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CREDIT OPINION
20 December 2022

Update

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RATINGS

Volkswagen Aktiengesellschaft

Domicile	Wolfsburg, Germany
Long Term Rating	A3
Type	LT Issuer Rating
Outlook	Stable

Please see the ratings section at the end of this report for more information. The ratings and outlook shown reflect information as of the publication date.

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Volkswagen Aktiengesellschaft

Update on Key Credit Considerations

Summary

Volkswagen Aktiengesellschaft's (Volkswagen, or VW) A3 long-term ratings are supported by its robust portfolio of highly recognisable brands and established market positions in Western Europe and China, where its main brand, Volkswagen Passenger Cars, generally benefits from a pricing advantage over other volume brands; its generally successful and frequent model launches; its geographical diversification and good product offering that help shield the group's earnings and cash flow from local or regional demand cycles, which are inherent to the automotive industry; our expectation of sustainable, positive and robust free cash flow (FCF) generation (adjusted for the outflows related to the diesel issue), despite high investments; the company's sizeable liquidity position and solid credit metrics.

VW has been able to restore its metrics in a favourable market environment, with strong customer demand leading to improved price and mix effects for automakers, but also depressed production volumes due to supply chain issues. As a result, VW's EBITA margin (Moody's adjusted) increased to 7.4% in the last twelve months to September 2022 (6.0% in 2020). Considering VW's remarkable track record of sustainable performance against most peers over the last few years, we expect margins to be sustained at a level of around 7%, notwithstanding some weakening we expect for 2023. The group's global reach across a multitude of brands and model types while simultaneously using its large scale to efficiently deploy and use resources should allow its sufficient operating leverage to quickly recover profitability, even at times of more difficult macroeconomic conditions. The group also has significant exposure to the Chinese market, which was more resilient during the 2020 crisis and which has recovered quicker than other regions of the world. China is Volkswagen's largest single market, with 3.3 million units (38% of group) sold in 2021. With a share of 16% (2021), Volkswagen has been the market leader in the country. However, performance has been lackluster in the last few years and the group has lost some market share to competitors.

VW's ratings are constrained by the high cyclicality of the automotive industry; the remainder of legal and remediation costs associated with the diesel emission issue; globally increasing environmental standards, stricter emissions regulation and electrification, which require high investments into R&D and new model launches; and the complexity within the group, given the global scale of VW, its multiple brands and product strategy.

The IPO of VW's subsidiary Dr. Ing. h.c. F. Porsche AG (Porsche AG) at the end of September 2022 and the sale of a minority stake to Porsche Automobil Holding SE (Porsche Holding) will lead to total proceeds of approximately €19.2 billion. Even after the payment of a special dividend of €9.6 billion in early 2023, the transaction will improve VW's financial flexibility,

a credit positive. At the same time, the sale of the minority stake in Porsche will increase the complexity of VW's governance, and dividend payments to minority shareholders of Porsche AG will lead to some cash leakage within the VW group going forward.

Credit strengths

» Robust and diversified business profile, with strong positions in the global automotive market

» Underlying profitability to benefit from VW's modular tool kit strategy and cost reductions

» Ability to offer attractive financing, which is a key component of VW's business model

» Sizeable liquidity position

Credit challenges

» Difficult market environment for the automotive industry globally, including its high cyclicality and a highly competitive market environment

» Legal and remediation costs associated with the diesel emissions issue, which continue to consume capital, although most of the required diesel emissions issue-related payments have already been made, and the remaining risks stemming from potential fines, penalties and ongoing lawsuits

» Corporate governance issues

» Increased need for investment to cope with the regulatory risk regarding fuel efficiency and emission reductions as well as for the development and production of alternative fuel vehicles

» Strong divergence in profitability across passenger car brands

» Credit metrics somewhat weaker than those of its peers

Rating outlook

The stable outlook reflects our expectation of continued recovery in global light vehicle sales in 2023, but with increasing challenges in the second half, once the existing order backlog has been executed. On the back of this volume recovery, and despite a weakening consumer sentiment, we expect VW to be able to achieve Moody's-adjusted EBITA margin of around 6%-7% (7.4% in LTM September 2022), maintain debt/EBITDA (Moody's-adjusted) below 2.0x (1.9x in LTM September 2022) and generate positive FCF (Moody's-adjusted) within the next 12-18 months.

Factors that could lead to an upgrade

We would consider upgrading VW's ratings if:

» VW demonstrates its ability to, at least, protect its market share in the major markets where it operates, especially in Western Europe and China, regardless of potential changes in global macroeconomic conditions,

» there is a significantly improved competitive position for the Volkswagen Passenger Cars brand and in the US market,

» there is a more consistent earnings pattern across its commercial vehicle brands as a result of the successful execution of its long-term plan for the division,

» more stringent corporate governance structures are implemented,

» VW generates robust cash flow on a sustained basis, despite elevated capital spending, with Moody's-adjusted FCF/debt of around 10%,

» VW's Moody's-adjusted EBITA margin is above 7% on a sustained basis

Factors that could lead to a downgrade

VW's ratings could be downgraded in case of an operational weakness or more aggressive financial policies resulting in:

» Moody's-adjusted EBITA margin below 7%,

» Moody's-adjusted debt/EBITDA to above 2.5x, or

» FCF/debt (Moody's-adjusted) falling below mid single-digit percentages for a prolonged period.

Also, an erosion in VW's market shares in its core markets, as well as its inability to enhance Volkswagen Passenger Cars' profitability to a more competitive level on a sustained basis, and a weakening of the company's liquidity profile could lead to a rating downgrade.

Key Indicators

Volkswagen Aktiengesellschaft

	Dec-18	Dec-19	Dec-20	Dec-21	LTM Sep-22	2023 (E)
EBITA Margin %	8.6%	8.3%	6.0%	6.9%	7.4%	6.0% -7.0%
EBITA Margin % excl. JVs	6.9%	6.7%	4.5%	5.8%	6.5%	5.0% - 6.0%
Debt / EBITDA	2.0x	1.9x	2.8x	2.4x	1.9x	1.5x - 2.0x
Debt / EBITDA excl. JVs	2.3x	2.1x	3.2x	2.6x	2.0x	1.7x - 2.2x
(Cash + Marketable Securities) / Debt	63.0%	60.0%	63.7%	68.2%	73.5%	90% - 100%
RCF / Debt	31.0%	43.0%	21.1%	28.4%	28.9%	30% - 35%
FCF / Debt	-3.6%	15.9%	4.4%	14.6%	8.5%	8% - 10%
EBITA / Interest Expense	8.6x	10.4x	7.1x	9.2x	7.5x	7.0x - 8.0x

2023 (E) represents Moody's forward view, not the view of the issuer
Source: Moody's Financial Metrics™

Profile

Volkswagen Aktiengesellschaft, headquartered in Wolfsburg, Germany, is Europe's largest car manufacturer in terms of passenger car unit sales, with a market share of 24% in 2021 in Europe (according to the European Automobile Manufacturers Association), and one of the two largest globally, marginally below Toyota Motor Corporation (A1/P-1 stable).

VW manufactures mass-market and premium vehicles under the Volkswagen Passenger Cars, SKODA, SEAT, Cupra, Audi, Bentley, Lamborghini and Porsche brands, as well as commercial vehicles under the Volkswagen Commercial Vehicles brands. VW also produces trucks and busses via its publicly listed subsidiary TRATON SE (Baa2 stable, VW share 89.7%), which produces vehicles under the MAN, Scania, Navistar and VW Truck & Bus brands. In addition, VW's subsidiary Audi has a 100% stake in the premium motorcycle manufacturer, Ducati.

