

# MOODY'S

## INVESTORS SERVICE

### CREDIT OPINION

3 April 2019

#### Update

 Rate this Research

#### RATINGS

##### ZF Friedrichshafen AG

Domicile	Germany
Long Term Rating	Baa3
Type	LT Issuer Rating
Outlook	Negative

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.

#### Contacts

Matthias Heck, CFA +49.69.70730.720  
VP-Sr Credit Officer  
matthias.heck@moodys.com

Anke Rindermann +49.69.70730.788  
Associate Managing Director  
anke.rindermann@moodys.com

Timo Fittig +44.207.772.5277  
Associate Analyst  
timo.fittig@moodys.com

» Contacts continued on last page

#### CLIENT SERVICES

Americas	1-212-553-1653
Asia Pacific	852-3551-3077
Japan	81-3-5408-4100
EMEA	44-20-7772-5454

## ZF Friedrichshafen AG

Update following change of outlook to negative

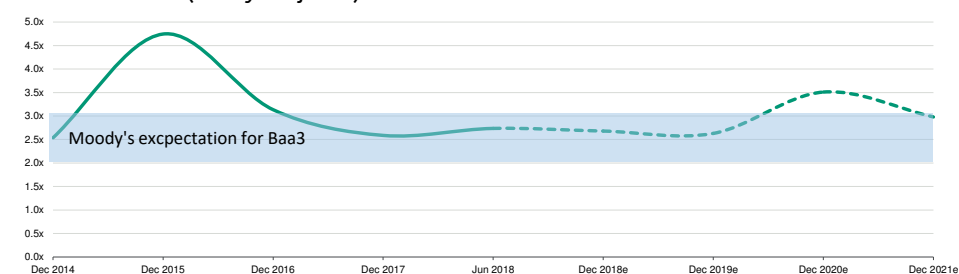
### Summary

[ZF Friedrichshafen AG's](#) (ZF) Baa3 ratings reflect as positives the company's (1) leading market position as one of the largest tier 1 global automotive suppliers, combined with its sizeable industry-facing operations, and, both, regional and customer, diversification; (2) clear focus on innovation and new product development; (3) positive strategic alignment to address the disruptive trends of automotive electrification and autonomous driving; (4) conservative financial policy, as reflected in its moderate dividend payments, which emphasises debt reduction and cash flow generation; and (5) good liquidity profile.

The ratings also reflect as negatives the company's (1) leverage, with debt/EBITDA (as measured by us) of 2.7x as of the end of the first half of 2018, taking into account the fact that the automotive industry is at its or very close to its peak; (2) modest operating profitability, with an EBITA margin of 6.8% (for the 12 months ended June 2018), although broadly in line with the industry average; and (3) continued high capital and R&D expenditure, reflecting the group's focus on innovation.

#### Exhibit 1

**ZF's leverage is expected to further increase as result of Wabco acquisition**  
**Gross debt/EBITDA (Moody's-adjusted)**



Source: Moody's Financial Metrics™, Moody's Investor Services' estimate

## Credit strengths

- » ZF's positioning, given the disruptive trends, such as alternative fuels or autonomous driving, affecting the auto sector
- » Substantial free cash flow (FCF) generation, leading to decreasing leverage
- » Moderate shareholder returns

## Credit challenges

- » Exposure to the cyclical nature of the automotive industry
- » Modest operating profitability, in line with the industry average
- » Ownership structure, which prevents ZF from accessing equity markets if needed
- » Swift de-leveraging following the proposed acquisition of Wabco

## Rating outlook

The negative outlook reflects the expectation that ZF's financial leverage will increase to around 3.5-4.0x (Moody's adjusted debt/ EBITDA) in 2020, which will be the first full year including Wabco. This leaves ZF's leverage very weakly positioned versus the range of 2.0x-3.0x required on a sustainable basis for the Baa3 rating. The negative outlook also reflects a more challenging automotive industry environment, as reflected on Moody's negative industry outlook on global automotive manufacturers.

## Factors that could lead to an upgrade

An upgrade to Baa2 would be conditional to ZF achieving:

- » A further improvement in EBITA margins to above 8% (Moody's adjusted),
- » a further reduction in leverage, as evidenced by debt / EBITDA moving towards 2.0x (Moody's adjusted), and
- » an increase in retained cash flow (RCF) / net debt to sustainably above 35%.

## Factors that could lead to a downgrade

ZF's ratings might be downgraded if:

- » EBITA margins were to fall below 6.5%, or
- » debt / EBITDA would increase above 3.0x sustainably, or
- » FCF generation would weaken to below EUR500 million p.a.

This publication does not announce a credit rating action. For any credit ratings referenced in this publication, please see the ratings tab on the issuer/entity page on [www.moody's.com](http://www.moody's.com) for the most updated credit rating action information and rating history.

