

Request for Comment: Industry Credit Guidelines for Global Automobile Manufacturers

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Summary

These criteria describe PENGYUAN's analytical approach to assess global automobile manufacturers. PENGYUAN defines an automobile manufacturer as a company that primarily engages in the design and manufacture of vehicles, both passenger and commercial, with a distribution and services network that facilitates the sales and service of vehicles to end customers.

The criteria for automobile manufacturers are built on top of the rating framework presented in PENGYUAN's General Corporate Rating Criteria. In order to more precisely reflect the risk profile of automobile manufacturers, PENGYUAN makes some adjustments to our General Corporate Rating Criteria on weightings allocated to sub-factors of the operation profile and makes sales volume a primary factor in assessing operating scale.

In this criteria report, we address how we derive the indicative credit score (ICS) for global automobile manufacturers. The ICS will then be combined with three additional adjustment factors to achieve an issuer's stand-alone credit profile (SACP). A corporate issuer's credit rating is the combined result of this company's SACP and the possible external supports from either a supporting parent or a government which this company is important to and has close ties with. The detailed discussion regarding additional adjustments and external support can be found in our General Corporate Rating Criteria.

In PENGYUAN's view, the automobile manufacturing industry has high industry risk. Given the fact that automobiles are big-ticket consumer discretionary items, the industry is highly exposed to macroeconomic, social, and political trends. The profitability and free cash flow of automobile manufacturers tends to be volatile as the cycles of consumers spending and automaker capital expenditure are constantly fluctuating. In addition, the industry faces the threat of technological disruption from frontier technologies such as autonomous driving, vehicles connectivity, powertrain electrification and shared mobility.

PENGYUAN's assessment of automobile manufacturers reveals that their business profile is primarily supported by their operation profile. This considers an automakers' operating scale, competitiveness in product, service and technology, brand image, market share, operating efficiency as well as business diversity.

PENGYUAN is also of the view that the impact of the macroenvironment on automakers cannot be overlooked. The business operations of automakers with a global footprint are highly subject to various macro factors in different jurisdictions including industry regulations and policies as well as the efficiency of the financial system.

PENGYUAN's criteria are mostly in line with our General Corporate Rating Criteria when it comes to assessing automobile manufacturers' financial profiles. Notably, a partial-consolidation approach might be used to calculate the leverage and profitability ratios when an automaker's profit contribution from joint ventures is substantially large. In this case, we believe the partial consolidation approach better reflects some operating risks put off the balance sheet under the equity method that is applied to the accounting treatment of joint ventures.

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Industry Definition

In PENGYUAN's view, automobile manufacturers are defined as companies primarily engaged in designing and manufacturing vehicles – both passenger and commercial – with a distribution network that facilitates the sale of vehicles to retail customers. Automobile manufacturing companies procure the majority of their components from outside suppliers but some core components, such as engines, are made in-house. In general, automobile manufacturers have their own production facilities and R&D centers. However, some automobile manufacturers – especially nascent companies – adopt an asset-light business model, outsourcing production to other manufacturers and focusing on research and development, supply chain management and sales and marketing.

Indicative Credit Score (ICS)

These criteria use a matrix of the business profile and financial profile to derive an indicative credit score (ICS) for a corporate issuer. A detailed explanation of how we derive the ICS of a corporate issuer can be found in our General Corporate Rating Criteria.

Business Profile Analysis

PENGYUAN's General Corporate Rating Criteria outlines the way we assess a corporate's business profile – combining factors of the Macro Environment and Industry & Operation Risk Profile into the assessment.

The industry risk profile is evaluated on a five-point scale system, with '5' being the highest score and lowest industry risk, and '1' being the lowest score and highest industry risk. Our assessment reveals that the automobile manufacturing industry risk profile is 'High' with the score of 2.

The business profile of an individual automobile manufacturing company is determined by looking at a combination of the macro environment, industry risk profile and its operation risk profile. The operation risk profile is the key element in our assessment but we consider the macro environment important as well, as any automobile manufacturer with a global footprint is highly subject to macro factors in different jurisdictions including industry regulations, government policies and the efficiency of the financial system.

Macro Environment

The assessment of the macro environment is explained in detail in our General Corporate Rating Criteria.

Industry Risk Profile

Under PENGYUAN's General Corporate Rating Criteria there are six key risk factors we will assess for a specific industry. These include, concentration risk, entry barriers, growth perspective, profitability level & trend, substitution risk and cyclicity risk.

Based on a holistic understanding of the above six risk factors, we assess the automobile manufacturing industry risk score as 'High' with the score of 2.