In 2021, VW delivered 8.9 million vehicles to its customers (9.3 million in 2020). Volkswagen generates the vast majority of its unit sales in Europe and other regions (43% in last twelve months to March 2022) as well as Asia-Pacific (43%, predominantly China), followed by North America (9%) and South America (5%).

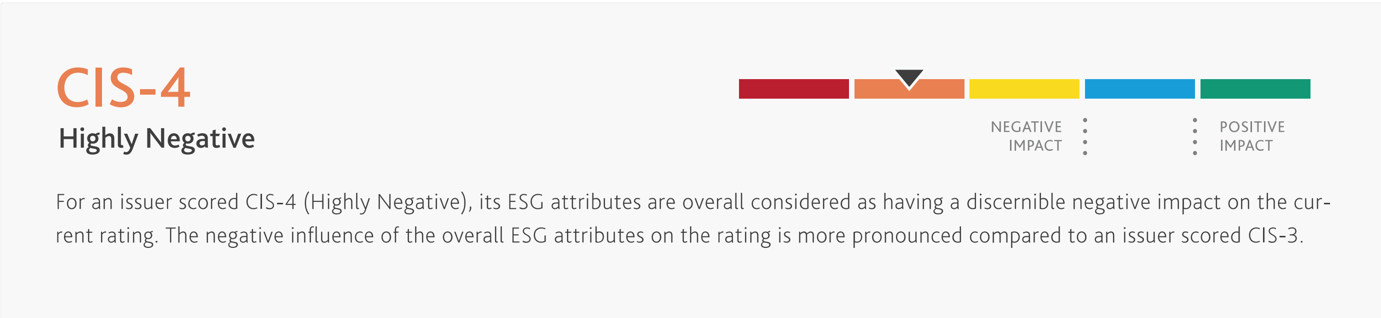
VW also provides a full range of banking, leasing, insurance and mobility services mainly through its subsidiaries Volkswagen Financial Services AG (A3/P-2 stable) and Volkswagen Bank GmbH (bank deposits A1, senior unsecured A3 stable, BCA baa2). Volkswagen Bank GmbH holds a banking licence and offers wholesale and retail banking services.

ESG considerations

Volkswagen Aktiengesellschaft's ESG Credit Impact Score is Highly Negative CIS-4

Exhibit 2

ESG Credit Impact Score

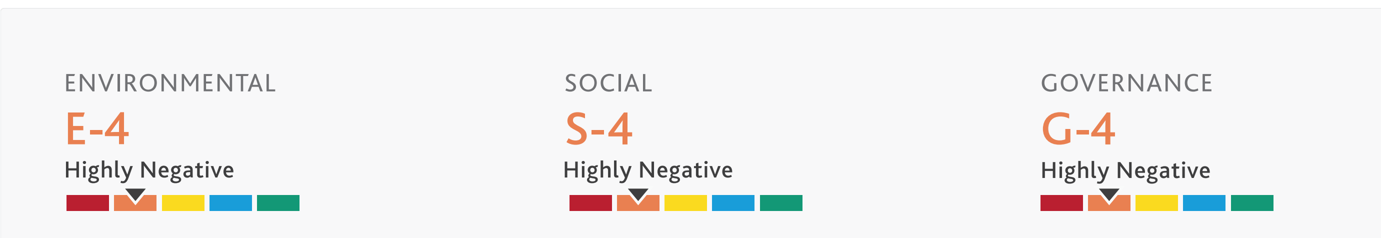


Source: Moody's Investors Service

CIS-4. ESG considerations have a highly negative impact on VW's rating. We downgraded VW to A3 when the Diesel issue emerged in 2015. Since then, the company has spent more than €30 billion for litigation and compensation payments, which otherwise could have been invested into the business. The main ESG risks relate to carbon transition and the high costs to manage it, and to company's relatively weak governance, which are both constraints to the rating.

Exhibit 3

ESG Issuer Profile Scores



Source: Moody's Investors Service

Environmental

E-4. VW is highly negatively exposed to environmental risks. The key risk relates to carbon transition, which is a high risk for the global auto sector in terms of stricter environmental regulation and the trend towards low and zero emission vehicles. VW has, however, taken mitigating actions by developing and successfully launching electrified vehicles (plug-in hybrids and battery electric vehicles) and investing sizeable amounts into future technologies. It also managed to reduce average fleet emissions in the EU substantially since 2020 and fully complied with the stricter targets in 2021.

Social

S-4. VW is exposed to high social risks. Human capital risks incorporate the reliance to a highly skilled workforce and high strike risks, given the high degree of unionization of production workforce. Responsible production risks are also high, given the complexity of the global supply chain and very high requirements for vehicle product quality. Demographic & Societal Trends include the heightened environmental awareness among consumers and the risk that brand loyalty among younger consumers might gradually fall.

Governance

G-4. VW's governance risks are high. Whilst its financial strategy and risk management is conservative, the company still has a relatively poor management credibility and track record following the Diesel issue, which emerged in 2015 and which has cost the company more than €30 billion. In addition, the company has a history of high management turnover, which weighs on its credibility. Risks also relate to the company's board structure and policies, as these have to reflect the influence of various strong stakeholders, including the family owners, the German State of Lower Saxony and the workers' unions. The IPO of Porsche AG and the subsequent sale of a minority stake to VW's main shareholder Porsche Holding in 2022 has further increased the complexities of VW's organizational structure as well as board structure, policies and procedures.

ESG Issuer Profile Scores and Credit Impact Scores for the rated entity/transaction are available on Moodys.com. In order to view the latest scores, please click here to go to the landing page for the entity/transaction on MDC and view the ESG Scores section.

Detailed credit considerations

Robust and diversified business profile, with strong positions in the global automotive market

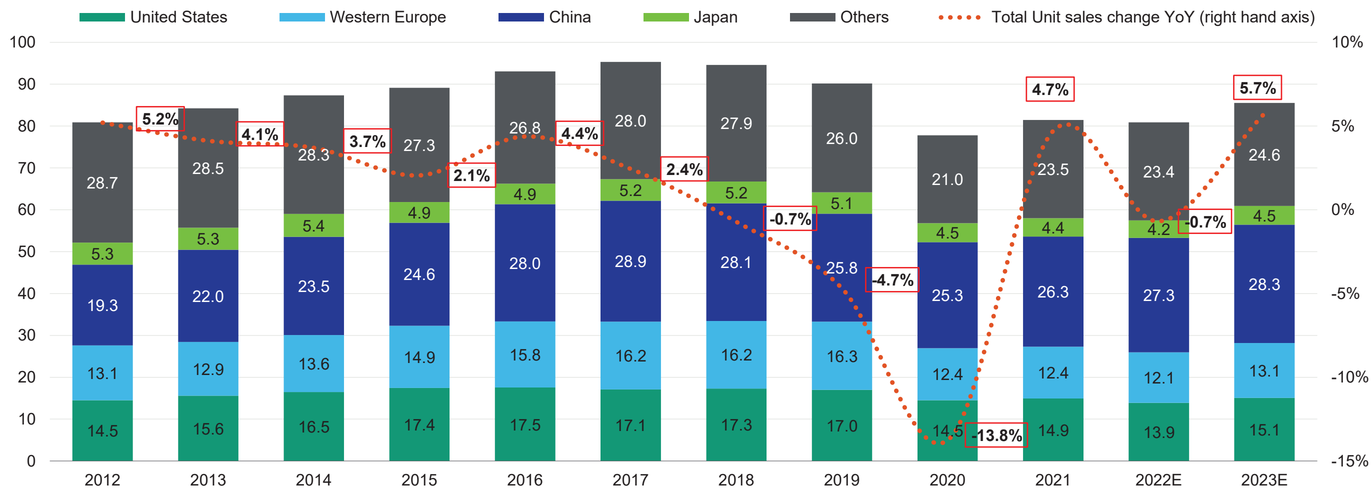
VW has a strong business profile, with leading market positions in Europe (number one position with around 24.3% market share in 2021 [25.4% in 2020, 24.5% in 2019, 24.0% in 2018], according to ACEA), China (number one position achieved through joint ventures [JVs] with local partners) and Brazil (second position, behind Stellantis N.V. (Baa2 stable) and just before General Motors Company (Baa2/Baa3 stable). Given its broad and attractive product and service offering (including the ability to provide customer financing), as well as a strong product pipeline, we expect the company to maintain a market share in Europe at the current level of around 23%-25% in the medium term.