## Key indicators

Exhibit 2

### ZF Friedrichshafen AG

US Billions	Dec-13	Dec-14	Dec-15	Dec-16	Dec-17	LTM (Jun-18)
Revenue	22.4	24.5	32.4	38.9	41.2	43.9
EBITDA Margin %	5.8%	6.3%	6.2%	7.4%	7.4%	6.8%
EBITDA / Interest Expense	4.4x	4.4x	3.1x	4.4x	5.2x	5.3x
FCF / Net Debt	62%	56%	17%	29%	32%	29%
Debt / EBITDA	2.5x	2.5x	4.7x	3.1x	2.6x	2.7x
Net Debt/Net Book Capitalization	36%	40%	64%	62%	56%	53%

(1) All ratios are based on 'Adjusted financial data and incorporate Moody's Global Standard Adjustments for Non-Financial Corporations

(2) Credit metrics for 2015 are influenced by the fact that TRW was consolidated for 7.5 months.

Source: Moody's Financial Metrics™

## Profile

ZF Friedrichshafen AG (ZF), headquartered in Friedrichshafen, Germany, is a leading global automotive technology company specialised in driveline and chassis technology as well as active and passive safety technology. The company, which completed the acquisition of TRW Automotive (TRW) in May 2015, generates most of its revenue within the passenger car and commercial vehicle industries, but also delivers to other markets, including the construction and agricultural machinery sector. Following the acquisition of TRW, ZF is one of the largest automotive suppliers on a global scale, with revenue of €36.4 billion (2017), similar in size to Robert Bosch GmbH, Denso and Magna. ZF, which is owned by two foundations, employs more than 146,000 people and is represented at about 230 locations in 40 countries.

## Detailed credit considerations

### Substantial FCF generation, leading to decreasing leverage

ZF's credit metrics are now fully in line with our requirements for a Baa3 rating. The improvements are driven by a further reduction in its adjusted gross debt to €10.3 billion as of June 2018 from €12.8 billion in 2016, and its solid underlying operating performance. We expect Moody's-adjusted gross debt/EBITDA of around 2.5x as of year-end 2018, slightly lower than the 2.7x at the end of June 2018. The expected improvement in leverage as of year-end 2018 already reflects the early redemption of the €1.15 billion notes initially due April 2019.

ZF's ability to generate positive FCF is supported by its policy to pay out a moderate dividend. In October 2017, ZF's shareholders implemented a dividend policy, which is now based on a payout ratio of 18% on net profit. In line with the new policy, ZF paid out €195 million in H1 2018 for 2017.

Assuming an ongoing stable industry environment, we believe the dividend payouts are affordable and leave ZF in a position to continuously reinvest substantial amounts into the business, as indicated by a high ratio of reported capital spending to depreciation of over 137% in 2017, following an average of 149% during 2013-16. We expect capital spending to remain elevated, given the company's innovation requirement and the outsourcing trend by auto manufacturers. However, given the limited ability of ZF to access equity markets, a conservative dividend payout is necessary to build a sufficient equity buffer in case of a cyclical downturn or the need to further increase investments in new technologies.

On the back of our assumption of a more challenging global automotive industry environment, with only marginal growth in 2019 and 2020, we expect very modest EBITDA improvements and gradually declining debt levels for ZF in 2019. Within about 18 months following the debt-financed acquisition of Wabco (anticipated to close in early 2020, see below), we expect that ZF's sizeable FCF will move the company's debt/EBITDA back into our expected range for the Baa3 rating (2.0x-3.0x Moody's adjusted debt/EBITDA).

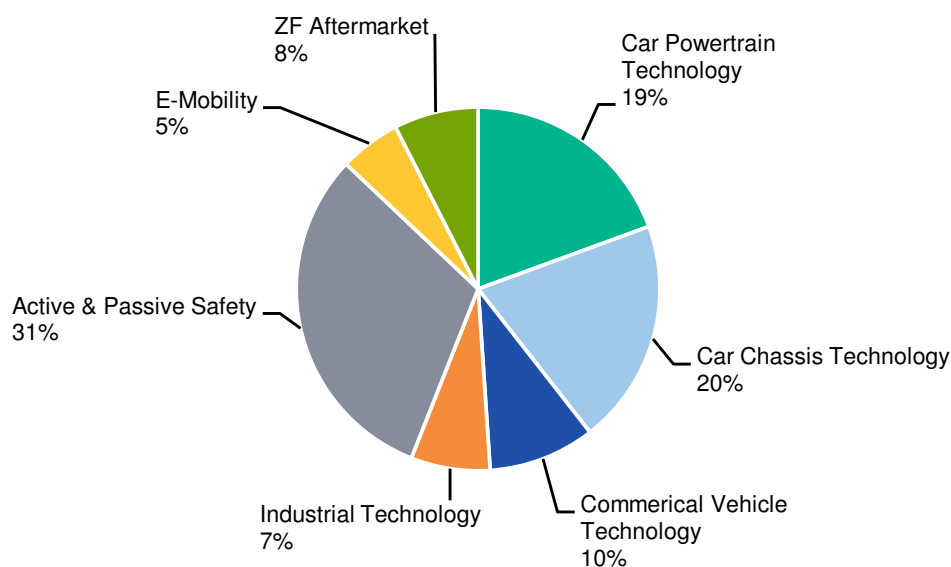
### ZF's positioning, given the disruptive trends affecting the auto sector

We believe that ZF has positive exposure to the two main disruptive trends currently affecting the automotive sector: (1) electrification and the roll-out of alternative fuel vehicles; and (2) autonomous driving, in both cars and commercial vehicles.

