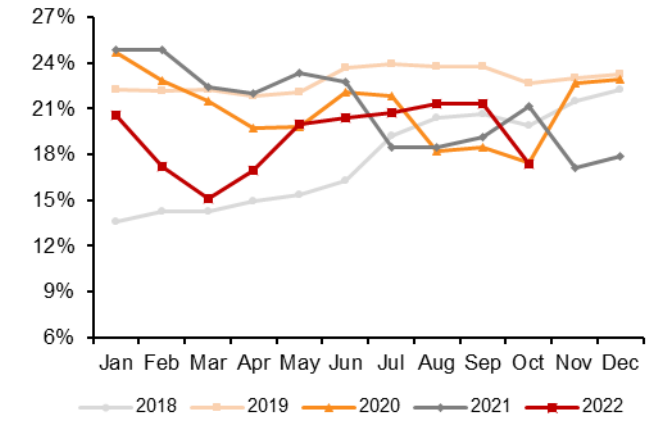
Source: ThinkerCar, CMBIGM

Figure 88: Cadillac discounts at dealers



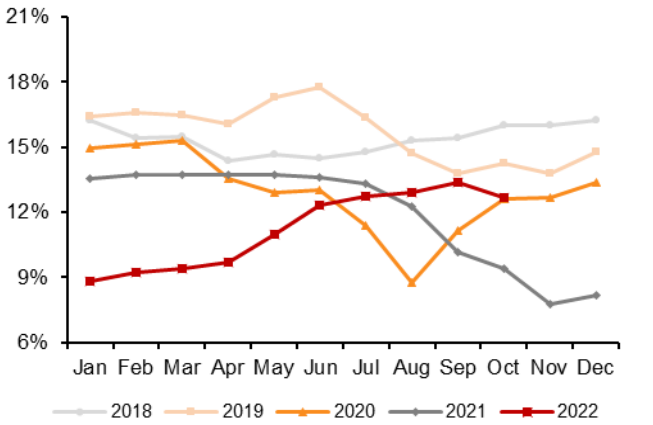
Source: ThinkerCar, CMBIGM

Figure 89: Buick discounts at dealers



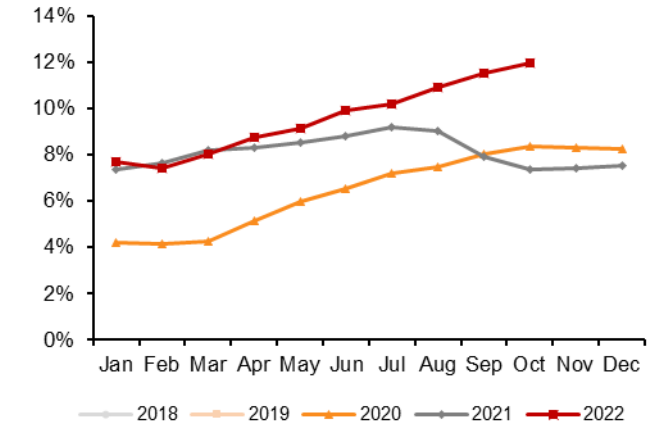
Source: ThinkerCar, CMBIGM

Figure 90: Dongfeng Nissan discounts at dealers



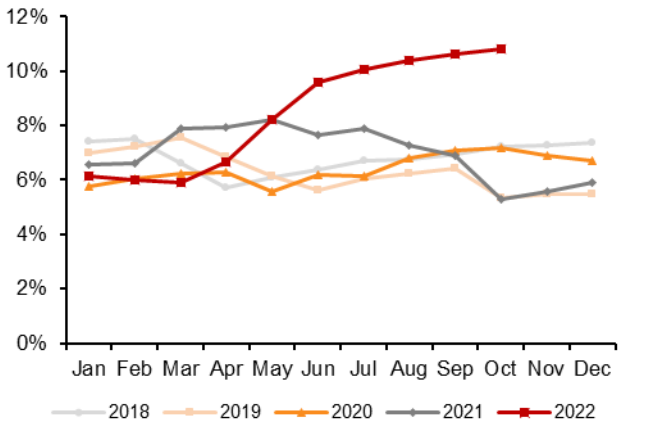
Source: ThinkerCar, CMBIGM

Figure 91: FAW Toyota discounts at dealers



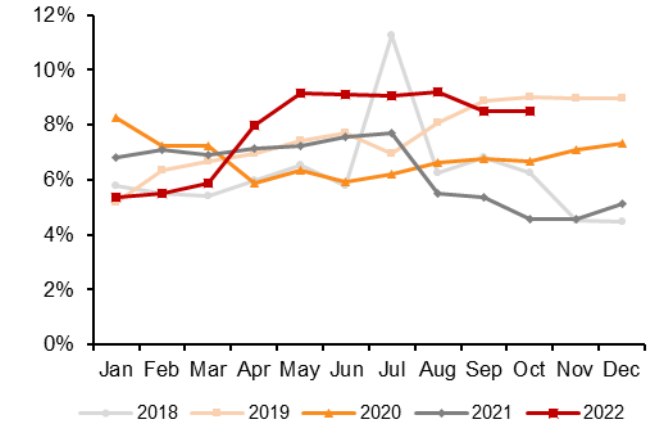
Source: ThinkerCar, CMBIGM

Figure 92: GAC Toyota discounts at dealers



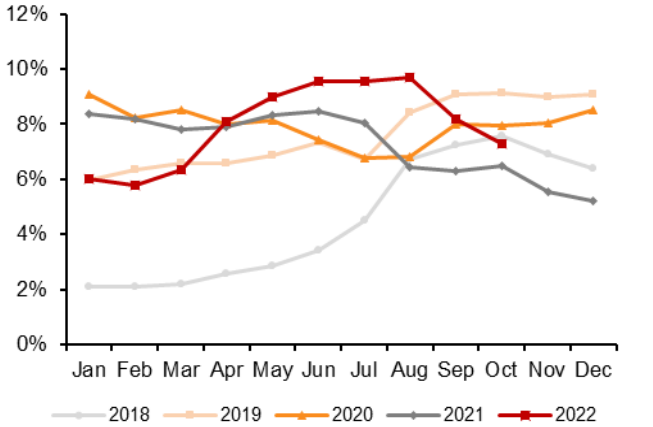
Source: ThinkerCar, CMBIGM

Figure 93: GAC Honda discounts at dealers



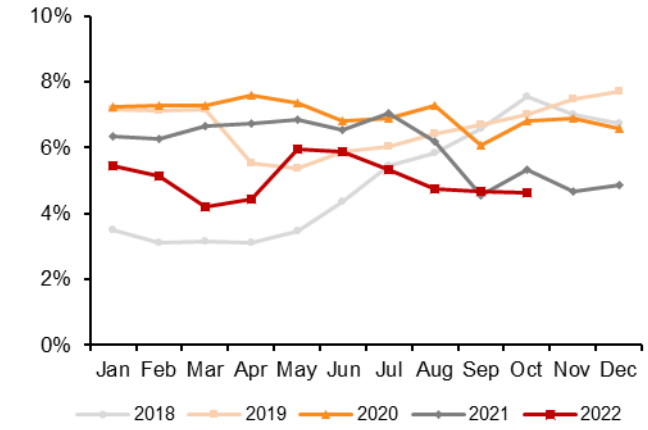
Source: ThinkerCar, CMBIGM

Figure 94: Dongfeng Honda discounts at dealers



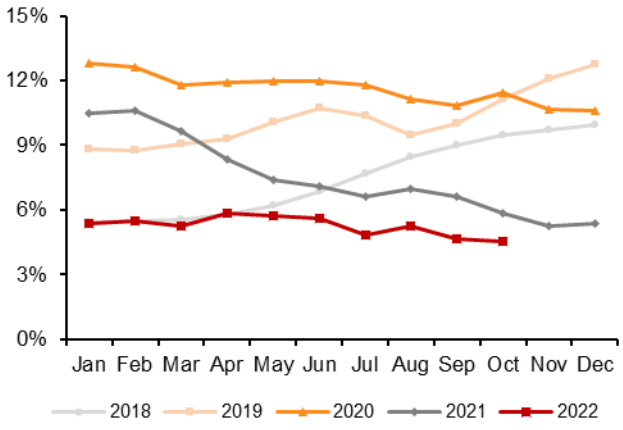
Source: ThinkerCar, CMBIGM

Figure 95: Changan discounts at dealers