VW's operating performance has recovered from the pandemic lows in 2020. In 2021, group industrial sales revenues increased by 13% to €206.2 billion, 3% below 2019 level of €212.5 billion. Vehicle unit sales decreased to 8.9 million (2021), from 9.3 million (2020), which is still substantially below the 11.0 million in 2019. The ongoing low volumes are driven by a sector-wide shortage in the supply of certain parts, especially semiconductors, since the end of 2020. As VW, like its large peers, allocated the available semiconductors to the more profitable vehicles and gave less price discounts, its operating profit before special items recovered to €20.0 billion in 2021 (8.0% margin, company reported), exceeding pre-pandemic levels of €19.3 billion (7.6% margin in 2019) and substantially above the €10.6 billion (4.8% margin) in 2020. In 2022, the Russia-Ukraine crisis and resulting supply shortages (e.g. for wiring harnesses) as well as covid-related lockdowns in China further affected VW's production. Vehicle unit deliveries fell by 12.9% to 6.1 million units in the first three quarters. However, strong pricing effect led to 8.8% higher sales revenues of around €203 billion compared to the same period last year and strong increase in operating profit from €12.5 billion to €16.7 billion (excluding fair value measurements on derivatives).

We expect VW's deliveries to customers in 2022 to be similar to 2021, thanks to a recovery in the fourth quarter. This should enable Moody's-adjusted EBITA margin to slightly exceed 2021 levels (6.9%) in 2022. We expect the recovery in the automotive industry and somewhat improving supplies with semiconductors together with lower raw material prices to support margins. Higher energy costs, price inflation of parts supplied and rising salaries are constraining factors for VW's profitability in 2023. In addition, the weakening consumer sentiment at times of high price inflation and increasing interest rates will weigh on mix and pricing effects, resulting in a slight decline of margins to around 6.0-7.0% in 2023. We expect VW's Moody's-adjusted debt/EBITDA to remain between 1.5-2.0x within the next 12-18 months, a level which is appropriate for its A3 rating.

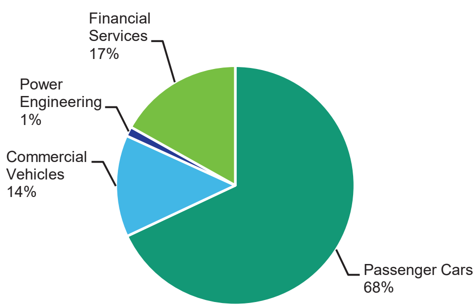
Global light vehicle sales plummeted 14% in 2020 because of the pandemic and recovered by only around 4% in 2021, as production was constrained by a global shortage of semiconductors. We forecast 2.5% global GDP growth for 2022 and 1.3% for 2023, as the global economy is on the verge of a downturn amid persistent inflation, monetary policy tightening, fiscal challenges, geopolitical shifts and financial market volatility (see Global Macro Outlook 2023-24 [November 2022 Update]). For the auto sector, this means a more muted recovery path, with global light vehicle sales being about flat (-0.7%) in 2022 (including production bottlenecks due to disrupted supply chains) and 5.7% growth in 2023 (see our Global Automotive Industry Outlook, published September 2022). With this, global light vehicle sales will remain short of the 2019 sales level of 90 million units and much less (around 10%) than the peak of 95 million units in 2017.

Exhibit 4
Global sales are unlikely to recover to the previous peak levels until mid-2020s
Our projections for global light vehicle unit sales (in million units)



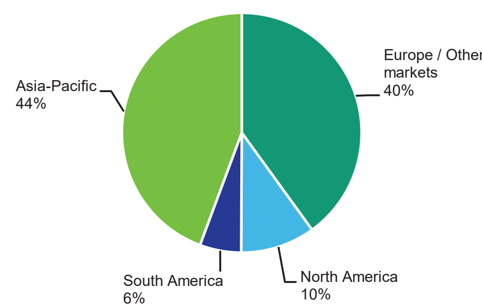
China unit sales represent auto sales, including those of both passenger and commercial vehicles
Source: ACEA, CAAM, LMC and Moody's Investors Service estimates

Exhibit 5
Revenue breakdown by segment
Based on LTM September 2022 revenues



Does not include the Chinese joint venture revenue. Breakdown by sales revenue, excluding internal reconciliation
Source: Company and Moody's Investors Service

Exhibit 6
Vehicle sales by region
Based on LTM September 2022 revenues



Does include the Chinese joint ventures.
Source: Company and Moody's Investors Service

VW's presence in both passenger cars and commercial vehicles brings a degree of diversification to its business risk profile. We expect cooperation between VW's commercial vehicle brands to increase. VW has bundled its commercial vehicle activities under its publicly listed subsidiary TRATON SE (Baa2 stable; VW share: 89.7% as of December 2021), comprising Scania, MAN, Navistar and VW Truck & Bus, which is expected to generate additional synergies over the long term.

Emissions issue-related cost will continue to consume capital, although most of the payments have already been made
Despite the substantial provisions to settle the diesel issue (as Exhibit 5 shows) and the difficult market conditions, we positively note the solid operating performance of the Volkswagen Group over the last years. Special items in 2021 were primarily related to the diesel issue and totaled around €0.8 billion, significantly lower than the €2.3 billion in 2019 and €3.2 billion in 2018. Lawsuits in many regions worldwide are still in place, including the US, Canada, Germany, Italy and the Netherlands. In the US, the Ohio Supreme Court recently declined to dismiss certain claims brought by Ohio, and Volkswagen subsequently sought a review by the US Supreme Court. At this

stage, most of the payments related to the diesel issue, totaling to cost of around €33 billion, were already made in 2016-20 (€28.8 billion). In 2021 and 9M 2022, outflows amounted only to another €1 billion each.