Exhibit 1: Industry risk score of the Automobile Manufacturing Industry

Sub-factors	Score
Concentration Risk	Medium Risk
Entry Barrier	Medium Risk
Growth Perspective	High Risk
Profitability Level & Trend	High Risk
Substitution Risk	Medium Risk
Cyclical Risk	High Risk

Concentration Risk

In our view, the automobile manufacturing industry is considered to have medium concentration risk. Concentration risk represents the impact on an industry caused by either having too much or too little market competition. If the industry is too fragmented, unnecessary rivalries can result in harmful activities such as price wars that hurt profitability. If, on the other hand, the industry is too concentrated - such as in a monopoly, duopoly, or oligopoly - the efficiency of market participants may be compromised affecting the quality of products and services. We consider a moderate level of industry concentration desirable to maintain healthy competition.

We believe the automobile manufacturing industry is reasonably concentrated. We estimate that the top 10 original equipment manufacturers (OEMs) accounted for over 70% of worldwide vehicles sales from 2015-2018. They also represented an average of 72% of the industry's total annual revenue in that period. The evaluation of medium concentration risk reflects our view that the level of concentration in the automobile manufacturing industry will remain relatively healthy in the medium to long term despite there being a large number of small-scale OEMs that intensify competition. We think there is some headroom for industry consolidation as the small-scale OEMs will find it hard to survive in an environment of sluggish demand for automobiles and given the high level of capital spending required to keep competitive in the ACES – 'Automated, Connected, Electric, and Shared' - battleground.

Entry Barrier Risk

Our assessment reveals that the entry barrier risk in the automobile manufacturing industry is medium. Key factors we consider include economies of scale, supply chain management, technological know-how and industry regulations.

The automobile manufacturing industry is very capital-intensive. OEMs need to make tremendous initial and recurring investment in production facilities. This limits many small-scale OEM's from staying competitive with participants that are in large scale, and thus acts as a barrier to new entrants.

The capability to deal with the complexity of the supply chain management serves as another roadblock for outsiders. An internal combustion engine passenger car has roughly 30,000 components. The process of procuring these parts from a wide variety of suppliers is a tough logistical challenge for new industry players to master. Without strong control over the supply chain that assures effective cost management and efficient production lead time for OEMs, new players would struggle to survive.

Technological barriers for this industry are high in our view. An automobile is a complex system where a large number of components with various functions have to work well with each other in order to ensure the automobile performs safely and reliably. To achieve this, substantial know-how, much of it gained over years of experience, is required.

In our opinion, regulatory barriers are moderate in the automobile manufacturing industry. Baseline requirements of obtaining permits for production and meeting minimum standards of quality and safety are not difficult. Some countries do require an initial minimum production scale however. Besides these, regulations on the industry are relatively mild when compared to some industries, such as mining or airlines, where governments set up tough regulatory barriers to protect the environment or maintain sovereignty.

In recent years, automobile OEMs have faced an increasing threat from potential rivals with strong DNA in software and IT. The automobile manufacturing industry is undergoing a shift from being hardware defined to software defined as the trend of ACES – 'Automated, Connected, Electric, Shared' – radically changes the way manufacturers produce, and the way

consumers perceive an automobile. Given this shift, we believe that the entry barriers for the industry have also been weakened by this transition.

Growth Perspective Risk

We assess the growth perspective risk of the automobile manufacturing industry as high. When compared with fast-growing industries like mobile handsets, application software and internet media industries, the automobile industry saw mild revenue growth between 2008 and 2018. Global new cars sales volume and industry revenue growth rates have lost steam after peaking in 2010, despite the boom in China's new cars sales during the past decade. We believe the industry will continue to see stagnant growth until new growth drivers emerge. The visibility on growth for this industry is highly uncertain as many consumers worldwide have taken a hard hit financially with the outbreak of COVID-19. Automobile purchases are highly likely to be deferred. China, the key growth engine for the global automobile sales for the past decade, has seen a deceleration of new cars sales with negative shipment growth for two straight years since 2017. The road ahead is bumpy in our view.

Profitability Level and Trend Risk

We evaluate the profitability level and trend risk of the automobile manufacturing industry to be high. Our research showed that from 1996-2018 EBITDA margins for global automobile OEM's ranged between 6% and 12%. The uptrend in EBITDA margin that began in 2009 started to wane in 2017. This loss in momentum was due to several factors including slowing worldwide automobile consumption, mounting competition, higher costs related to toughened emissions standards and rising capital expenditure on areas such as ACES. We believe that these factors will continue to intensify the volatility in profitability for the foreseeable future.

