Rosefinch Research | 2024 Series # 3

Intelligent Car – Poised for Take-off

As an important scenario for energy transition, the automotive industry has undergone a "new" phase: the power system has changed from internal combustion engines to battery, electric motor, and electric control systems, and energy source has changed from petroleum to lithium ion. In 2020, the penetration rate of new energy vehicles was only 5%, while it has now increased to around 40%. From fuel vehicles to new energy vehicles, the first half of the transformation of the automotive industry is in full swing. From electrification to intelligentization, the marching drums for the second half have also been sounded.

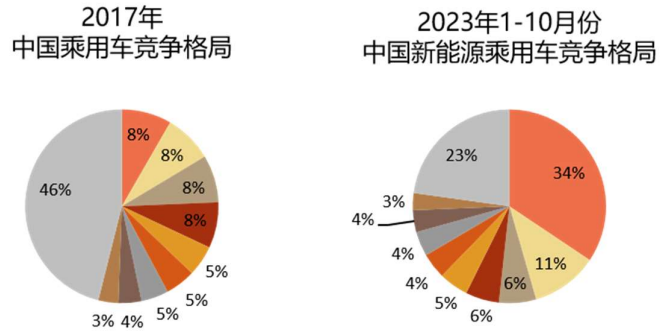
How has the competitive landscape of the automotive industry changed in the new energy era? What opportunities will the intelligent transformation bring? The development of the Chinese automotive industry over the past 20 years can generally be divided into three phases. The first phase was the period of high-speed growth before 2010, with compound annual growth rates of 24%. The second phase was the period of steady growth from 2010 to 2016, with compound annual growth rates of 7-8%. The third phase is the period of slow growth since 2018, with compound annual growth rates of around 3%.

1. Automobile price war to continue in coming 1-2 years.

Over the next 5-10 years, we believe that China's automobile industry will likely maintain a certain growth rate, albeit slower than previous phases. In the context of slowing growth, the dominant industry characteristic is an intensifying price war.

There are two main reasons for price wars: First, with the transition from fuel vehicles to new energy vehicles, the competitive landscape of the industry has undergone significant changes. In the era of fuel

vehicles, the pattern was like the Spring and Autumn period in ancient Chinese history, with the top players taking turns to lead but without obvious dominant winners. Reflected in the market share of automakers, for example in 2017, the market share of top companies was all around 8%, with an overall diversified distribution.

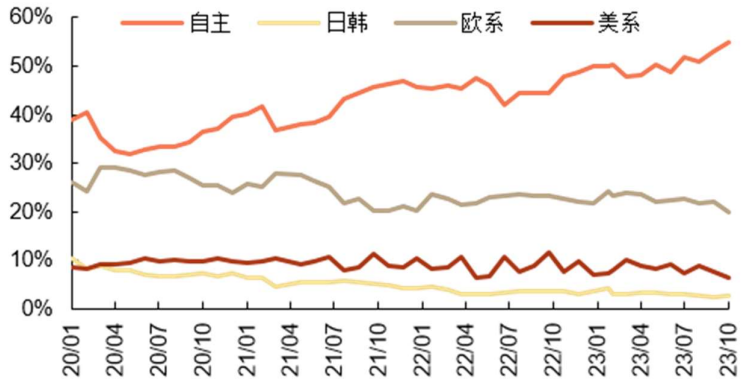


Source: China Automobile Association, Rosefinch.

However, in the era of new energy vehicles, the market competition pattern is more like the late Warring States period, with intensifying integration between countries. The industry presents a polarized state, with the top player's market share reaching 34%, the second 11%, and the top two totaling 45%, while the market share of second-tier enterprises is compressed to below 5%. Therefore, the price wars initiated by second-tier enterprises are understandable to a certain extent.

The second reason is the changes in the main participants of the automobile industry. In the era of fuel vehicles, joint ventures accounted for the majority of the share, but in the electric vehicle era, Chinese independent brands have shown stronger competitiveness. Reflected in the market share, the share of Chinese brands has also risen rapidly from the 35-40% range to over 50%.

Passenger Car market share by manufacturing country



Source: China Automobile Association, Rosefinch.

There are obvious differences between joint ventures and independent brands in terms of business strategies. The primary goal for joint ventures operating in China is profit, but for independent brands, the first goal is to seize market share. Changes in major players and business strategies are also important reasons for price wars.