Exhibit 7
VW's remediation and litigation overview

Year	Amount
2015	Legal €7.0 billion Other items €9.2 billion
2016	Mainly legal risks €6.4 billion
2017	Buyback/retrofit program + legal €3.2 billion
2018	Legal €3.2 billion (includes a fine imposed by the public prosecutor in Braunschweig and Munich)
2019	€2.3 billion (includes a fine imposed by the Stuttgart Public Prosecutor on Porsche AG of €0.5 billion and further additions to reserves for legal risks)
2020	€0.9 billion additional legal cost
2021	€0.8 billion special items
2022 (9M)	€0.4 billion special items
Total	**€33.4 billion**

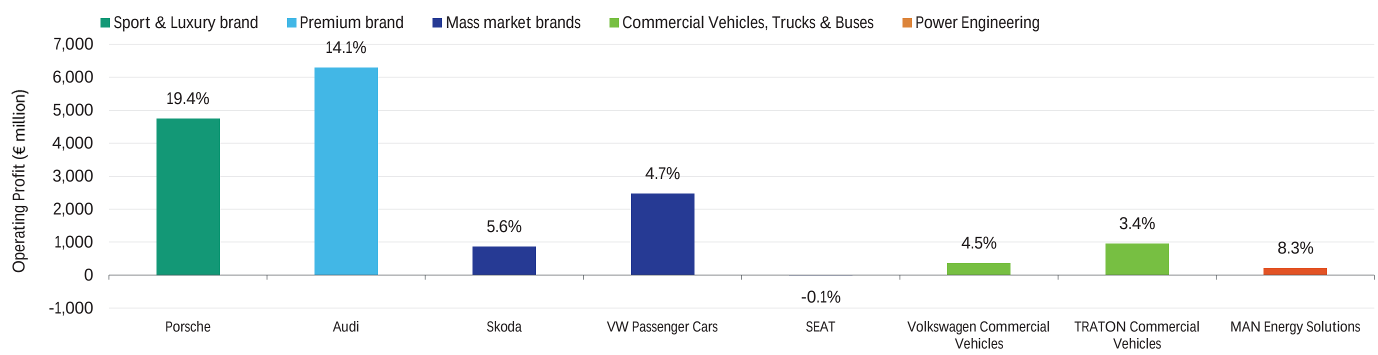
Source: Company and Moody's Investors Service

We expect an improvement in the group's liquidity position over the next two years, as remaining outflows for the diesel issue should remain significantly below the payments in 2016-20. However, we believe that the funds paid to resolve the diesel issue otherwise could have been used for investments in future products or to strengthen the company's credit metrics.

Strong divergence in profitability across passenger car brands

While VW's premium brands continue to drive earnings, higher profitability at the group's other brands is key to the group's objective of achieving a sustainable operating margin before special items of 8%-9% by 2025/26. In 2021, the Audi and Porsche brands alone accounted for around 53% of the group's operating profit (excluding the intercompany profit, special items and results from JVs), with an average operating margin of 12.7%. Volkswagen Passenger Cars and SKODA reported operating margins (before special items) of only 3.3% and 6.1%, respectively, in the same period. SEAT was even negative at -2.4%. In the first three quarters of 2022, all VW brands (except of SEAT and group components) reported positive operating results, with, however, still very tiny levels Commercial Vehicles.

Exhibit 8
Profitability of the Volkswagen Passenger Cars brand is key to achieving higher operating margins at the group level
Reported operating profit and margin by brand and business field YTD September 2022



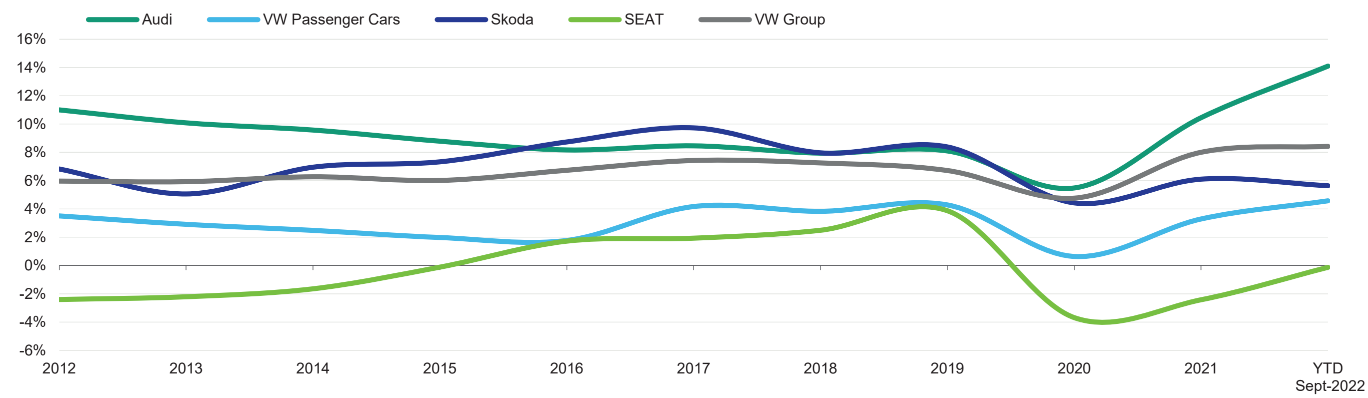
Excluding intercompany profit, special items and results from joint ventures.
Audi's figures include other premium brands' impact of Bentley, Lamborghini and Ducati. Audi's figures exclude €1.3 billion fair value gain on commodity hedging derivatives
Source: Company and Moody's Investors Service

A major challenge for Volkswagen will be to further improve profitability at its main brand Volkswagen Passenger Cars, especially in light of the ongoing electrification of its product portfolio in a highly competitive market segment. Moreover, high investments into the software architecture will continue to weigh on profitability.

Profitability will benefit from the group's modular tool kit strategy and cost reductions, despite significant investment requirements

VW is taking steps to improve its overall cost effectiveness. The group's ongoing strategy to drive economies of scale in unit cost through the global rollout of its MQB (Modularer Querbaukasten) platform will play a key role in enhancing the profitability of its mass-market brands. The effects of the strategy were, so far, most visible at the SKODA and SEAT brands, with their operating margins improving (as reported by VW) by around three and six percentage points, respectively, in 2013-19. This trend was interrupted in 2020, when the profitability of all brands was hurt by the pandemic, with Spain, where SEAT is located, being particularly hit.

Exhibit 9
Positive market conditions YTD September 2022 benefited manufacturers' profitability



Excluding intercompany profit, special items and results from joint ventures; VW Group's operating margin before special items increased to 8.0% in 2021 from 4.8% in 2020.
Source: Company and Moody's Investors Service

Volkswagen aims to gradually improve its profitability. In December 2021, management increased its strategic group operating margin target (before special items) to 8%-9% by 2025/26, from previously 7%-8% by 2025. This includes an interim strategic target of 7%-9% for 2023.

For 2022, Volkswagen aims for a margin between 7.0%-8.5% (before special items), from 4.8% in 2020 and 8.0% in 2021. The sharp recovery in margins has been supported by the current shortage of semiconductor supplies, which leads to a focus on the most profitable vehicles. We expect, however, some normalization of margins from 2023 once the shortage has been resolved, furthermore some raw material prices are already softening. The weakening macroeconomic environment, where consumers are suffering from high price inflation and increased interest rates, energy and salary inflation will also weigh on margins in 2023. To achieve the margin improvements by 2025, the group aims to cut overhead cost, reduce its total number of model variants, and streamline its modular architectures further, reducing them to four major variants.