Substitution Risk

The substitution risk of the automobile manufacturing industry is considered medium in our assessment. Alternative methods for short-to-medium distance travel, such as subways and high-speed rail, provide a risk to the demand for automobiles. In addition, increased awareness of the effects of air pollution and the time lost due to traffic congestion has seen consumers' switch to other less polluting and more time-efficient forms of transportation. This is particularly true for inner-city travel in places like Europe where the use of bicycles and scooters has become more popular, especially after the pandemic of COVID-19. We believe there is moderate replacement risk for automobiles due to the prevalence of alternative transportation for short-to-medium distance travel.

Cyclical risk

We believe the automobile manufacturing industry has very high risk of cyclicality. Demand for automobiles is highly subject to cycles of the economy, product replacement and OEMs' capital spending. As a durable and discretionary consumer good that requires a considerable proportion of a buyers' disposal income, automobile consumption has a strong correlation with the overall economic outlook. A booming economy means the propensity to spend on an automobile is theoretically high; while the reverse is the case in uncertain times.

Consumption of automobiles is also affected by the replacement cycle. In general, a car owner tends to replace his existing car with a new one after several years of ownership. This cycle is dependent on market consumption habits and can vary. For example, the replacement cycle for old cars in China is usually 7-8 years.

OEMs' capital spending also presents as a feature of cyclicality as capacity expansion and investment in new technologies varies over the time. The combination of the cycles mentioned above will bring a large degree of sensitivity to OEMs' profit. A decision to expand capacity made during an economic boom or an uptrend in the replacement cycle can take years to complete and the company might find itself in a different part of that cycle – perhaps in the downturn of demand - by the time the work is done. This might lead to idle capacity and take a heavy toll on its profit.

PENGYUAN has reviewed how badly revenue and EBITDA margins of some major industries react under economic downturns which we classify as BB stress tests. Notably, the automobile manufacturing industry shows a high degree of vulnerability in revenue and EBITDA margin when the economy falls into recession. The average drop from the peak for the revenue and EBITDA margin of this industry under our four stress-testing cases are -4% and -16% respectively, ranking it in a lower position among the major industries we examine.

Operations Profile

PENGYUAN considers five operational sub-factors when assessing a corporate issuer's operations profile. These are:

- (1) operating scale
- (2) products, services and technology (PST)
- (3) brand image and market share (BIMS)
- (4) operating efficiency
- (5) business diversity.

These five sub-factors will be assessed on a seven-point numeric scale, with '7' as the highest score and lowest risk, and '1' as the lowest score and highest risk.

Exhibit 2: Sub-factors for operations profile

Weight	Score range	Sub-factors
20%	1-7	Operating Scale
25%	1-7	Product, Service & Technology
20%	1-7	Brand Image & Market Shares
20%	1-7	Operating Efficiency
15%	1-7	Business Diversity

We assign the weighting of 20%, 25%, 20%, 20% and 15% to each of the five sub-factors, which is different from the weightings we assign to these sub-factors in General Corporate Rating Criteria, i.e., 20%, 20%, 15%, 25%, 20%.

We believe we should give a higher weighting to Product, Service & Technology rather than Operating Efficiency when we assess the operation profile of automobile OEMs. In our opinion, the PST sub-factor is critical to an automaker's long-term survivorship and its core competitiveness especially when frontier technologies in autonomous driving, vehicles connectivity, electrification and shared mobility become more important.

The rating scale or the weighted score for the Operation Profile is banded into the descriptive categories shown in Exhibit 3.

Exhibit 3: Translation Table for Weighted Average Assessment Scores to Operations Profile

Weighted average assessment score	Operations Profile
>6.5 - 7	Excellent
>5.5 - 6.5	Very Strong
>4.5 - 5.5	Strong
>3.5 - 4.5	Moderate
>2.5 - 3.5	Weak
>1.5 - 2.5	Fairly Weak
1.0-1.5	Vulnerable

Operating Scale

PENGYUAN measures an automobile OEM's operating scale primarily by sales volume. This differs from our General Corporate Rating Criteria where we use revenue as the primary measuring factor for operating scale. We believe that there are some limitations to relying on revenue to measure operating scale for automobile OEMs. First, in the case of an automaker that primarily manufactures luxury models that have limited production and sales volumes but a very high selling price, revenue might inflate that automaker's operating scale. Second, revenue fails to consider sales volume achieved through joint ventures

as it only captures volume sold on a consolidated basis - the sales volume we consider includes the volume made by joint ventures. Last, revenue of automobile OEMs usually includes the business of captive finance that is seen as a side business of OEMs.