The growing adoption of alternative fuel vehicles with hybrid or all-electric powertrains reflects a combination of tougher carbon emissions regulations applied to the automotive original equipment manufacturers (OEMs) and the falling cost of key technologies, most notably batteries. We believe that ZF, along with [Valeo S.A.](#) (Baa3 stable), [Continental AG](#) (Continental, Baa1 stable) and [GKN Holdings](#) (Ba1 stable), stands to benefit from electrification for two key reasons. Firstly, the internal combustion engine is currently one of the few parts within a car that is not subject to outsourcing. While some OEMs may opt to manufacture the key equipment themselves, we believe that powertrain-focused suppliers such as ZF will play a much bigger role in the future. Secondly, the integration of hybridisation equipment with the transmission system (including the control units) will be critical in optimising the powertrain, in our view. On this basis, we believe that ZF is well positioned because of its long pedigree in transmission systems. ZF is arguably able to accommodate all technology pathways for hybrids and fully electric vehicles, depending on the requirements of its OEM customers. For mild hybrids, the group offers a modular motor unit, which connects the engine and gearbox. For full hybrids, ZF integrates a high-powered motor into its standard 8-speed automatic gearbox. Finally, for fully electric vehicles, the group manufactures axle drives, with the motor integrated directly into the axle.

Following the acquisition of TRW, ZF also gained access to a number of key technologies, which will likely underpin the transition to fully autonomous driving. In our view, the time horizon for this development is somewhat longer than for fully electric vehicles. Nevertheless, the trend has already started with new executive saloons (such as the Mercedes S-Class and the BMW 7-Series) having increasing numbers of sensors and driver assistance functions than was previously the case. This provides an opportunity for suppliers such as ZF. While the group is arguably a much smaller company for these technologies than peer companies Robert Bosch GmbH, Continental and Valeo S.A., ZF has an emerging product portfolio, which includes front-facing cameras and a 77-gigahertz radar, both of which will likely be employed on autonomous vehicles. In addition, ZF (along with many other auto suppliers) is forming partnerships to address gaps in its product portfolio. In June 2017, the group announced new strategic relationships with [Hella](#) (Baa1 stable), which will contribute its expertise in software solutions, and with [NVIDIA Corporation](#) (A3 positive), the semiconductor manufacturer and provider of artificial intelligence technologies.

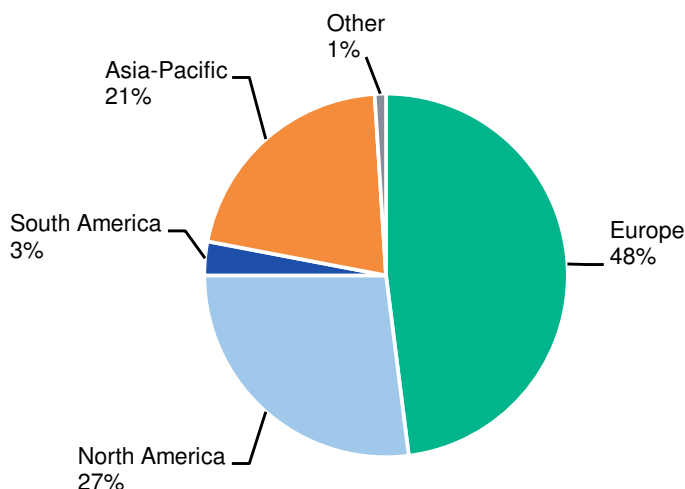
Exhibit 3

**ZF's product diversification**

Source: Company information, H1 2018 presentation

Likewise, the integration of TRW into ZF improves its geographical diversification, given that TRW has a strong position in North America and the Asia-Pacific region.