IPO of Porsche led to substantial cash proceeds, but will make governance more complicated

Since 29 September 2022, Volkswagen's previously wholly owned subsidiary Porsche AG (Porsche) has been publicly listed at the Frankfurt stock exchange. Porsche has been fully embedded in the VW Group and is a technology leader in many categories that are later rolled out to the wider VW group.

Prior to Porsche's IPO, VW had split Porsche's shares into 50% ordinary shares and 50% preference shares. 24.2% of the preference shares (after market stabilization measures) were placed via the IPO to institutional investors, and 25% plus one share of the ordinary shares have been sold to Porsche Automobil Holding SE (Porsche Holding), Volkswagen's main shareholder. This transaction has preserved the group's structure and led to substantial cash proceeds, which have increased the financial flexibility for the group's ongoing technological transformation, a credit positive.

Gross cash proceeds from the IPO and the sale of ordinary shares have reached a substantial amount of €19.2 billion (€9.1 billion from preferred shares, and €10.1 billion from ordinary shares). Even after the special dividend of €9.6 billion for the IPO (payable in early 2023), and transaction cost, proceeds of nearly €10 billion will contribute to financing VW's substantial investments (€159 billion investment for capital expenditure and research and development planned during 2022-26). We view the special dividend as a one-off payment and do not anticipate a fundamental shift in VW's conservative dividend policy going forward.

The presence of minority investors will also result in cash flow and dividend leakage within the Volkswagen Group, a credit negative factor. While the transaction has preserved VW's overall group structure (including majority ownership and control over Porsche), the group's governance has become even more complex, with Porsche's free float investors and the blocking minority of Porsche Holding. Moreover, Porsche's CEO was also appointed Volkswagen's CEO as of September 2022, which can lead to conflicts of interests between both roles.

Strong emphasis on electrification will require ongoing high investments but should help to protect the group's strong market position and comply with stricter emission regulation

The global automotive industry is currently undergoing a structural transformation towards alternative fuel vehicles (AFVs), including battery electric vehicles (BEVs) and hybrid vehicles. In our report Automakers' move to alternative fuels will hurt returns; updated forecasts show faster adoption, we said that we forecast the share of AFVs will approach 40% in global light vehicle sales at the end if this decade, compared to only 4% in 2020. BEVs will be the most important AFV technology, with around 25% of global light vehicles.

Volkswagen's share of BEVs has increased sharply over the last three years, from less than 1% in 2019 (73,700 units), 2.5% in 2020 (231,600 units), 5.1% in 2021 to 6.0% (9M 2022). The company aims to increase its BEV share to around 7-8% in 2022, around 20% in 2025 and around 50% in 2030 (with a higher share of 60% in Europe).

On 15 March 2021, Volkswagen presented a technology road map for batteries and charging up to 2030. According to the strategy, the group plans to develop six gigafactories with a total production capacity of 240 GWh in Europe to secure battery supply in a partnership model. One plant with up to 40 GWh production capacity will be developed in a JV with its partner Northvolt in Sweden, another up to 40 GWh plant will be developed by Volkswagen in Salzgitter (Germany). Moreover, the group aims to recycle up to 95% of raw materials. Volkswagen also plans to develop a network of 18,000 fast-charging points in Europe with its partners.

The group has allocated around 56% of its €159 billion investment programme (R&D and capital spending) for the period 2022-26 to electrification and digitisation. This strategy illustrates Volkswagen's strong commitment to electrification and to reduce emissions of its fleet, which is subject to increasingly stricter environmental regulation (see the ESG section below). Sourcing of batteries is key to Volkswagen's strategy. The group sources from large battery suppliers such as LG Chem, Ltd. (A3 stable), Samsung SDI, SKI (Baa3 negative) and CATL (Baa1 stable) to cover its demand of more than 150 GWh from 2025 in Europe and North America, and a similar level in Asia. In addition, Volkswagen established a JV with the battery producer Northvolt in 2019 and will invest around €450 million into a lithium-ion battery factory in Salzgitter (Germany), which will start production in early 2024, with an initial capacity of 16 GWh. The newly announced plan to develop sizeable own battery production will reduce VW's dependence on external battery supplies. However, ongoing high investments into R&D and capital spending will also weigh on Volkswagen's profit margins and cash flow generation.

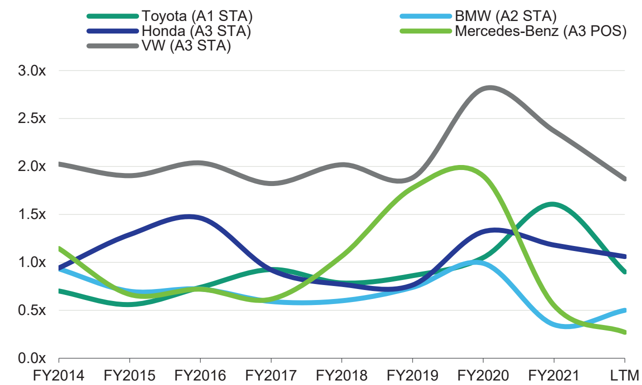
VW aims to reduce its capital spending for the Automotive division to around 5% of sales by 2025/26, in line with the 5.1% in 2021 but well below the 6.1% in 2020 and 6.6% in 2019. We expect the target that to be difficult to achieve, given the high investment needs into electrification and resulting new model launches. This is also illustrated by the interim target of 6.0% for 2023.

VW also aims to reduce R&D spend to around 6% by 2025/26, from 6.7% in 2019 and 7.6% in 2020 and 2021. R&D spend will be around 8.0% for 2022 again, which also indicates the need for substantial investment spending to implement the group's electrification and digitisation strategy, including high investments into software. VW's dedicated software subsidiary was founded in 2020 and is now called CARIAD. It is pooling the group's software expertise to create a standardized operating system (VW.OS) for the group's vehicles. CARIAD, which employs 4,500 specialists, is responsible for the development of connectivity, infotainment, driver assistance and autonomous driving systems. CARIAD's solutions require high investments, and will be key to maintain the product appeal of the group's vehicles and defend its market positions. We note, however, that VW recently lost some market share in China, where innovation and competition is particularly high.

Steady credit metrics, although somewhat weaker than those of its peers

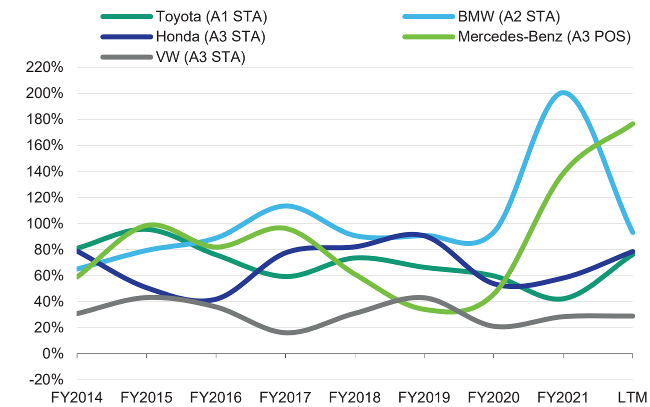
VW's adjusted gross debt/EBITDA at the end of September 2022 declined to 1.9x, in line with the level as of year-end 2019. During the pandemic, the substantially weakened operating profitability and related decrease in volumes had resulted in a spike at 2.8x as of 2020. VW remains somewhat higher levered compared to its rating peers.