While sales volume is the primary determinant of operating scale when we evaluate an automobile manufacturer, we will also consider revenue as an additional factor. We believe a consideration of revenue makes our analysis more cross-industry comparable and we will make some adjustments to our evaluation on operating scale based on Exhibit 4 if there is a large discrepancy between sales volume and revenue size.

PENGYUAN understands that some automobile OEMs who make commercial or special-purpose vehicles – niche-market products – are smaller in scale by nature when compared with OEMs manufacturing passenger vehicles. When evaluating the operating scale of these automobile OEMs, we will make additional adjustments rather than strictly following the scoring rules set in Exhibit 4. By doing so, we seek to avoid punishing automobile OEMs that make niche-market products for their relatively smaller scale.

Exhibit 4: Operating Scale

Score	Sales Volume
7	More than 8 million
6	6 – 8 million
5	4 – 6 million
4	3 – 4 million
3	2 – 3 million
2	1 – 2 million
1	Less than 1 million

Products, Services & Technology (PST)

PENGYUAN deems PST essential for automobile OEMs to survive and remain competitive in the long run. There are key points that we pay more attention to when assigning a score to PST of an automobile OEM. These points serve as supplementary guidance on top of our General Corporate Rating Criteria.

Products

- Product quality:** product quality is one of the lifelines for OEMs to maintain their long-term competitiveness and to gain loyalty from customers. We assess the product quality of an automobile OEM principally based on its track record of vehicles recalled in the past, consumer feedback on quality as well as reports on quality from other channels including well-known industry websites such as JD Power and AutoHome. Additionally, we believe that the warranty an OEM offers for its products can also give a hint as to its product quality.
- Product pipeline:** product pipeline is a way to measure an automaker’s capabilities in product development. In our view, the regular launch of brand-new or facelifted models is tremendously important as it enables the automaker to constantly remind consumers of their products and brands. In the passenger car segment, car buyers love options and tend to make a comparison among various products. As such, how many models an OEM produces and how frequently it can renew their existing products is crucial for expanding its market influence in the market.
- Product popularity:** having a well-known brand and highly sought-after models means an automobile manufacturer should have very competitive products. There are a number of industry websites globally that rank sales volume of different models in different regions. We believe it is a good sign if a manufacturers’ product ranks in the top 10 in various regions.

- **Pricing premium:** premiumization of products is also a reflection on an OEM's product competitiveness. Premium or higher-end products tends to have a greater market suggested retail price (MSRP), which suggests stronger bargaining power for the OEM with consumers.

Services

- **Distribution and services network:** an automakers' distribution and services network plays an important role in helping OEMs reach and serve customers. OEMs need to build sales and service points either through direct ownership or franchising to provide sales and after-sale services to car purchasers. In our opinion, the larger number of sales and services points an OEM can establish, the broader reach to customers it can make. With a wider distribution and service network OEMs are able to take better care of their customers throughout the lifecycle of their vehicles. This can lead to higher loyalty and reputational gains.
- **Availability of financing service:** automobile financing has been prevalent in developed markets for years and it is gaining significant penetration in some developing markets, such as China. Most of automobile OEMs globally have their own captive finance business that offers financing services to both wholesalers and retailers. This service, to some extent, can boost automobile consumption as it helps ease purchasers' possible financing limits and also improves customer stickiness.

Technology

- **Technological strength in core components and platform architecture:** generally speaking, automobile OEMs perform the role of assembling various components into a final product but the ability to make core components in-house can reflect the technological strength of OEMs. For example, we will consider whether the OEM has the capability to design and manufacture a high-performance engine when we are assessing the technology of OEMs. In addition, as many OEMs are putting greater focus on modular platform architecture (allowing a number of different models to be built on the same platform, which is in a more efficient way) we also examine whether an OEM has the technology associated with building a modular platform.
- **Technology relating to ACES:** 'Automated, Connected, Electric, Shared', also known as ACES, is the technological frontier of the automobile manufacturing industry. It involves technologies related to autonomous driving, inter-connection among vehicles and to the cloud, electric vehicles and the emerging mobility of car hailing and sharing. ACES is a sure sign that the automobile manufacturing industry is radically transforming from a 'hardware-defined' past to a 'software-defined' future. Automobile OEMs have to make their products 'smart' in order to gain traction among consumers, especially younger generations. We consider an OEMs' efforts in ACES when dealing with the assessment on technology.

We incorporate the above-mentioned considerations into the scoring guidance below to give a greater sense of how our rating committee assesses PST for automobile OEMs.