Exhibit 4

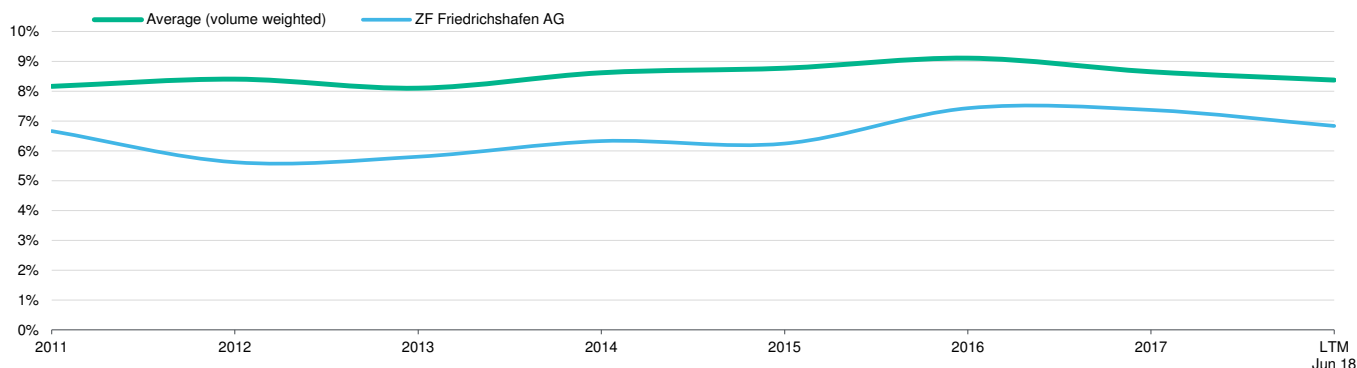
**ZF's geographical diversification**

Source: Company information, H1 2018 presentation

**Modest operating profitability, in line with the industry average**

ZF's EBITA margin has improved over the past few years, but is still slightly lower than the average of EMEA-based auto suppliers. Even considering that one-time effects may have had a negative effect on operating profit, we note that peers, such as Hella or Continental, which had to cope with the same industrial environment, were able to generate stronger margins. This is to some extent driven by the product mix of ZF, which encompasses products with very high technological content with high profitability, especially in its commercial vehicles segment, and products with lower market entry barriers such as axle systems. Margins in these segments are also rather low because of the high outsourcing of production, which, however, would provide for a rather high return on the capital employed. ZF's operating margin should continue to benefit from the integration of the more profitable TRW business and from better operating performance, and remain around 6.5%-8.0%, in line with our requirements for a Baa3 rating.

Exhibit 5

**ZF's EBITA margin compared with the EMEA automotive supplier sector average**

EBITA margin reflects Moody's adjustments. Average numbers relate to our rated universe.

Source: Moody's Financial Metrics™

**Exposure to the cyclical nature of the automotive industry**

ZF, like most global auto suppliers, has a strong reliance on the production rates of light vehicles by the various OEMs. After several years of continuous growth since the beginning of the decade, global light vehicle sales declined slightly to below 95 million units in

2018. While the US, Western Europe and Japan stagnated at high levels, sales in China contracted and are the main reason for the decline globally. In addition, weak sales in Western Europe in the second half of 2018, impacted by the new worldwide harmonized light vehicle test procedure (WLTP), contributed to the decline.

Moody's expects global light vehicle sales to grow by only 0.5% and 0.8% in 2019 and 2020, respectively. While we expect China to grow slightly above the global average, supported by the policy guidance of the central government in January 2019, the VAT reduction as of April 2019, as well as the still low market penetration in China, we anticipate that Western Europe will grow modestly by 0.4% in 2019 and 0.6% in 2020. After a good finish of 2018, we expect the United States may decline by 2.9% in 2019, and another 0.6% in 2020.

Despite this cyclical, we expect ZF to nevertheless outperform the market by around 2% over time, reflecting its strong positioning in active and passive safety systems as well as powertrain technology. Additionally, we believe its industrial and commercial vehicle technology, as well as the aftermarket business (ZF Aftermarket), provides some mitigation from the cyclical of the auto OEM market.

Exhibit 6

### Weakening demand in China to weigh on global growth

Our global light vehicle sales projections by region

K Units	Unit Sales 2015	Unit Sales 2016	Unit Sales 2017	Unit Sales 2018	YoY growth	Base Case 2019	YoY growth	Base Case 2020	YoY growth
Western Europe	14,857	15,775	16,201	16,162	-0.2%	16,230	0.4%	16,330	0.6%
Japan	4,934	4,904	5,164	5,201	0.7%	5,250	0.9%	5,286	0.7%
United States	17,445	17,540	17,100	17,300	1.2%	16,800	-2.9%	16,700	-0.6%
China	24,598	28,028	28,879	28,081	-2.8%	28,642	2.0%	29,143	1.8%
Others	27,303	26,797	27,965	28,149	0.7%	28,408	0.9%	28,649	0.8%
<b>Total</b>	<b>89,137</b>	<b>93,038</b>	<b>95,308</b>	<b>94,893</b>	<b>-0.4%</b>	<b>95,330</b>	<b>0.5%</b>	<b>96,109</b>	<b>0.8%</b>

China unit sales represent auto sales, which include both passenger vehicle and commercial vehicles.

Source: ACEA, CAAM, LMC, Moody's estimates

### Envisaged acquisition of Wabco strengthens ZF's business profile but increases leverage

On 28 March 2019, ZF announced the acquisition of the Belgium-based automotive supplier Wabco for USD7.0 billion in cash, based on a share price of USD136.5 per share. Wabco is a global automotive supplier in the area of advanced driver assistance, braking, stability control, suspension, transmission automation aerodynamics for trucks, busses, trailers, cars and off-highway vehicles and generated sales of \$3.8 billion in 2018. Including Wabco's debt and acquisition-related cost, this results in an enterprise value of USD8.5 billion or EUR7.4 billion.