Exhibit 10
Peer comparison
Moody's-adjusted gross debt/EBITDA



LTM leverage of Toyota is based on the data for the fiscal year that ended March 2022. Honda, Mercedes-Benz and VW are based on LTM that ended in September 2022 and BMW based on LTM that ended in June 2022.
Source: Moody's Financial Metrics™

Exhibit 11
Peer comparison
Moody's-adjusted retained cash flow/debt



LTM leverage of Toyota is based on the data for the fiscal year that ended March 2022. Honda, Mercedes-Benz and VW are based on LTM that ended in September 2022 and BMW based on LTM that ended in June 2022.
Source: Moody's Financial Metrics™

The pension adjustment of €40.8 billion at the end of December 2021 ($45.3 billion) is the largest adjustment we make to Volkswagen's gross debt. We revisit the pension adjustment on an annual basis, when sufficient disclosure in the annual report is available. We note, however, that pension provisions in VW's interim report declined to €26.0 billion at the end of September 2022. This indicates that our pension adjustment could decline materially once the audited financials for 2022 are available.

As of 30 September 2022, the group's debt equalled €59.2 billion ($58 billion, Moody's adjusted). In 2019, after two years of sizeable cash outflows for the diesel issue, the company's FCF generation turned around and improved by €11 billion to reach €8.8 billion. In 2020, despite the negative impact of the pandemic, VW still generated a sizeable positive FCF of €2.9 billion. Finally, driven by the favorable market environment for automobile manufacturers and low litigation costs, VW improved their FCF generation to €9.2 billion in 2021. We expect the cash flow generation to normalize to around €6.0 billion in 2022 (after increased dividend payments) and to reach a mid single-digit billion amount also in 2023 (excluding the proposed payment of the special dividend for the Porsche IPO of around €9.4 billion). We expect VW's FCF/Debt to exceed 10% in 2022 but fall to around 8%-10% in 2023 (excluding the special dividend).

Overall, the group has delivered fairly steady debt protection ratios in the last five years, although we consider the fact that these ratios are below those of other competitors that we rate in the single-A rating category such as Bayerische Motoren Werke Aktiengesellschaft (BMW, A2 stable) and Mercedes-Benz Group AG (A3 positive), as Exhibits 8 and 9 show.

Ability to offer attractive financing is a key component of VW's business model

VW's issuer rating incorporates our assessment of the company's captive finance operations because these operations represent an integral part of the group's business model as the availability of financing support is an important element in promoting product sales and maintaining its competitive position. Our approach is to analyse the finance business as a standalone entity and consider what capital or liquidity support may be necessary in a stress scenario, which is then considered in the context of VW's overall rating. As of 30 September 2022, the Financial Services division (including Scania Financial Services, Porsche Holding Salzburg Financial Services and Navistar Financial Services) had total assets of about €261 billion (45.5% of the broader group's assets) and an equity ratio of 15.7%, and generated an operating profit of €4.2 billion (9M 2022), slightly up from €4.0 billion a year earlier (€6.0 billion in 2021).

In its leasing business, Volkswagen is exposed directly to residual value risk worldwide. In addition, Volkswagen also bears indirect residual value risk through the health of its dealerships. However, the continued solid operating and asset-quality performance of Volkswagen's Financial Services division will reflect Volkswagen's success in maintaining stable or growing levels of demand for and pricing power of its automotive brands. In addition, so far, residual values have not suffered significantly from the diesel-related issues.

Carbon transition is Volkswagen's key environmental risk

We assess Volkswagen's environmental risks as high, in line with sector-wide risks of the automotive industry (see our environmental heat map, published October 2022). Environmental considerations are particularly relevant because these restrict the company's ability to reduce certain investments: Continued tightening of emissions standards and regulations across most major markets, because of environmental concerns, require investments into greater efficiency and electrification to maintain compliance and avoid fines or additional costs.

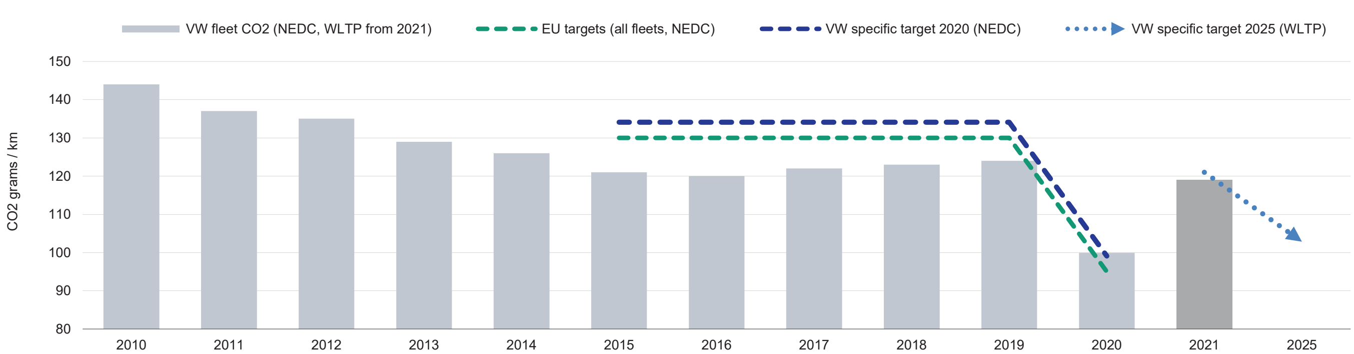
Volkswagen, like its competitors, faces stricter CO_2 emission targets set by the EU. Efforts to achieve these targets (as Exhibit 10 shows) and Volkswagen's aim of playing a leading role in the strategic areas for the future of connectivity, autonomous driving, mobility services and electric drive, as well as in the intelligent linking up of these areas, require substantial capital investments. Despite the fact that capital spending and R&D spending are expected to decrease to 6.0% of sales in the Automotive division by 2025/26, Volkswagen expects improved efficiencies within the group to make funds available for sufficient and sizeable investments in the mentioned strategic areas, including the development of its new MEB (Modularer E-Antriebs-Baukasten) platform for electric vehicles. Nevertheless, we expect automotive manufacturers to continue to invest substantial amounts in R&D and capital spending to meet increasingly stringent hurdles imposed by CO_2 emissions regulations worldwide.

Committed to the Paris Agreement, Volkswagen has put in place a decarbonisation strategy, which includes a target of 30% CO_2 reduction over the life cycle of a vehicle by 2025, and 50% be 2030 versus 2018 and to be CO_2 neutral by 2050 at the latest in terms of both its products and its production. Within its €159 billion five-year investment plan for capital spending and R&D, Volkswagen has allocated a significant amount of €60 billion (38%) into the development of BEVs (€52 billion) and PHEVs (€8 billion).

Since the beginning of this decade, Volkswagen managed to reduce CO2 emissions of the group's new passenger car fleet in the EU. In 2020, when the EU limit was lowered to 95 gram (g) CO per kilometre (km), implying Volkswagen's company-specific target of 99g/km, the company managed to reduce its fleet emissions by as much as 20%, missing the stricter target by only 0.8g/km. This significant improvement was driven by substantially higher sales of electrified vehicles (battery electric vehicles and plug-in hybrids), and lower sales volumes of conventional combustion engines during the pandemic.