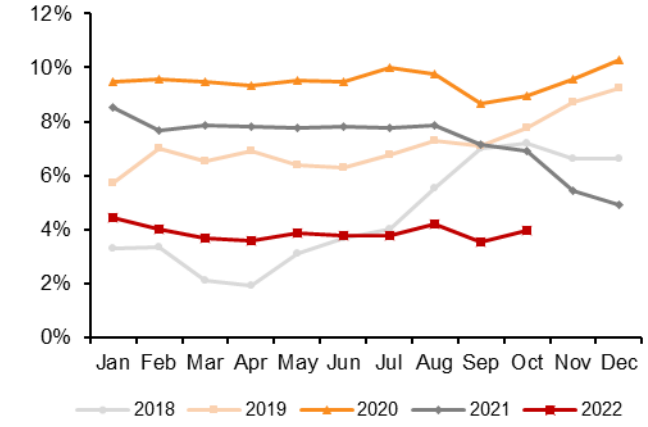
Source: ThinkerCar, CMBIGM

Figure 96: Geely discounts at dealers



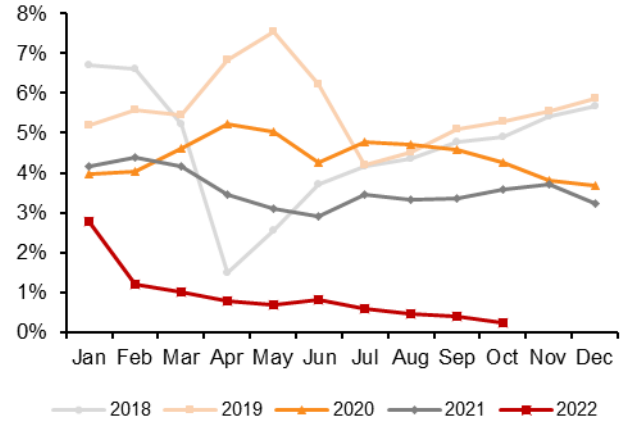
Source: ThinkerCar, CMBIGM

Figure 97: Great Wall Motor discounts at dealers



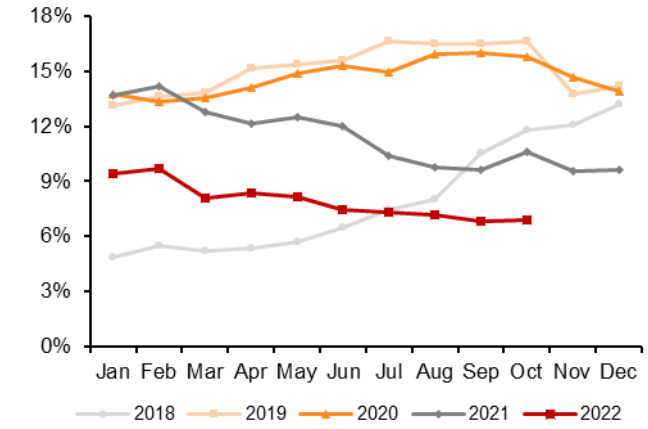
Source: ThinkerCar, CMBIGM

Figure 98: BYD discounts at dealers



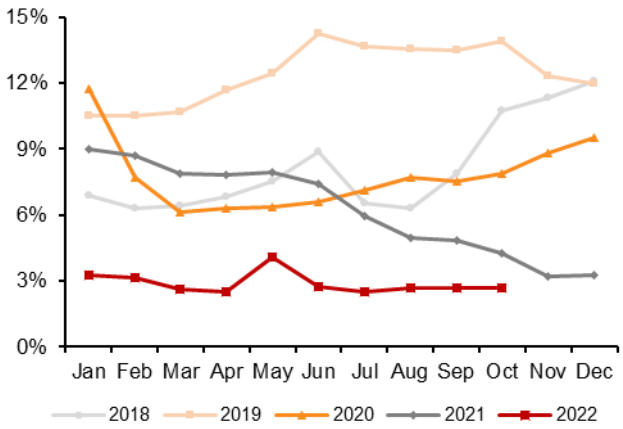
Source: ThinkerCar, CMBIGM

Figure 99: SAIC PV discounts at dealers



Source: ThinkerCar, CMBIGM

Figure 100: GAC Motor discounts at dealers



Source: ThinkerCar, CMBIGM

Disclosures & Disclaimers

Analyst Certification

The research analyst who is primary responsible for the content of this research report, in whole or in part, certifies that with respect to the securities or issuer that the analyst covered in this report: (1) all of the views expressed accurately reflect his or her personal views about the subject securities or issuer; and (2) no part of his or her compensation was, is, or will be, directly or indirectly, related to the specific views expressed by that analyst in this report.

Besides, the analyst confirms that neither the analyst nor his/her associates (as defined in the code of conduct issued by The Hong Kong Securities and Futures Commission) (1) have dealt in or traded in the stock(s) covered in this research report within 30 calendar days prior to the date of issue of this report; (2) will deal in or trade in the stock(s) covered in this research report 3 business days after the date of issue of this report; (3) serve as an officer of any of the Hong Kong listed companies covered in this report; and (4) have any financial interests in the Hong Kong listed companies covered in this report.

CMBIGM or its affiliate(s) have investment banking relationship with the issuers covered in this report in preceding 12 months.