The acquisition of Wabco will notably strengthen ZF's business profile as a leading global automotive supplier, adding approximately 10% to ZF's revenues, and strengthening its product portfolio in the area of autonomous driving systems, where brake systems form an essential part. However, as the acquisition will be fully-debt funded, the enterprise value will increase ZF's financial debt accordingly. Including WABCO's EBITDA contribution, we expect that ZF's gross leverage will increase from 2.7x (Moody's adjusted debt/EBITDA) at June 2018, to around 3.5-4.0x as of 2020, which is considerably above our current expectation of a maximum of 3.0x for ZF's Baa3 rating. We note that ZF de-levered very quickly after the last major acquisition, TRW in 2015 with an initial leverage of more than 4x in 2015 decreasing to 2.6x at the end of 2017, supported by ZF's high free cash flow generation and asset disposals, as well as company's commitment to debt reduction.

### Liquidity analysis

ZF's liquidity profile is good, even after the redemption and buyback of bonds in H2 2018. Main sources of liquidity over the 12 months ending June 2019 comprise €1.2 billion of cash on hand as of June 2018 and funds from operations of around €3.0 billion, as well as €3.0 billion available under the undrawn revolving credit facility. This amounts to more than €7 billion of liquidity sources, which substantially exceed the company's expected cash needs of around €4.5 billion for working cash (estimated at €1.1 billion), capital

spending (€2.0 billion), short-term debt maturities (€1.2 billion, essentially comprising the TRW bonds repaid in December 2018) and cash outflow for dividend payments (€0.2 billion).

In terms of the proposed acquisition of Wabco, we understand that ZF has secured an acquisition financing for the entire transaction volume, so the payment of the acquisition price will not negatively impact ZF's liquidity.

## Rating methodology and scorecard factors

In assessing ZF's credit quality, we have applied our Global Automotive Supplier Industry rating methodology. The actual rating assigned of Baa3 is in line with the indicated rating from the methodology grid, based on both, financial metrics as of the 12 months ended June 30, 2018, and our 12-18-month forward view. The forward-looking view reflects the intended Wabco acquisition announced by ZF end of March 2019, which will weaken the company's credit metrics.

Exhibit 7

### Rating factors

ZF Friedrichshafen AG

Automotive Supplier Industry Grid [1][2]			Current LTM 6/30/2018		Moody's 12-18 Month Forward View As of 3/28/2019 [3]	
Factor 1 : Scale (10%)	Measure	Score			Measure	Score
a) Revenue (USD Billion)	\$43.9	Aa			\$45 - \$48	Aa
Factor 2 : Competitive Position (10%)						
a) Competitive Position	A	A			A	A
Factor 3 : Profitability and Cash Flow (25%)						
a) EBITA Margin	6.8%	B			5.5% - 6%	B
b) FCF Through the Business Cycle	Baa	Baa			Baa	Baa
Factor 4 : Financial Policy (20%)						
a) Financial Policy	Baa	Baa			Baa	Baa
Factor 5 : Coverage and Leverage (35%)						
a) EBITA / Interest	5.3x	Baa			3x - 4x	Ba
b) Retained Cash Flow / Net Debt	28.9%	Baa			28% - 33%	Baa
c) Debt / EBITDA	2.7x	Ba			3.5x - 4x	B
d) Capital Structure: Net Debt / Net Capitalization	53.3%	Ba			50% - 55%	Ba
Rating:						
a) Indicated Rating from Grid		Baa3				Baa3
b) Actual Rating Assigned						Baa3

(1) All ratios are based on 'Adjusted' financial data and incorporate Moody's Global Standard Adjustments for Non-Financial Corporations; (2) As of 6/30/2018(L); (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.

Source: Moody's Financial Metrics™

## Ratings

Exhibit 8

Category	Moody's Rating
<b>ZF FRIEDRICHSHAFEN AG</b>	
Outlook	Negative
Issuer Rating	Baa3
<b>ZF NORTH AMERICA CAPITAL, INC.</b>	
Outlook	Negative
Bkd Senior Unsecured	Baa3
<b>TRW AUTOMOTIVE INC.</b>	
Outlook	Negative
Senior Unsecured	Baa3