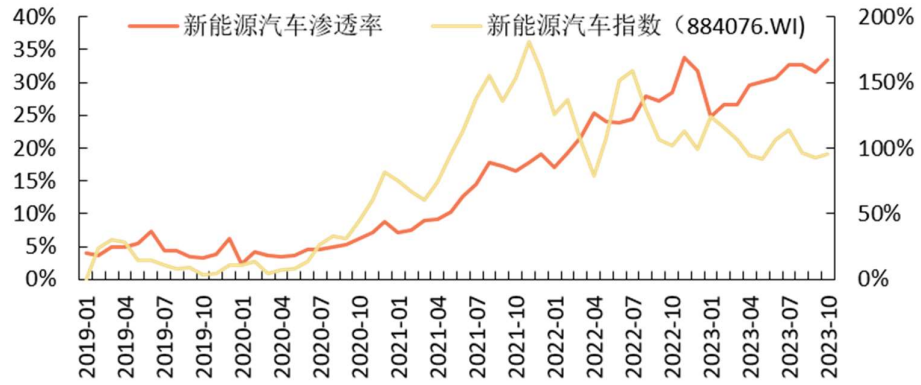
The competitive landscape of new energy vehicles in the future is likely to remain concentrated at the top, and the trend of independent brands increasing market share is also unlikely to change. There is still a possibility that the price war in the industry will continue for another one to two years in the future.

2. The core links of automobile industry chain.

So in this context, what opportunities are there in the automotive industry? We believe we need to focus on grasping the structural opportunities brought by technological changes.

First, it's worth noting that the WIND New Energy Vehicle Index has risen sharply by 180% since 2019, with a sharp increase of 125% when the penetration rate climbed from 5% to 15.

New energy vehicle penetration rate and new energy vehicle index



Data source: China Automobile Association, WIND.

Second, it is only by paying attention when the penetration rate is relatively low that there may be good investment opportunities with favorable valuation.

Third, in terms of grasping the core links of the entire automotive industrial chain, there are different idiosyncrasies in different industry links:

The first is the upstream resource end. We believe that more importantly is the forecasting of supply and demand patterns and judgment of the cycle. Taking lithium carbonate prices as an example, prices rose from less than 50,000 yuan/ton in 2019 to over 600,000 yuan/ton at their peak, a significant increase.

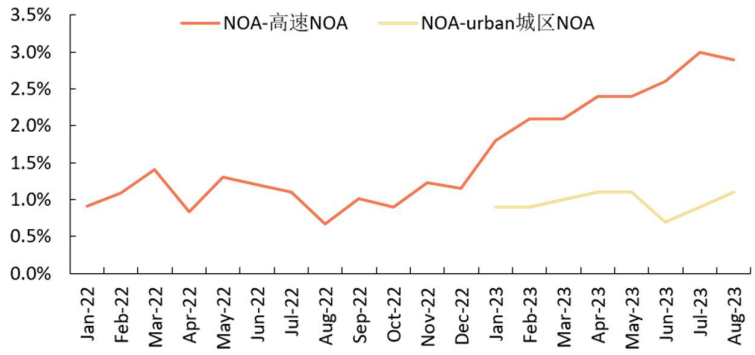
The second is core components. Here we focus on market space, competitive landscape, and technological trends. The higher up the upstream, the higher the certainty; the further down the downstream, the higher the requirements for research.

The third is the downstream full-vehicle segment, which is relatively core. There are many domestic automakers, each with distinct characteristics. If it is to judge right now which automaker can ultimately break out and dominate, it is more difficult. Although the certainty of full-vehicles is insufficient, the upside of this link is very high. Therefore, in terms of investment in full-vehicles manufacturers, it will test the depth of research team, including entrepreneurs, corporate strategy, technological advantages, product cycle and other factors.

3. The penetration rate of intelligentization will increase substantially.

Currently, the penetration rate of high-level autonomous driving in China is only 3%. However, we believe that the penetration rate is likely to break through to some extent in the future, and intelligentization is likely to enter a period of rapid improvement.

The penetration rate of high-level autonomous driving



Data source: Recent Advancements in End-to-End Autonomous Driving using Deep Learning, Geely Intelligent Vehicle.