CMBIGM Ratings

BUY	: Stock with potential return of over 15% over next 12 months
HOLD	: Stock with potential return of +15% to -10% over next 12 months
SELL	: Stock with potential loss of over 10% over next 12 months
NOT RATED	: Stock is not rated by CMBIGM
OUTPERFORM	: Industry expected to outperform the relevant broad market benchmark over next 12 months
MARKET-PERFORM	: Industry expected to perform in-line with the relevant broad market benchmark over next 12 months
UNDERPERFORM	: Industry expected to underperform the relevant broad market benchmark over next 12 months

CMB International Global Markets Limited

Address: 45/F, Champion Tower, 3 Garden Road, Hong Kong, Tel: (852) 3900 0888 Fax: (852) 3900 0800

CMB International Global Markets Limited ("CMBIGM") is a wholly owned subsidiary of CMB International Capital Corporation Limited (a wholly owned subsidiary of China Merchants Bank)

Important Disclosures

There are risks involved in transacting in any securities. The information contained in this report may not be suitable for the purposes of all investors. CMBIGM does not provide individually tailored investment advice. This report has been prepared without regard to the individual investment objectives, financial position or special requirements. Past performance has no indication of future performance, and actual events may differ materially from that which is contained in the report. The value of, and returns from, any investments are uncertain and are not guaranteed and may fluctuate as a result of their dependence on the performance of underlying assets or other variable market factors. CMBIGM recommends that investors should independently evaluate particular investments and strategies, and encourages investors to consult with a professional financial advisor in order to make their own investment decisions.

This report or any information contained herein, have been prepared by the CMBIGM, solely for the purpose of supplying information to the clients of CMBIGM or its affiliate(s) to whom it is distributed. This report is not and should not be construed as an offer or solicitation to buy or sell any security or any interest in securities or enter into any transaction. Neither CMBIGM nor any of its affiliates, shareholders, agents, consultants, directors, officers or employees shall be liable for any loss, damage or expense whatsoever, whether direct or consequential, incurred in relying on the information contained in this report. Anyone making use of the information contained in this report does so entirely at their own risk.

The information and contents contained in this report are based on the analyses and interpretations of information believed to be publicly available and reliable. CMBIGM has exerted every effort in its capacity to ensure, but not to guarantee, their accuracy, completeness, timeliness or correctness. CMBIGM provides the information, advices and forecasts on an "AS IS" basis. The information and contents are subject to change without notice. CMBIGM may issue other publications having information and/ or conclusions different from this report. These publications reflect different assumption, point-of-view and analytical methods when compiling. CMBIGM may make investment decisions or take proprietary positions that are inconsistent with the recommendations or views in this report.

CMBIGM may have a position, make markets or act as principal or engage in transactions in securities of companies referred to in this report for itself and/or on behalf of its clients from time to time. Investors should assume that CMBIGM does or seeks to have investment banking or other business relationships with the companies in this report. As a result, recipients should be aware that CMBIGM may have a conflict of interest that could affect the objectivity of this report and CMBIGM will not assume any responsibility in respect thereof. This report is for the use of intended recipients only and this publication, may not be reproduced, reprinted, sold, redistributed or published in whole or in part for any purpose without prior written consent of CMBIGM.

Additional information on recommended securities is available upon request.

For recipients of this document in the United Kingdom

This report has been provided only to persons (I)falling within Article 19(5) of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005 (as amended from time to time)("The Order") or (II) are persons falling within Article 49(2) (a) to (d) ("High Net Worth Companies, Unincorporated Associations, etc.,) of the Order, and may not be provided to any other person without the prior written consent of CMBIGM.

For recipients of this document in the United States

CMBIGM is not a registered broker-dealer in the United States. As a result, CMBIGM is not subject to U.S. rules regarding the preparation of research reports and the independence of research analysts. The research analyst who is primary responsible for the content of this research report is not registered or qualified as a research analyst with the Financial Industry Regulatory Authority ("FINRA"). The analyst is not subject to applicable restrictions under FINRA Rules intended to ensure that the analyst is not affected by potential conflicts of interest that could bear upon the reliability of the research report. This report is intended for distribution in the United States solely to "major US institutional investors", as defined in Rule 15a-6 under the US, Securities Exchange Act of 1934, as amended, and may not be furnished to any other person in the United States. Each major US institutional investor that receives a copy of this report by its acceptance hereof represents and agrees that it shall not distribute or provide this report to any other person. Any U.S. recipient of this report wishing to effect any transaction to buy or sell securities based on the information provided in this report should do so only through a U.S.-registered broker-dealer.

For recipients of this document in Singapore

This report is distributed in Singapore by CMBI (Singapore) Pte. Limited (CMBISG) (Company Regn. No. 201731928D), an Exempt Financial Adviser as defined in the Financial Advisers Act (Cap. 110) of Singapore and regulated by the Monetary Authority of Singapore. CMBISG may distribute reports produced by its respective foreign entities, affiliates or other foreign research houses pursuant to an arrangement under Regulation 32C of the Financial Advisers Regulations. Where the report is distributed in Singapore to a person who is not an Accredited Investor, Expert Investor or an Institutional Investor, as defined in the Securities and Futures Act (Cap. 289) of Singapore, CMBISG accepts legal responsibility for the contents of the report to such persons only to the extent required by law. Singapore recipients should contact CMBISG at +65 6350 4400 for matters arising from, or in connection with the report.