Source: Moody's Investors Service

## Appendix

Exhibit 9

### ZF peer comparison

	ZF Friedrichshafen AG Baa3 Stable			Continental AG Baa1 Stable			Valeo S.A. Baa3 Stable			Schaeffler AG Baa3 Stable			Lear Corporation Baa2 Stable		
(in US millions)															
Revenue	\$38,910	\$41,177	\$43,866	\$44,866	\$49,725	\$52,910	\$20,884	\$22,584	\$22,584	\$15,842	\$16,817	\$16,817	\$20,467	\$21,149	\$21,149
EBITDA	\$4,515	\$4,647	\$4,471	\$7,051	\$7,590	\$7,973	\$2,150	\$2,142	\$2,142	\$2,698	\$2,674	\$2,674	\$2,139	\$2,177	\$2,177
Total Debt	\$13,493	\$12,780	\$11,974	\$10,528	\$11,019	\$11,493	\$7,280	\$7,761	\$7,761	\$6,703	\$6,837	\$6,837	\$2,821	\$2,807	\$2,807
Cash & Cash Equiv.	\$1,716	\$1,579	\$1,448	\$1,766	\$2,073	\$1,693	\$2,925	\$2,694	\$2,694	\$486	\$482	\$482	\$1,500	\$1,493	\$1,493
EBITA Margin	7.4%	7.4%	6.8%	11.1%	10.8%	10.4%	6.5%	5.1%	5.1%	11.2%	9.7%	9.7%	8.0%	7.6%	7.6%
EBITA / Int. Exp.	4.4x	5.2x	5.3x	15.5x	15.7x	14.6x	8.4x	6.0x	6.0x	7.1x	6.2x	6.2x	14.3x	13.3x	13.3x
Debt / EBITDA	3.1x	2.6x	2.7x	1.6x	1.4x	1.5x	3.2x	3.7x	3.7x	2.3x	2.6x	2.6x	1.3x	1.3x	1.3x
Net Debt / Net Cap	61.5%	55.8%	53.3%	35.5%	30.9%	31.9%	48.0%	54.2%	54.2%	65.6%	63.5%	63.5%	23.0%	22.6%	22.6%
RCF / Net Debt	29.1%	32.3%	28.9%	54.8%	63.6%	51.3%	31.9%	23.5%	23.5%	31.6%	26.3%	26.3%	122.9%	135.0%	135.0%

Source: Moody's Financial Metrics™. All figures & ratios calculated using Moody's estimates & standard adjustments. FYE = Financial Year-End. LTM = Last Twelve Months. RUR\* = Ratings under Review, where UPG = for upgrade and DNG = for downgrade.

All figures and ratios are calculated using Moody's estimates and standard adjustments. FYE = Financial year-end. LTM = Last 12 months. RUR\* = Ratings under review, where UPG = for upgrade and DNG = for downgrade.

Source: Moody's Financial Metrics™

Exhibit 10

### Calculation of Moody's-adjusted debt

(in US Millions)	FYE Dec-13	FYE Dec-14	FYE Dec-15	FYE Dec-16	FYE Dec-17	LTM Jun-18
<b>As Reported Debt</b>	<b>1,592.9</b>	<b>895.4</b>	<b>10,687.0</b>	<b>8,714.4</b>	<b>7,674.3</b>	<b>7,010.0</b>
Pensions	3,760.4	4,770.0	4,521.2	4,039.7	4,316.9	4,197.4
Operating Leases	425.8	381.2	573.9	655.0	760.1	739.1
Non-Standard Adjustments	243.9	78.7	98.9	84.4	28.8	28.0
<b>Moody's-Adjusted Debt</b>	<b>6,023.0</b>	<b>6,125.3</b>	<b>15,880.8</b>	<b>13,493.4</b>	<b>12,780.1</b>	<b>11,974.5</b>

Adjusted financial data and incorporate Moody's Global Standard Adjustments for Non-Financial Corporations.

Sources: Company data, Moody's Investors Service

Exhibit 11

### Calculation of Moody's-adjusted EBITDA

(in US Millions)	FYE Dec-13	FYE Dec-14	FYE Dec-15	FYE Dec-16	FYE Dec-17	LTM Jun-18
<b>As Reported EBITDA</b>	<b>2,298.8</b>	<b>2,645.3</b>	<b>3,618.4</b>	<b>4,340.7</b>	<b>4,416.6</b>	<b>4,375.8</b>
Pensions	17.3	18.6	16.7	6.6	6.8	7.2
Operating Leases	136.8	139.5	194.3	229.0	238.4	251.7
Unusual	-26.6	115.6	163.2	10.0	39.5	-9.5
Non-Standard Adjustments	-67.7	-267.1	-571.8	-70.8	-54.2	-153.9
<b>Moody's-Adjusted EBITDA</b>	<b>2,358.6</b>	<b>2,652.0</b>	<b>3,420.8</b>	<b>4,515.5</b>	<b>4,647.1</b>	<b>4,471.2</b>

Adjusted financial data and incorporate Moody's Global Standard Adjustments for Non-Financial Corporations.

Sources: Company data, Moody's Investors Service



© 2019 Moody's Corporation, Moody's Investors Service, Inc., Moody's Analytics, Inc. and/or their licensors and affiliates (collectively, "MOODY'S"). All rights reserved.