The main three reasons are as follows:

First, from a technological perspective, map-less autonomous driving technologies developed by OEMs have become relatively mature. Previously, both new entrants and traditional automakers generally used high-precision map-based autonomous driving technologies. However, high-precision maps have two obvious disadvantages: 1) high maintenance costs and 2) the use of high-precision maps requires separate approval in each region, and the approval process restricts the popularization of autonomous driving technologies. Without maps, autonomous driving can get rid of regional restrictions. Once the technology matures, there is potential for large-scale promotion nationwide.

Second, Tesla's FSD V12 version is expected to lead another iteration of autonomous driving technology, because V12 uses an end-to-end large model, which has a higher ceiling than traditional modular autonomous driving technologies. Technological progress will promote continuous improvement in advance-level autonomous driving penetration.

From the reported progress of OEMs, two companies have officially announced in the fourth quarter of this year that they will perform urban autonomous driving NOA by the end of this year, and subsequently traditional automakers are expected to follow up one after another.

Third, on the consumer side, whether the ultimate autonomous driving penetration rate can be improved depends on consumers' acceptance. We believe that consumers will be able to accept autonomous driving in 2024 for three reasons. One is that the main driving scenarios for consumers are in cities, accounting for 70%-80%. Two is that the environment and conditions for urban autonomous driving will be more complex, but the risk is lower than high-speed intelligent driving, and the reduction of risks will also make consumers more willing to try it. Three is that in the scenario of urban autonomous driving, most users will use commuting mode, i.e. commuting to and from work on relatively fixed scenarios. Under a single scenario, it further reduces the technical requirements for autonomous driving. Intelligent driving technology can optimize and enhance the autonomous driving experience based on our repetitive driving conditions.

In summary, with the progress of technology, the active promotion of autonomous driving by OEMs, and consumers' dependence on urban autonomous driving, the penetration rate of autonomous driving is very likely to increase significantly in the future.

4. Intelligentization raised the importance of full-car automaker in industry chain

So which links in the intelligent driving industrial chain can be focused on? First, it is clear that the position of the full-car automaker in the industrial chain will have a significant upgrade during the technological transformation of intelligent driving.

During the electrification process, the position of the full-car automaker was not very prominent, because new energy vehicles replaced fuel vehicles, and the key was the reduction in costs. However, core components of OEMs, including batteries, motors, power control, etc. can be externally sourced from third parties. It is difficult for OEM products to form differentiated competition. To some extent, the cost reduction of new energy vehicles was driven by the supply chain together. Therefore, during the electrification process, full-car automakers only acted as final assembler to face end consumers.

However, in the intelligence stage, the position of full-car automakers in the industrial chain will change significantly. The key to improving the penetration rate of intelligent driving lies in software and algorithms. Automakers are precisely the core link that controls software and algorithms.

Looking at the deployment of new forces on intelligent driving teams, the number of personnel is often above 1,000, and they focus on the software and algorithm end. It can be judged that under the trend of intelligent driving, the manufacturing attributes of automakers will decline to some extent, while the technological attributes of automakers will definitely increase with the enhancement of research and development capabilities, especially software and algorithm capabilities.

Therefore, as intelligent driving is gradually implemented, intelligent driving will become a key link for differentiated competition among OEMs and will further concentrate the competitive pattern. Enterprises with advantages in intelligent driving technology are expected to gain higher market shares. From the perspective of profits, software has stronger economies of scale, while also bringing better customer stickiness, which will ultimately bring better profit space for automakers.

5. On positioning for part-suppliers.

Focusing on intelligent driving must also involve core components. One of the core algorithms for intelligent driving is data. When screening core components, we follow the data flow path in the intelligent driving system and consider factors such as scalable pricing power, competitive landscape, and market space.

The first and more important link is the SOC chip. Its performance is very likely to determine the upper limit of the vehicle's intelligent driving capabilities. From an industrial chain perspective, the SOC chip is equivalent to the automaker.

The second link is the sensory link. After Tesla introduced the BEV+Transformer algorithm, the importance of the visual perception system in intelligent driving has increased significantly. The visual perception system includes cameras, chips, etc. With the improvement of intelligent driving requirements for sensor performance, the visual system will have logical value-quantity improvement.

The third link is the decision-making link. The core product here is the intelligent driving domain controller. It has sufficient value and a good competitive landscape. In the future, with the improvement of chip performance, the domain controller will also have scalable pricing power.