In 2021, the calculation of CO2 emissions was changed from the old testing standard NEDC to the new standard WLTP. According to the WLTP standard, which typically leads to higher emissions, Volkswagen's emissions amounted to 119 g/km, and thus fully complied with the stricter regulatory maximum of 121 g/km. This was achieved due to various measures, including the continued launch of new electrified models (both, battery electric and plug-in electric vehicles), the launch of more efficient conventional models with internal combustion engines and the termination of production of older, inefficient models.

Exhibit 12
Volkswagen Group fleet CO_2 emissions achieved the 2021 target; further improvement needed for 2025



Sources: Company and Moody's Investors Service

As of 2025, the EU commission strives to reduce the CO_2 targets by another 15% versus 2021. VW's main driver to reduce fleet emissions is the launch of up to 70 new BEV (20 are already in production) and 60 PHEV models (more than half of there are in production) by 2030.

Liquidity analysis

In our theoretical scenario of no access to the capital markets for its manufacturing and financial services activities, Volkswagen had a coverage of more than 12 months of its corporate needs as of 30 September 2022. The group's liquidity position, which will be supported by cash on balance sheet and short-term marketable securities (after a 20% haircut) of around €51.7 billion (as of 30 September 2022), as well as its cash flow generation in the next 12 months. In addition, VW has access to a significant amount of long-term committed credit facilities, totaling around €28 billion (as of December 2021). These credit facilities were partly drawn (€1.5 billion, well below 10%) as of the end of December 2021.

VW's liquidity will also be supported by the sale of the minority stake in Porsche AG of €19.2 billion, of which €16.2 billion were collected in the fourth quarter of 2022, and the remainder will be collected in early 2023. After the payment of a special dividend of 49% of gross proceeds in early 2023, VW's liquidity will have improved by nearly €10 billion in total.

Methodology and scorecard

For the ratings of VW, we have applied our Automobile Manufacturer Industry rating methodology, published in May 2021. The historic scorecard-indicated outcome as well as the next 12-18 month forward view indicates Baa1, one notch below VW's actual A3 rating. With a continued improvement in efficiency and reduction in leverage metrics, we expect the scorecard-indicated rating to support Volkswagen's A3 rating from 2023.

Exhibit 13
Rating Factors

Auto Manufacturer Industry Scorecard [1][2]	Current LTM 9/30/2022		Moody's 12-18 Month Forward View As of 12/13/2022 [3]	
Factor 1 : Business Profile (40%)	**Measure**	**Score**	**Measure**	**Score**
a) Trend in Global Unit Share Over Three Years	Baa	Baa	Baa	Baa
b) Market Position and Product Breadth/Strength	A	A	A	A
Factor 2 : Profitability and Efficiency (20%)				
a) EBITA Margin	7.4%	Baa	6% - 7%	Ba
Factor 3 : Leverage and Coverage (30%)				
a) Debt / EBITDA	1.9x	A	1.5x - 2x	A
b) (Cash + Marketable Securities) / Debt	73.5%	Baa	90% - 100%	A
c) RCF / Debt	28.9%	Baa	30% - 35%	Baa
d) FCF / Debt	8.5%	Ba	8% - 10%	Ba
e) EBITA / Interest Expense	7.5x	A	7x - 8x	A
Factor 4 : Financial Policy (10%)				
a) Financial Policy	A	A	A	A
Rating:				
a) Scorecard-Indicated Outcome		Baa1		Baa1
b) Actual Rating Assigned				A3

[1] All ratios are based on 'Adjusted' financial data and incorporate Moody's Global Standard Adjustments for Non-Financial Corporations.
[2] As of 9/30/2022.
[3] This represents Moody's forward view, not the view of the issuer, and unless noted in the text, does not incorporate significant acquisitions and divestitures. RCF and FCF are before payment of the special dividend for the Porsche IPO.
Source: Moody's Financial Metrics™

Ratings

Exhibit 14

Category	Moody's Rating
VOLKSWAGEN AKTIENGESELLSCHAFT	
Outlook	Stable
Issuer Rating	A3
Sr Unsec Bank Credit Facility -Dom Curr	A3
Senior Unsecured MTN -Dom Curr	(P)A3
Commercial Paper -Dom Curr	P-2
VOLKSWAGEN FINANCIAL SERVICES AUSTRALIA LTD	
Outlook	Stable
Bkd Senior Unsecured -Dom Curr	A3
Bkd Commercial Paper	P-2
Bkd Other Short Term -Dom Curr	(P)P-2
VOLKSWAGEN FINANCIAL SERVICES JAPAN LTD.	
Outlook	Stable
Bkd Senior Unsecured -Dom Curr	A3
Bkd Commercial Paper -Dom Curr	P-2
Bkd Other Short Term	(P)P-2
VOLKSWAGEN GROUP OF AMERICA FINANCE, LLC	
Outlook	Stable
Bkd Senior Unsecured	A3
Bkd Commercial Paper	P-2
VOLKSWAGEN FINANCIAL SERVICES N.V.	
Outlook	Stable
Bkd Senior Unsecured	A3
Bkd Commercial Paper -Dom Curr	P-2
VOLKSWAGEN FINANCIAL SERVICES AG	
Outlook	Stable
Issuer Rating	A3
Senior Unsecured	A3
Commercial Paper -Dom Curr	P-2
VOLKSWAGEN LEASING GMBH	
Outlook	Stable
Bkd Senior Unsecured -Dom Curr	A3
Bkd Commercial Paper -Dom Curr	P-2
Bkd Other Short Term -Dom Curr	(P)P-2
VOLKSWAGEN INTERNATIONAL FINANCE N.V.	
Outlook	Stable
Bkd Senior Unsecured	A3
Bkd Jr Subordinate -Dom Curr	Baa2
Bkd Commercial Paper -Dom Curr	P-2
Bkd Other Short Term -Dom Curr	(P)P-2
VW CREDIT CANADA, INC.	
Outlook	Stable
Bkd Senior Unsecured -Dom Curr	A3
Bkd Commercial Paper -Dom Curr	P-2
Bkd Other Short Term	(P)P-2
VW CREDIT, INC.	
Outlook	Stable
Bkd Commercial Paper	P-2
Bkd Other Short Term	(P)P-2
TRATON FINANCE LUXEMBOURG S.A.	
Outlook	Stable
Bkd Senior Unsecured -Dom Curr	Baa2
TRATON SE	
Outlook	Stable
Issuer Rating	Baa2

Senior Unsecured MTN	(P)Baa2
TRATON TREASURY AB	
Outlook	Stable
Bkd Sr Unsec MTN	(P)Baa2
VOLKSWAGEN BANK GMBH	
Outlook	Stable
Bank Deposits	A1/P-1
Issuer Rating	A1
Senior Unsecured MTN -Dom Curr	(P)A1
Subordinate -Dom Curr	Baa1
Commercial Paper -Dom Curr	P-1
Other Short Term -Dom Curr	(P)P-1
VOLKSWAGEN INTERNATIONAL BELGIUM S.A.	
Outlook	No Outlook
Commercial Paper -Dom Curr	P-2
Other Short Term -Dom Curr	P-2
VOLKSWAGEN GROUP OF AMERICA, INC.	
Outlook	No Outlook
Bkd Commercial Paper	P-2
PORSCHE HOLDING GESELLSCHAFT M.B.H.	
Outlook	No Outlook
Bkd Commercial Paper -Dom Curr	P-2
SKOFIN S.R.O.	
Outlook	No Outlook
Bkd Commercial Paper -Dom Curr	P-2
VOLKSWAGEN GROUP CANADA, INC.	
Outlook	No Outlook
Bkd Commercial Paper -Dom Curr	P-2
VOLKSWAGEN INTERNATIONAL LUXEMBURG S.A	
Outlook	No Outlook
Bkd Commercial Paper -Dom Curr	P-2