CREDIT RATINGS ISSUED BY MOODY'S INVESTORS SERVICE, INC. AND ITS RATINGS AFFILIATES ("MIS") ARE MOODY'S CURRENT OPINIONS OF THE RELATIVE FUTURE CREDIT RISK OF ENTITIES, CREDIT COMMITMENTS, OR DEBT OR DEBT-LIKE SECURITIES, AND MOODY'S PUBLICATIONS MAY INCLUDE MOODY'S CURRENT OPINIONS OF THE RELATIVE FUTURE CREDIT RISK OF ENTITIES, CREDIT COMMITMENTS, OR DEBT OR DEBT-LIKE SECURITIES. MOODY'S DEFINES CREDIT RISK AS THE RISK THAT AN ENTITY MAY NOT MEET ITS CONTRACTUAL FINANCIAL OBLIGATIONS AS THEY COME DUE AND ANY ESTIMATED FINANCIAL LOSS IN THE EVENT OF DEFAULT OR IMPAIRMENT. SEE MOODY'S RATING SYMBOLS AND DEFINITIONS PUBLICATION FOR INFORMATION ON THE TYPES OF CONTRACTUAL FINANCIAL OBLIGATIONS ADDRESSED BY MOODY'S RATINGS. CREDIT RATINGS DO NOT ADDRESS ANY OTHER RISK, INCLUDING BUT NOT LIMITED TO: LIQUIDITY RISK, MARKET VALUE RISK, OR PRICE VOLATILITY. CREDIT RATINGS AND MOODY'S OPINIONS INCLUDED IN MOODY'S PUBLICATIONS ARE NOT STATEMENTS OF CURRENT OR HISTORICAL FACT. MOODY'S PUBLICATIONS MAY ALSO INCLUDE QUANTITATIVE MODEL-BASED ESTIMATES OF CREDIT RISK AND RELATED OPINIONS OR COMMENTARY PUBLISHED BY MOODY'S ANALYTICS, INC. CREDIT RATINGS AND MOODY'S PUBLICATIONS DO NOT CONSTITUTE OR PROVIDE INVESTMENT OR FINANCIAL ADVICE, AND CREDIT RATINGS AND MOODY'S PUBLICATIONS ARE NOT AND DO NOT PROVIDE RECOMMENDATIONS TO PURCHASE, SELL, OR HOLD PARTICULAR SECURITIES. NEITHER CREDIT RATINGS NOR MOODY'S PUBLICATIONS COMMENT ON THE SUITABILITY OF AN INVESTMENT FOR ANY PARTICULAR INVESTOR. MOODY'S ISSUES ITS CREDIT RATINGS AND PUBLISHES MOODY'S PUBLICATIONS WITH THE EXPECTATION AND UNDERSTANDING THAT EACH INVESTOR WILL, WITH DUE CARE, MAKE ITS OWN STUDY AND EVALUATION OF EACH SECURITY THAT IS UNDER CONSIDERATION FOR PURCHASE, HOLDING, OR SALE.

MOODY'S CREDIT RATINGS AND MOODY'S PUBLICATIONS ARE NOT INTENDED FOR USE BY RETAIL INVESTORS AND IT WOULD BE RECKLESS AND INAPPROPRIATE FOR RETAIL INVESTORS TO USE MOODY'S CREDIT RATINGS OR MOODY'S PUBLICATIONS WHEN MAKING AN INVESTMENT DECISION. IF IN DOUBT YOU SHOULD CONTACT YOUR FINANCIAL OR OTHER PROFESSIONAL ADVISER. ALL INFORMATION CONTAINED HEREIN IS PROTECTED BY LAW, INCLUDING BUT NOT LIMITED TO, COPYRIGHT LAW, AND NONE OF SUCH INFORMATION MAY BE COPIED OR OTHERWISE REPRODUCED, REPACKAGED, FURTHER TRANSMITTED, TRANSFERRED, DISSEMINATED, REDISTRIBUTED OR RESOLD, OR STORED FOR SUBSEQUENT USE FOR ANY SUCH PURPOSE, IN WHOLE OR IN PART, IN ANY FORM OR MANNER OR BY ANY MEANS WHATSOEVER, BY ANY PERSON WITHOUT MOODY'S PRIOR WRITTEN CONSENT.

CREDIT RATINGS AND MOODY'S PUBLICATIONS ARE NOT INTENDED FOR USE BY ANY PERSON AS A BENCHMARK AS THAT TERM IS DEFINED FOR REGULATORY PURPOSES AND MUST NOT BE USED IN ANY WAY THAT COULD RESULT IN THEM BEING CONSIDERED A BENCHMARK.

All information contained herein is obtained by MOODY'S from sources believed by it to be accurate and reliable. Because of the possibility of human or mechanical error as well as other factors, however, all information contained herein is provided "AS IS" without warranty of any kind. MOODY'S adopts all necessary measures so that the information it uses in assigning a credit rating is of sufficient quality and from sources MOODY'S considers to be reliable including, when appropriate, independent third-party sources. However, MOODY'S is not an auditor and cannot in every instance independently verify or validate information received in the rating process or in preparing the Moody's publications.

