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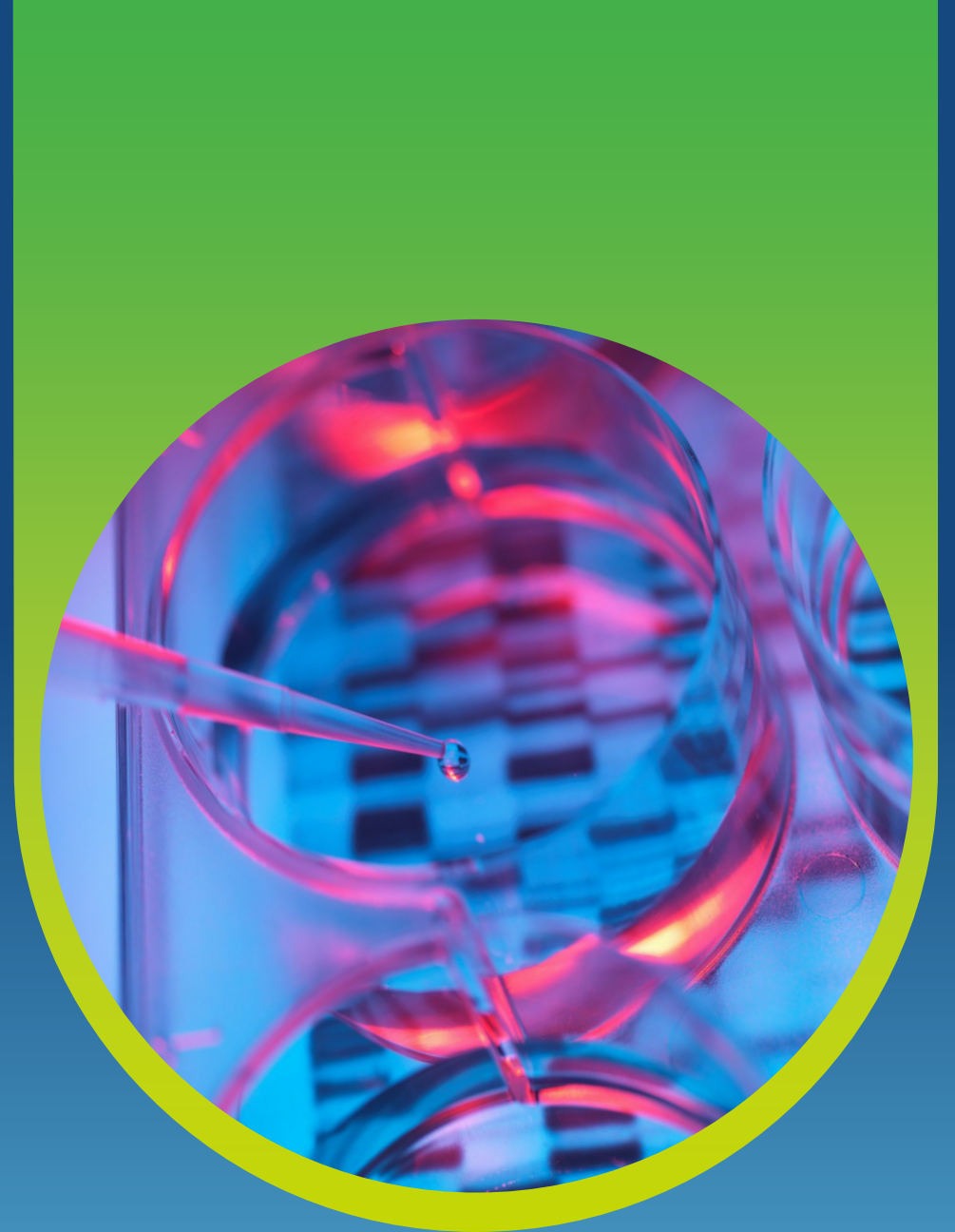
European Chemicals

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Industry Insights

Spring 2023



Executive Summary

Executive Summary

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Key raw materials prices in the chemicals sector showed mixed trends in Q1 2023



The ifo Business Climate Index for the German chemical industry continues to be in a negative trajectory due to recession concerns



Consumer specialty chemicals companies experienced broad share price declines over the last 12 months



The number of announced European chemicals transactions in Q1 2023 has dropped to its lowest level since 2009

Executive Summary

Overview

In this edition of European Chemicals Update from Kroll, we evaluate current trends for key raw materials, prevailing investor sentiment and valuation developments in the featured consumer specialty sub-sector.