Exhibit 5: Products, Services & Technology (PST)

7	The company's products and services are essential, not substitutable and extremely desirable. The company is the technology leader and sets standards for the industry and controls most of the key industry patents. Its rivals are not able to close the technology and quality gap for a very long time.
6	The company's products and services are essential, desirable and the company has a substantial technology advantage over the vast majority of its competitors with various patent protections. Its rivals are not able to close the technology and quality gap for the foreseeable future.
5	The company's products and services are important to the industry. The company is a technology innovator in some aspects with some patent protection. However, the company's technology lead is not significant and it needs a lot of effort to maintain its position in its industry.
4	The company's products and services are generic and subject to substitution risk. The company is a technology innovator in some aspects with some patent protection. However, the company's technology lead is not significant and it needs a strong effort to maintain its position in the industry.
3	The company's products and services are generic and substitutable. The company is a technology follower in some aspects with very little patent protection. The company faces challenges in keeping up with technology development.
2	The company's products and services are easily replaced. The company is a technology follower in every aspect with no patent protection. The company has fallen behind the industry's technology development noticeably.
1	The company's products and services are obsolete and the company uses other players' technologies. The company is increasingly falling behind the industry's technology development and has no hope of catching up.

Brand Image and Market Share (BIMS)

PENGYUAN believes brand image is crucial for an automobile OEM to maintain its core competitiveness in the long term. In our view, brand image can only be built over time and with continuous dedication to improving product, service and technology. Marketing tactics are also pivotal to painting brand image. Once successfully established, a strong brand image can help OEMs gain bargaining power over and loyalty from customers as customers are willing to pay a price premium on products from an automaker whose brand they value. Given the increased importance placed on the environment, society, and governance (ESG) in recent years, we also believe that the corporate behavior of an OEM on ESG will have a significant impact on its brand image. We particularly examine how great are an OEM's efforts in reducing their CO2 emission when considering the environmental impact on its brand image.

The concept of market share in the automobile manufacturing industry is usually measured by sales volume, and it is a quantitative indicator reflecting an OEM's brand recognition and its product competitiveness. Gaining market share is strategically important to OEMs as it can help them cement customer stickiness.

The abovesaid considerations with respect to how the rating committee will evaluate an OEM's brand image and market share are incorporated into Exhibit 6 – a general guidance on how to assign scores on BIMS.

Exhibit 6: Brand Image & Market Share (BIMS)

- | | |
|---|---|
| 7 | <p>Top brand recognition with extremely high customer stickiness which creates insurmountable barriers for competitors.</p> <p>Dominant market share and lead over competitors by a very large margin, so no meaningful competition for the foreseeable future.</p> |
| 6 | <p>Very high brand recognition with very high customer stickiness which creates very strong barriers for competitors.</p> <p>Leading market share which is sustainable for the foreseeable future. A lead over the competition by a solid margin but some competitors are following closely behind.</p> |
| 5 | <p>High brand recognition with high customer stickiness which creates strong barriers for competitors.</p> <p>One of the leaders in terms of market share but needs to watch out for competitors as it could fall out of the leaders' group if technology trends, market conditions or customer preferences turn against the company.</p> |
| 4 | <p>Moderate brand recognition with some customer stickiness which creates some barriers for competitors.</p> <p>The company is not in a leading position in terms of market share but a close follower and not showing any sign of falling far behind. The company is able to keep up with market developments and maintain its market share.</p> |
| 3 | <p>Little brand recognition and not much customer stickiness; competitors can replace the company with some effort.</p> <p>Small market share which may not be sustainable if the company can't keep up with market developments and competitors step up their efforts to take market share from the company.</p> |
| 2 | <p>Very little brand recognition, no customer stickiness, widespread competition.</p> <p>Tiny market share which is not sustainable if competitors enter its market. The company cannot create much meaningful barriers to deter rivals.</p> |
| 1 | <p>No brand recognition, no customer stickiness, widespread competition.</p> <p>Negligible market share which is not sustainable if competitors enter its market. The company cannot create any meaningful barrier to deter rivals.</p> |

Operating Efficiency

Apart from the guidance on how to assess operating efficiency outlined in General Corporate Rating Criteria (Exhibit 7), PENGYUAN specifically underscore some key indicators for automobile manufacturers in assessing their operating efficiency.