To the extent permitted by law, MOODY'S and its directors, officers, employees, agents, representatives, licensors and suppliers disclaim liability to any person or entity for any indirect, special, consequential, or incidental losses or damages whatsoever arising from or in connection with the information contained herein or the use of or inability to use any such information, even if MOODY'S or any of its directors, officers, employees, agents, representatives, licensors or suppliers is advised in advance of the possibility of such losses or damages, including but not limited to: (a) any loss of present or prospective profits or (b) any loss or damage arising where the relevant financial instrument is not the subject of a particular credit rating assigned by MOODY'S.

To the extent permitted by law, MOODY'S and its directors, officers, employees, agents, representatives, licensors and suppliers disclaim liability for any direct or compensatory losses or damages caused to any person or entity, including but not limited to by any negligence (but excluding fraud, willful misconduct or any other type of liability that, for the avoidance of doubt, by law cannot be excluded) on the part of, or any contingency within or beyond the control of, MOODY'S or any of its directors, officers, employees, agents, representatives, licensors or suppliers, arising from or in connection with the information contained herein or the use of or inability to use any such information.

NO WARRANTY, EXPRESS OR IMPLIED, AS TO THE ACCURACY, TIMELINESS, COMPLETENESS, MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OF ANY CREDIT RATING OR OTHER OPINION OR INFORMATION IS GIVEN OR MADE BY MOODY'S IN ANY FORM OR MANNER WHATSOEVER.

Moody's Investors Service, Inc., a wholly-owned credit rating agency subsidiary of Moody's Corporation ("MCO"), hereby discloses that most issuers of debt securities (including corporate and municipal bonds, debentures, notes and commercial paper) and preferred stock rated by Moody's Investors Service, Inc. have, prior to assignment of any rating, agreed to pay to Moody's Investors Service, Inc. for ratings opinions and services rendered by it fees ranging from \$1,000 to approximately \$2,700,000. MCO and MIS also maintain policies and procedures to address the independence of MIS's ratings and rating processes. Information regarding certain affiliations that may exist between directors of MCO and rated entities, and between entities who hold ratings from MIS and have also publicly reported to the SEC an ownership interest in MCO of more than 5%, is posted annually at [www.moody.com](http://www.moody.com) under the heading "Investor Relations — Corporate Governance — Director and Shareholder Affiliation Policy."

Additional terms for Australia only: Any publication into Australia of this document is pursuant to the Australian Financial Services License of MOODY'S affiliate, Moody's Investors Service Pty Limited ABN 61 003 399 657 AFSL 336969 and/or Moody's Analytics Australia Pty Ltd ABN 94 105 136 972 AFSL 383569 (as applicable). This document is intended to be provided only to "wholesale clients" within the meaning of section 761G of the Corporations Act 2001. By continuing to access this document from within Australia, you represent to MOODY'S that you are, or are accessing the document as a representative of, a "wholesale client" and that neither you nor the entity you represent will directly or indirectly disseminate this document or its contents to "retail clients" within the meaning of section 761G of the Corporations Act 2001. MOODY'S credit rating is an opinion as to the creditworthiness of a debt obligation of the issuer, not on the equity securities of the issuer or any form of security that is available to retail investors.

Additional terms for Japan only: Moody's Japan K.K. ("MJKK") is a wholly-owned credit rating agency subsidiary of Moody's Group Japan G.K., which is wholly-owned by Moody's Overseas Holdings Inc., a wholly-owned subsidiary of MCO. Moody's SF Japan K.K. ("MSFJ") is a wholly-owned credit rating agency subsidiary of MJKK. MSFJ is not a Nationally Recognized Statistical Rating Organization ("NRSRO"). Therefore, credit ratings assigned by MSFJ are Non-NRSRO Credit Ratings. Non-NRSRO Credit Ratings are assigned by an entity that is not a NRSRO and, consequently, the rated obligation will not qualify for certain types of treatment under U.S. laws. MJKK and MSFJ are credit rating agencies registered with the Japan Financial Services Agency and their registration numbers are FSA Commissioner (Ratings) No. 2 and 3 respectively.

MJKK or MSFJ (as applicable) hereby disclose that most issuers of debt securities (including corporate and municipal bonds, debentures, notes and commercial paper) and preferred stock rated by MJKK or MSFJ (as applicable) have, prior to assignment of any rating, agreed to pay to MJKK or MSFJ (as applicable) for ratings opinions and services rendered by it fees ranging from JPY125,000 to approximately JPY250,000,000.

MJKK and MSFJ also maintain policies and procedures to address Japanese regulatory requirements.

REPORT NUMBER

1168182

## Analyst Contacts

Matthias Heck, CFA +49.69.70730.720  
VP-Sr Credit Officer  
matthias.heck@moodys.com

Anke Rindermann +49.69.70730.788  
Associate Managing  
Director  
anke.rindermann@moodys.com

Timo Fittig +44.207.772.5277  
Associate Analyst  
timo.fittig@moodys.com

## CLIENT SERVICES

Americas	1-212-553-1653
Asia Pacific	852-3551-3077
Japan	81-3-5408-4100
EMEA	44-20-7772-5454