Our top insights are detailed below:

- Key raw materials prices in the chemicals sector showed mixed trends in Q1 2023, affected by the lower demand and macroeconomic conditions.
- Next, the ifo Business Climate Index for the German chemical industry continues to be in a negative trajectory due to weaker demand - although the business expectations trended upward in Q1 2023, indicating improvement in sentiments regarding current business activities. But tough times loom over the manufacturers due to the expectation of a global recession.
- Finally, in the consumer specialty sub-sector, featured companies experienced decreases in market capitalization. The share price of Chr. Hansen Holding performed best over the last 12 months, followed by the share prices of Symrise and Givaudan.

Despite strong economic headwinds, chemical companies are regaining confidence regarding business opportunities for the second half of 2023. Learn more in our report and contact Kroll to learn more about how we help our clients to stay ahead.

Quarterly Market Review

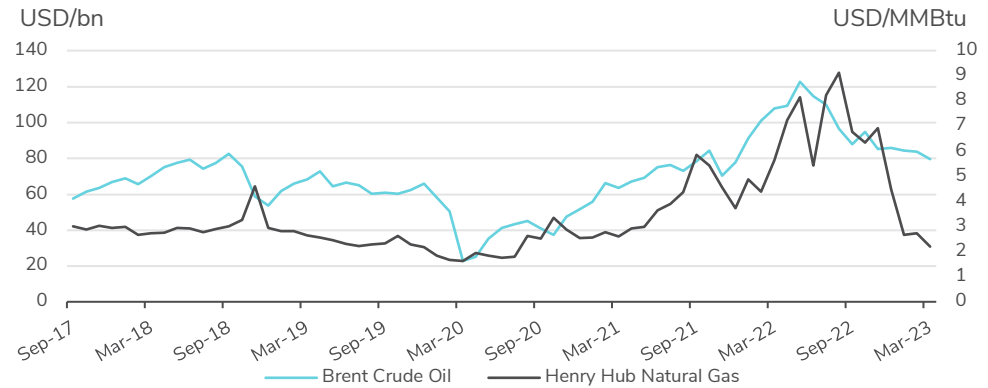
Key Raw Materials

Key Observations

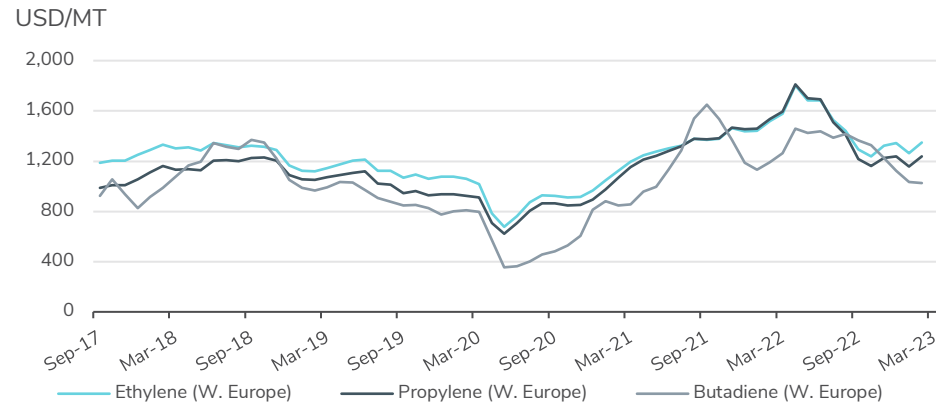
- Crude oil slipped by ~\$1/bn in February 2023, as Central Bank favors higher interest rates to curb inflation. Prices fell further by \$3/bn in March 2023 because of macroeconomic worries escalated following the collapse of Silicon Valley Bank.
- Benzene prices showed improvement in February 2023 despite the weak demand. The prices gained momentum as the raw material toluene prices moved upward.
- Butadiene prices witnessed mixed trend in first quarter of 2023 due to the low-cost pressure from the feedstock, high inflationary pressure and lower demand.