- Capacity utilization rate:** the automobile manufacturing industry is very asset-heavy. OEMs need to build sufficiently large capacity in order to achieve economies of scale. Therefore, how well an OEM can use its capacity – mainly measured by the capacity utilization rate – offers some hints on its operating efficiency. Generally speaking, an automobile OEM needs to maintain a certain level of capacity utilization in a bid to achieve break-even. In our view, too much idle capacity – far below the break-even utilization rate - is arguably inefficient as it hurts an OEM's gross profit margin significantly. On the other hand, an OEM is also considered inefficient if its capacity is pushed to the limit too often. In this case, it will most likely prolong order lead times such that customers might shift to other OEMs with shorter order lead times.
- Inventory level at dealership:** inventory held in dealerships is also known as channel inventory. The ability to manage channel inventory can also demonstrate the operating efficiency of an OEM. Whether channel inventory is too high or too low is defined variably in different countries and there is no clear-cut level that works globally. In our opinion, having too high channel inventory means dealers are likely to offer big discounts to customers in order to alleviate their inventory burden. An OEM would need to provide strong sales rebates to compensate the dealers for the profit hit that results from these heavy discounts. This, in turn, will take a toll on the OEM's gross profit margin. If big discounts become recurrent, it will also be harmful for the OEM's brand image. In contrast, too little channel inventory will prompt long delivery times for customers just when the demand for the OEM's products is hot and the OEM risks losing customers.

Exhibit 7: Operating Efficiency

7	6	5	4	3	2	1
<p>Company's cost structure is the lowest in the industry, which has consistently led to highest profitability among its peers.</p> <p>Consistently demonstrates excellent ability to manage fixed and variable costs in cyclical downturns.</p> <p>Best working capital management capability, evidenced by consistently best cash conversion cycle in the industry.</p>	<p>Company's cost structure is at top end in the industry, which has consistently led to much higher profitability than its peers.</p> <p>Consistently demonstrates strong ability to manage fixed and variable costs in cyclical downturns.</p> <p>Strong working capital management, evidenced by consistently top performance on the cash conversion cycle in the industry.</p>	<p>Company's cost structure is better than the industry average, which has consistently led to higher than average profitability.</p> <p>Consistently demonstrates above average ability to manage fixed and variable costs in cyclical downturns.</p> <p>Good working capital management, evidenced by consistently above average cash conversion cycle in the industry.</p>	<p>Company's cost structure is average in the industry, which led to average profitability.</p> <p>Consistently demonstrates average ability to manage fixed and variable costs in cyclical downturns.</p> <p>Average working capital management, evidenced by average cash conversion cycle in the industry.</p>	<p>Company's cost structure is worse than the industry average, which has consistently led to below average profitability.</p> <p>Insufficient ability to manage fixed and variable costs in cyclical downturns.</p> <p>Average working capital management, evidenced by consistently below average cash conversion cycle in the industry.</p>	<p>Company's cost structure is worse than most peers in the industry, which has consistently led to low profitability.</p> <p>Very little ability to manage fixed and variable costs in cyclical downturns.</p> <p>Weak working capital management, evidenced by consistently poor performance on the cash conversion cycle in the industry.</p>	<p>Company's cost structure is the worst in the industry, which has consistently led to the lowest profitability.</p> <p>Incapable of managing fixed and variable costs in cyclical downturns.</p> <p>Worst working capital management, evidenced by consistently the worst cash conversion cycle in the industry.</p>

Business Diversity

PENGYUAN believes that business diversity among products, brands, suppliers as well as geographical allocation of capacity is strategically indispensable for automobile OEMs to diversify their multiple risk exposures. As a supplementary guidance on top of our General Corporate Rating Criteria (Exhibit 8), we highlight some key considerations below on how we assess automakers' business diversity.

- Geographical diversity:** we consider the geographical diversity in sales and production as paramount to OEMs. Selling products in different markets not only expands their global footprint but can also strengthen resistance to sales volatility. Tapping into multiple geographical markets can help OEMs smooth fluctuations in sales volume through taking advantages of various consumption cycles in different markets. On the production front, allocating capacity into multiple geographical locations can let OEMs harness lower production cost in some developing regions or countries. Additionally, this can also help OEMs diversify production risks when one factory is out of work due to some unexpected shock others can take up the slack.
- Product diversity:** consumers love options. Product diversity can help OEMs entertain this characteristic of consumers. At the same time, single-product risk can be offset by introducing multiple types of products. For example, we consider an OEM with a balanced product mix among sedan, SUV and MPV and between passenger cars and commercial cars as performing better in product diversification than those with limited product options.
- Multi-brand strategy:** adopting a multi-brand strategy enables carmakers to tap into various market segments. A specific brand, in our view, is supposed to cater for a specific group of consumers sharing similar product preferences. An OEM operating multiple brands is deemed more resilient amid the automobile consumption cycle as a portfolio of brands is a better way to diversify business risk in our opinion.