Within the domain controller, there will also be many small but attractive tracks derived from electronic components such as memory, communication chips, isolation chips, etc. For these small but attractive tracks, the focus should be on looking at the overall industry competitive landscape.

Finally, it is the execution link, mainly wire control motors and wire control steering - two products with high technical barriers. Domestically, there is relatively large space for indigenous alternatives. The execution link is therefore also worth paying attention to.

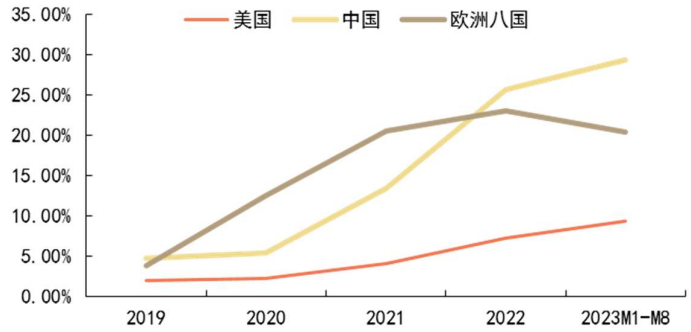
6. The globalization opportunities for automobile industry chain.

Another opportunity in the automotive industrial chain is globalization. In recent years, China's automotive industrial chain, including OEMs and components manufacturers, have been actively going global and have shown certain competitiveness.

The globalization efforts can be divided into two parts: complete vehicles and components. For complete vehicles, we are generally cautious because vehicle exports may face certain risks. Currently the better approach might be joint ventures between domestic OEMs and foreign OEMs for local production. In comparison, we pay more attention to the exports of components for new energy vehicles in China, because localized production abroad will likely have a smaller impact on local employment and economy.

Moreover, the cost reduction and product strength improvement of electric vehicles in Europe and the US also require deep participation from China's automotive industrial chain. Currently, the penetration rates of electric vehicles in Europe and the US are still at relatively low levels. If their penetration rates are hoped to continue rising like China's, it is crucial for them to receive relevant components from China's industrial chain.

China, US, Europe new energy vehicle penetration rate



Data source: Wind.

For domestic new energy vehicle component manufacturers, we have the following few screening criteria:

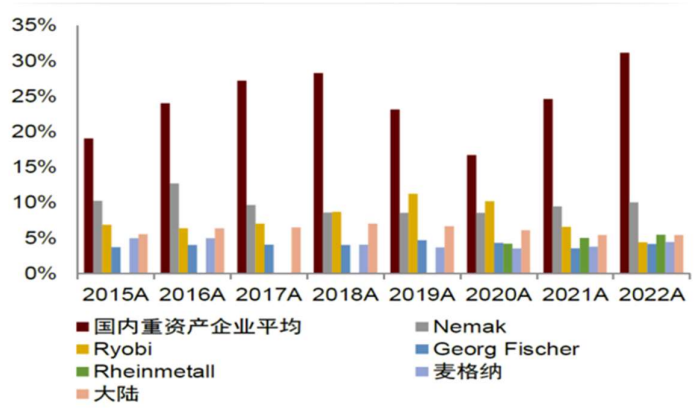
The first point is industry status - only those that have become leaders in niche fields domestically would possibly have relatively strong competitiveness abroad to seize market share.

The second point is management - overseas management would be more complex due to personnel or cultural factors. Domestically, enterprises must have very strong management capabilities. Experience in overseas operations would be an added advantage.

The third point is to have clear technological advantages, cost advantages or production capacity advantages. Taking the die casting industry as an example, die casting is a typical capital-intensive industry.

Looking at the capital expenditures as a percentage of revenue for die casting companies in China and the US, this percentage is over 20% for domestic enterprises with aggressive capacity expansion. However, during the past three years when new energy vehicle penetration in China increased rapidly, domestic die casting capacity was still relatively tight.

China-US die casting enterprise capital expenditures as percentage of revenue



Data source: wind, EU Commission, company financial reports.

Currently, the capital expenditures as a percentage of revenue for foreign die casting companies are all below 10%, which are more cautious. If electric vehicle penetration increases rapidly in Europe or North America, overseas die casting capacity may become tighter than in China. These Chinese companies therefore will have good development opportunities if they go global.

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