Source: Moody's Investors Service

Appendix

Exhibit 15
Peer group

(in USD million)	Volkswagen A3 Stable FYE Dec-20	FYE Dec-21	LTM Sep-22	Toyota Motor Corporation A1 Stable FYE Mar-21	FYE Mar-22	BMW AG A2 Stable FYE Dec-20	FYE Dec-21	LTM Jun-22	Mercedes-Benz Group AG A3 Positive FYE Dec-20	FYE Dec-21	LTM Sep-22	Nissan Motor Co., Ltd. Baa3 Stable FYE Mar-20	FYE Mar-21	LTM Sep-22
Revenue	207,845	244,011	240,339	236,788	259,288	94,888	116,214	120,977	107,376	125,358	126,826	64,543	65,862	65,720
Total Debt	80,192	71,930	58,000	44,405	29,686	8,170	5,638	7,303	25,423	10,940	5,626	13,825	9,663	4,829
Cash + Marketable Securities	51,053	49,087	42,632	63,821	52,137	16,737	19,268	24,320	31,212	27,660	15,417	15,790	11,060	9,213
EBITA Margin %	6.0%	6.9%	7.4%	9.4%	11.0%	3.0%	10.0%	8.9%	5.6%	12.6%	14.9%	-3.0%	1.6%	1.7%
EBITA / Interest Expense	7.1x	9.2x	7.5x	35.1x	47.2x	14.8x	72.2x	56.2x	12.7x	43.5x	55.7x	-4.2x	1.8x	2.0x
(Cash + Marketable Sec.) / Debt	63.7%	68.2%	73.5%	143.7%	175.6%	204.9%	341.7%	333.0%	122.8%	252.8%	274.0%	114.2%	114.4%	190.8%
Debt / EBITDA	2.8x	2.4x	1.9x	1.6x	0.9x	1.0x	0.3x	0.5x	1.9x	0.5x	0.3x	22.8x	2.9x	1.5x
FCF / Debt	4.4%	14.6%	8.5%	10.2%	23.4%	7.1%	94.9%	-1.2%	31.7%	60.5%	22.6%	-29.2%	-43.4%	-17.9%
RCF / Debt	21.1%	28.4%	28.9%	42.2%	76.2%	93.5%	200.6%	93.2%	45.9%	138.6%	176.7%	-23.3%	23.1%	37.3%

All ratios are based on 'Adjusted' financial data and incorporate Moody's Global Standard Adjustments for Non-Financial Corporations.
Source: Moody's Financial Metrics™

Exhibit 16
Moody's-adjusted debt breakdown

(in USD million)	FYE Dec-17	FYE Dec-18	FYE Dec-19	FYE Dec-20	FYE Dec-21	LTM Sep-22
As Reported Total Debt	**7,506**	**14,499**	**11,539**	**15,699**	**16,378**	**10,472**
Pensions	34,991	37,571	42,874	54,880	46,341	39,921
Operating Leases	5,782	6,129	0	0	0	0
Hybrid Securities	6,657	7,200	7,107	9,613	8,210	7,607
Non-Standard Adjustments	5,065	2,702	644	0	1,001	0
Moody's Adjusted Total Debt	**60,002**	**68,100**	**62,165**	**80,192**	**71,930**	**58,000**

Source: Moody's Financial Metrics™

Exhibit 17
Moody's-adjusted EBITDA breakdown

(in USD million)	FYE Dec-17	FYE Dec-18	FYE Dec-19	FYE Dec-20	FYE Dec-21	LTM Sep-22
As Reported EBITDA	**31,713**	**35,505**	**37,630**	**33,050**	**40,813**	**43,156**
Pensions	8	31	(26)	(104)	(1)	(1)
Operating Leases	1,637	1,996	0	0	0	0
Non-Standard Adjustments	0	(0)	0	0	0	0
Capital Development Costs	(5,943)	(6,181)	(5,789)	(7,388)	(9,280)	(10,345)
Unusual	3,574	3,508	1,385	1,027	(24)	1,605
Interest Expense - Discounting	0	0	(266)	0	0	0
Moody's Adjusted EBITDA	**30,989**	**34,859**	**32,934**	**26,585**	**31,509**	**34,416**

Source: Moody's Financial Metrics™

Exhibit 18
Summary financials

(in USD million)	FYE Dec-17	FYE Dec-18	FYE Dec-19	FYE Dec-20	FYE Dec-21	LTM Sep-22
INCOME STATEMENT						
Revenue	221,247	237,442	237,865	207,845	244,011	240,339
EBIT	17,194	19,611	18,935	11,424	15,665	16,840
EBITA	18,135	20,405	19,699	12,516	16,819	17,898
EBITDA	30,989	34,859	32,934	26,585	31,509	34,416
BALANCE SHEET						
Cash & Cash Equivalents	32,827	42,919	37,295	51,053	49,087	42,632
Total Debt	60,002	68,100	62,165	80,192	71,930	58,000
CASH FLOW						
Capital Expenditures	(16,990)	(19,220)	(16,812)	(13,884)	(13,893)	(14,150)
Dividends	1,329	2,600	1,450	3,372	3,933	4,424
Retained Cash Flow (RCF)	9,082	21,831	26,639	15,770	21,285	18,578
RCF / Debt	16.1%	31.0%	43.0%	21.1%	28.4%	28.9%
Free Cash Flow (FCF)	(8,533)	(2,519)	9,875	3,302	10,891	5,457
FCF / Debt	-15.1%	-3.6%	15.9%	4.4%	14.6%	8.5%
PROFITABILITY						
% Change in Sales (YoY)	5.3%	2.7%	5.7%	-14.3%	13.3%	5.7%
SG&A % of Sales	13.1%	12.9%	12.8%	13.4%	12.6%	12.3%
EBIT Margin %	7.8%	8.3%	8.0%	5.5%	6.4%	7.0%
EBITA Margin %	8.2%	8.6%	8.3%	6.0%	6.9%	7.4%
EBITDA margin %	14.0%	14.7%	13.8%	12.8%	12.9%	14.3%
INTEREST COVERAGE						
EBIT / Interest Expense	19.7x	8.2x	10.0x	6.5x	8.6x	7.1x
EBITA / Interest Expense	20.7x	8.6x	10.4x	7.1x	9.2x	7.5x
EBITDA / Interest Expense	35.4x	14.7x	17.3x	15.1x	17.3x	14.5x
(EBITDA - CAPEX) / Interest Expense	16.0x	6.6x	8.5x	7.2x	9.7x	8.5x
LEVERAGE						
Debt / EBITDA	1.8x	2.0x	1.9x	2.8x	2.4x	1.9x
Debt / (EBITDA - CAPEX)	4.0x	4.5x	3.8x	5.9x	4.2x	3.2x
LIQUIDITY						
(Cash + Marketable Securities) / Debt	54.7%	63.0%	60.0%	63.7%	68.2%	73.5%

All ratios are based on 'Adjusted' financial data and incorporate Moody's Global Standard Adjustments for Non-Financial Corporations.
Source: Moody's Financial Metrics™

REPORT NUMBER 1350936

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