Exhibit 8: Business Diversity

7	Business diversity, geographic diversity, product diversity, supplier diversity, client diversity. At least five clearly defined and uncorrelated business lines, and other diversities are all fully achieved.
6	Business diversity, geographic diversity, product diversity, supplier diversity, client diversity. At least four clearly defined and uncorrelated business lines, and other diversities are all fully achieved.
5	Business diversity, geographic diversity, product diversity, supplier diversity, client diversity. At least three clearly defined and uncorrelated business lines, and other diversities are all fully achieved.
4	Business diversity, geographic diversity, product diversity, supplier diversity, client diversity. At least two clearly defined and uncorrelated business lines, and other diversities are mostly achieved.
3	Business diversity, geographic diversity, product diversity, supplier diversity, client diversity. Among these five types of diversities, three are mostly achieved.
2	Business diversity, geographic diversity, product diversity, supplier diversity, client diversity. Among these five types of diversity, two are reasonably achieved.
1	Business diversity, geographic diversity, product diversity, supplier diversity, client diversity. Among these five types of diversity, one or none is reasonably achieved.

Financial Profile Analysis

PENGYUAN's financial profile analysis focuses on a variety of numeric and quantitative indicators designed to reveal the financial strength and leverage of each company. PENGYUAN ranks the company's financial profile by analyzing its cashflow-based leverage, financial volatility, debt structure, financial policy, and profitability relative to peers. Combining the Business Profile and Financial Profile, we will derive the indicative credit score for a corporate issuer. Both the leverage profile and profitability assessment are based on an 18-point scale, which has both alphabetic and numeric scales, with 'aaa' as the highest profitability and lowest financial leverage, and 'ccc/ccc-' as the lowest profitability and highest financial leverage.

Exhibit 9: Sub-factors for financial profile

Sub-Factors	Weight	Ratios
Leverage Profile	30%	Debt/EBITDA
	20%	FFO/Debt
	30%	EBITDA Interest Coverage
	20%	Gross Debt/Total Capitalization
Profitability Assessment		EBITDA Margin
		Return on Invested Capital

We adopt a notching approach to adjust a company's leverage profile to derive the financial profile by adjusting up and down the leverage profile based on the company's profitability. The approach we use to assess the financial profile of automakers is aligned with our General Corporate Rating Criteria.

In addition, a partial consolidation approach might be used to assess an automaker when its joint-venture business operation is remarkably significant in contributing profit to the automaker. Under global accounting standards, the equity method is usually adopted in measuring the financial impact of joint ventures on the corporate. However, we believe this method might conceal some off-balance-sheet risk especially when the corporate's profitability heavily relies on its joint ventures. In this case, we will combine the financials of joint ventures proportionately based on the percentage of shareholdings into the

financials of the corporate. We then calculate the ratios we use to evaluate leverage and profitability on the partial-consolidation basis.

Leverage Profile

Leverage ratios PENGYUAN use to measure automobile OEMs' leverage profile is on par with ratios defined in our General Corporate Rating Criteria. There are four core leverage ratios, namely debt to EBITDA, fund from operations (FFO) to debt, EBITDA interest coverage, gross debt over total capitalization, and two non-core leverage ratios for our supplementary analysis, namely operating cashflow over debt and free cashflow over debt. We believe these leverage ratios – focusing on the ability to service the debt and interest payment via operating profit and cash flow as well as free cash flow – can provide an appropriate approach to evaluate the leverage condition of automobile OEMs. All ratios are calculated on an adjusted basis, and the definitions of these ratios are subject to PENGYUAN's interpretation.

Each of these ratios is assessed on a five-year weighted average basis with the chronological weights of 10%, 15%, 25%, 25% 25% for the year t-2, t-1, t, t+1, t+2 respectively, where t represents the current year. More weight is given to future years to emphasize PENGYUAN's ratings are forward-looking opinions on a company's creditworthiness. However, when a company goes through drastic transformation or changes in corporate structure such as mergers and acquisitions, large one-time capital investment or dividend payout, etc., the historical financial data may not properly reflect what a company will be like in future. In these cases, PENGYUAN applies the weights of 40%, 30%, 30% for the current year and subsequent two years.

If a company is in a particularly volatile industry, or expects to experience very high cashflow uncertainty in the coming years, or if the company's financial performance is irrelevant for some reason in some years, the criteria allow rating committees to adopt a weighting that properly reflects the company's true financial strength and credit profile.

Exhibit 10: Leverage Profile Analysis Ratios

Letter	Numeric	Debt/EBITDA		EBITDA Int. Cov.		Gross Debt/Cap (%)		FFO/Debt (%)	
		Low	High	Low	High	Low	High	Low	High
aaa	18	---	0.00	20	---	0	15	65	---
aa+	17	0.00	0.67	18	20	15	20	60	65
aa	16	0.67	1.00	16	18	20	23	56	60
aa-	15	1.00	1.33	14	16	23	27	52	56
a+	14	1.33	1.67	12	14	27	30	48	52
a	13	1.67	2.00	10	12	30	33	44	48
a-	12	2.00	2.33	9	10	33	37	40	44
bbb+	11	2.33	2.67	8	9	37	40	36	40
bbb	10	2.67	3.00	7	8	40	43	32	36
bbb-	9	3.00	3.33	6	7	43	47	28	32
bb+	8	3.33	3.67	5	6	47	50	24	28
bb	7	3.67	4.00	4	5	50	53	20	24
bb-	6	4.00	4.50	3	4	53	57	16	20
b+	5	4.50	5.00	2	3	57	60	12	16
b	4	5.00	5.50	1.5	2	60	63	8	12
b-	3	5.50	6.00	1	1.5	63	67	0	8
ccc+	2	6.00	7.00	0.5	1	67	70	-3	0
ccc/ccc-	1	7.00	---	---	0.5	70	---	---	-3

Toning Factors for Leverage Profile

Toning factors PENGYUAN adopt to fine tune the preliminary leverage profile to reach the final leverage profile assessment on automobile manufacturers are in line with our General Corporate Rating Criteria.

Profitability Assessment

PENGYUAN emphasize on EBITDA margin and return on invested capital (ROIC) to assess automakers' profitability. Affecting factors on an automaker's operating profitability includes product profitability which is measured by gross profit margin and the ability to control various cost and expenses, and therefore EBITDA margin is a comprehensive reflection on an automaker's competitiveness in product development and cost management; ROIC which incorporates the consideration on invested capital is able to demonstrate an OEM's efficiency in making use of capital. For absolute profitability, we compare the company's profitability with its peers in the same industry using a five-point scoring system: '5,4,3,2,1'. The highest profitability within the industry will be assigned a score of '5'.

PENGYUAN not only assesses the company's absolute profitability, but also considers the long-term trend and volatility of the company's profitability. This help us to take a dynamic approach to evaluate an OEM's profitability by being forward-looking and considering the stability of profit over the time. We use a three-point scale to assess the trend and volatility of profitability, namely 'outperform', 'average', 'underperform'. The trend and volatility of profitability may be analyzed based on the absolute EBITDA or other profit trends and volatility, or it may be assessed on the EBITDA margin or other margin trends and volatility.

We incorporate absolute profitability and the trend and volatility of profitability into our final profitability assessment, which is expressed in a five-point scale: 'very strong (VS)', 'strong (S)', 'medium (M)', 'weak (W)', 'very weak (VW)'.

Exhibit 11: Determining the Profitability Assessment

Trend & Volatility	Level of Profitability				
	5	4	3	2	1
Outperform	VS	VS	S	M	W
Average	VS	S	M	W	VW
Underperform	S	M	W	VW	VW

In our view, the automobile manufacturing industry is classified as low profitability thanks to several reasons. Essentially, automobile consumption accounts for a significant proportion of people's disposal income and therefore people are very sensitive to the price. In this regard, automakers find it hard to raise prices drastically to compensate for their rising cost of production as well as heavy input in research and development. Meanwhile, automobile manufacturing is an asset-heavy business with relatively high operating leverage. The majority of automobile OEMs' gross profit margin span from low teens to around 20% with a few exceptional cases that have gross profit margins beyond 25%. Net profit margins are in the range of low single digits to low teens. As such, we use the profitability guidance for low level from our General Corporate Rating Criteria as presented in Exhibit 12.

Exhibit 12: Profitability assessment

Numeric Score	EBITDA Margin		ROIC	
	Low	High	Low	High
5	20	---	15	---
4	12	20	10	15
3	6	12	5	10
2	3	6	2.5	5
1	---	3	---	2.5

Adjustment Factors

PENGYUAN also evaluate the adjustment factors discussed in General Corporate Rating Criteria to achieve a SACP for automobile OEMs in conjunction with rating factors addressed in the criteria above.

Stand-Alone Credit Profile (SACP)

The definition and application of stand-alone credit profile for automobile manufacturers align with General Corporate Rating Criteria.

External Support Assessment (ESA)

PENGYUAN also take into account the external supports for automobile manufacturers, which is consistent with General Corporate Rating Criteria.

Related Criteria and Research

- Rating Symbols and Definitions, 7 May 2018
- General Principles of Credit Ratings, 15 March 2018
- Corporate Financial Adjustments and Ratio Definitions, 7 May 2018

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