Petrochemicals

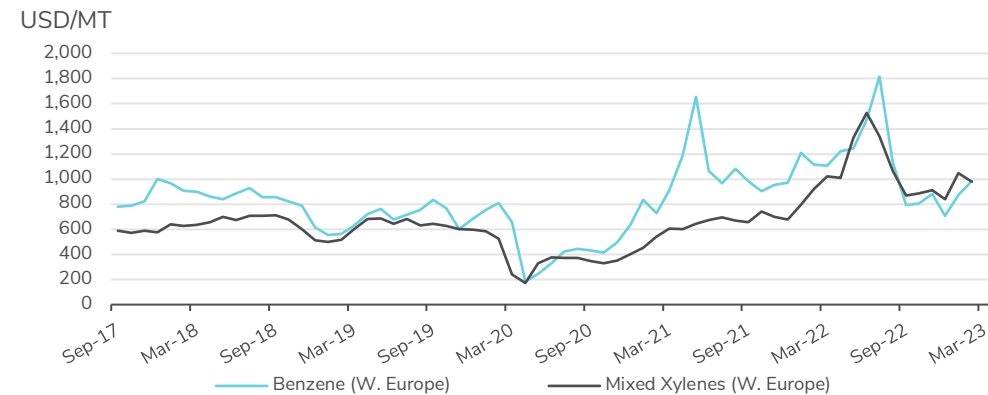
Feedstock



Olefins⁽¹⁾



Aromatics⁽¹⁾



Definitions:
MMBtu: 1 million British thermal units; bn.: barrels; MT: metric tons
Note: (1) Bloomberg as of February 28, 2023
Source: IEA, Chemanalyst, Bloomberg as of March 31, 2023

Quarterly Market Review

Raw Materials Wrap-Up

Product	Unit	Type	Delivery	Source	Date ⁽¹⁾					Change	
					Mar 2022	Jun 2022	Sep 2022	Dec 2022	Mar 2023	QoQ	YoY
Naphtha	USD/MT	1 Mo. Fwd	CIF N.W. Europe	Bloomberg	922.7	789.0	622.7	639.7	672.5	5.1%	(27.1%)
Methanol	EUR/MT	Spot	FOB Rotterdam	Polymerupdate	385.0	369.0	349.0	311.0	324.0	4.2%	(15.8%)
Acrylic acid	USD/MT	Spot	DDP W. Europe	Tecnon Orbichem	2,443.0	2,483.0	2,058.0	2,161.0	2,110.0	(2.4%)	(13.6%)
Adipic acid	USD/MT	Contract	DDP W. Europe	Tecnon Orbichem	3,962.0	3,857.0	3,720.0	3,283.0	2,944.0	(10.3%)	(25.7%)
Caustic soda (liquid)	USD/MT	Spot	DDP W. Europe	Tecnon Orbichem	1,136.0	1,514.0	1,540.0	2,595.0	1,740.0	(32.9%)	53.2%
Chlorine (liquid)	USD/MT	Spot	DDP W. Europe	Tecnon Orbichem	413.0	396.0	372.0	397.0	402.0	1.3%	(2.7%)
Urea (prill)	USD/MT	Spot	FOB Black Sea	Green Markets	547.5 ⁽²⁾	475.0	565.0	485.0	270.0	(44.3%)	(50.7%)

Definitions:

CIF: Cost, insurance and freight

FOB: Free on board

DDP: Delivered duty paid

QoQ: Quarter on Quarter

YoY: Year on Year

Note: (1) Data as of month ending (2) Data as of February 28, 2023

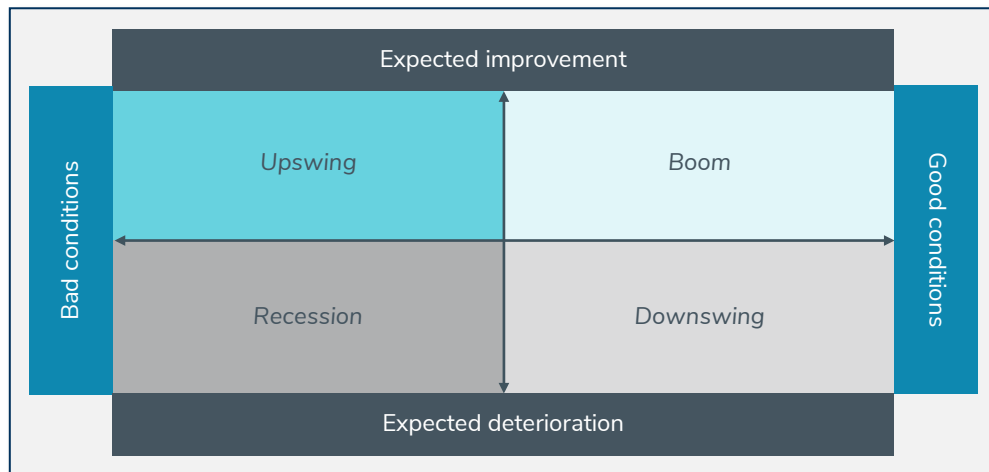
Source: Bloomberg as of March 31, 2023

Quarterly Market Review

ifo Survey German Chemical Industry

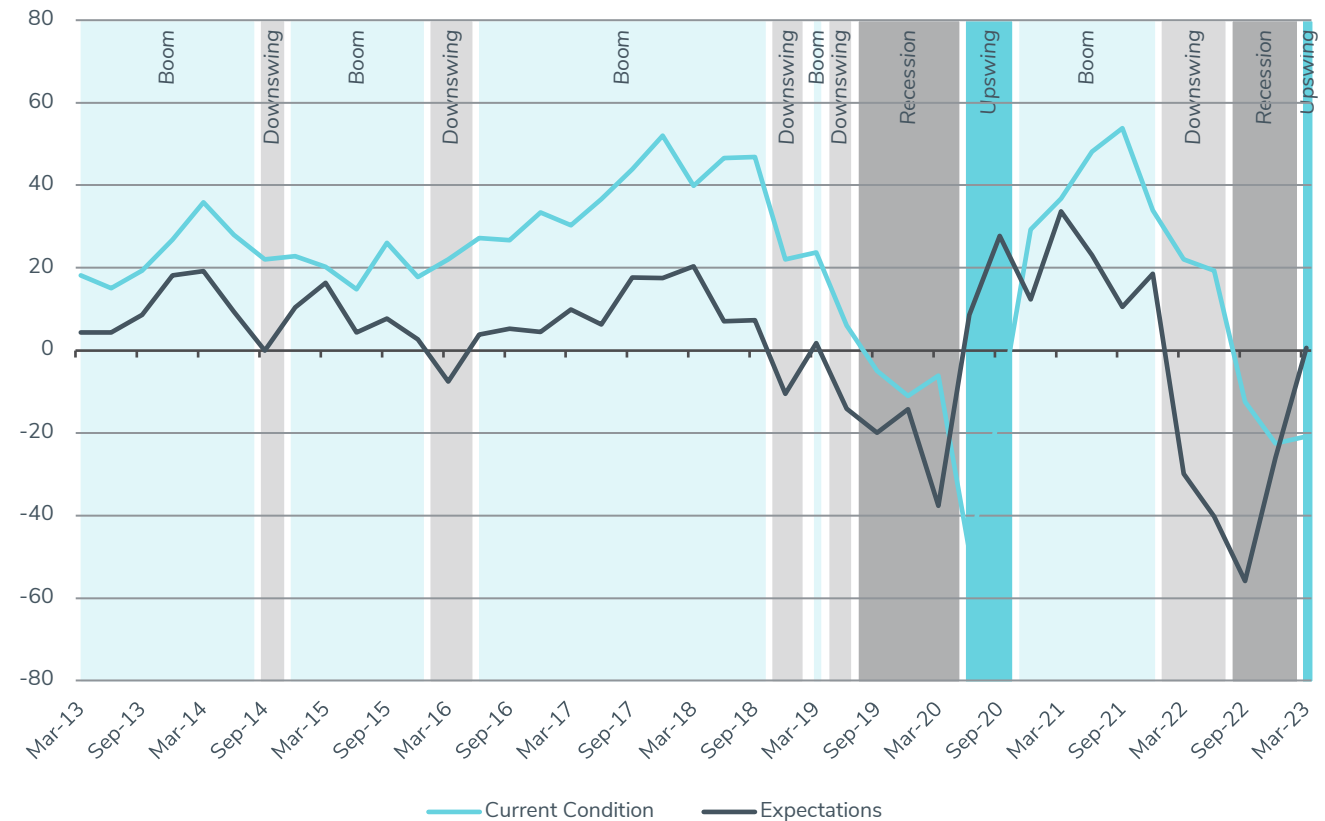
Key Observations

- March 2023 expectations have improved and reverted from the dip at the end of September 2022.
- Current conditions continue to be in a negative trajectory due to weak demand.
- The rising expectations and negative current conditions indicate the German companies are less pessimistic and are regaining confidence regarding current business activities. However, tough conditions are expected in the coming months due to the expectation of a global recession.



German Chemical Industry | Business Cycle

Balance in percentage



Note: Boom: good conditions, expected improvement; Downswing: good conditions, expected deterioration; Recession: bad conditions, expected deterioration; Upswing: bad conditions; expected improvement
 Source: ifo Institut für Wirtschaftsforschung, Bloomberg as of March 31, 2023

Quarterly Market Review

ifo Survey German Chemical Industry

Key Observations

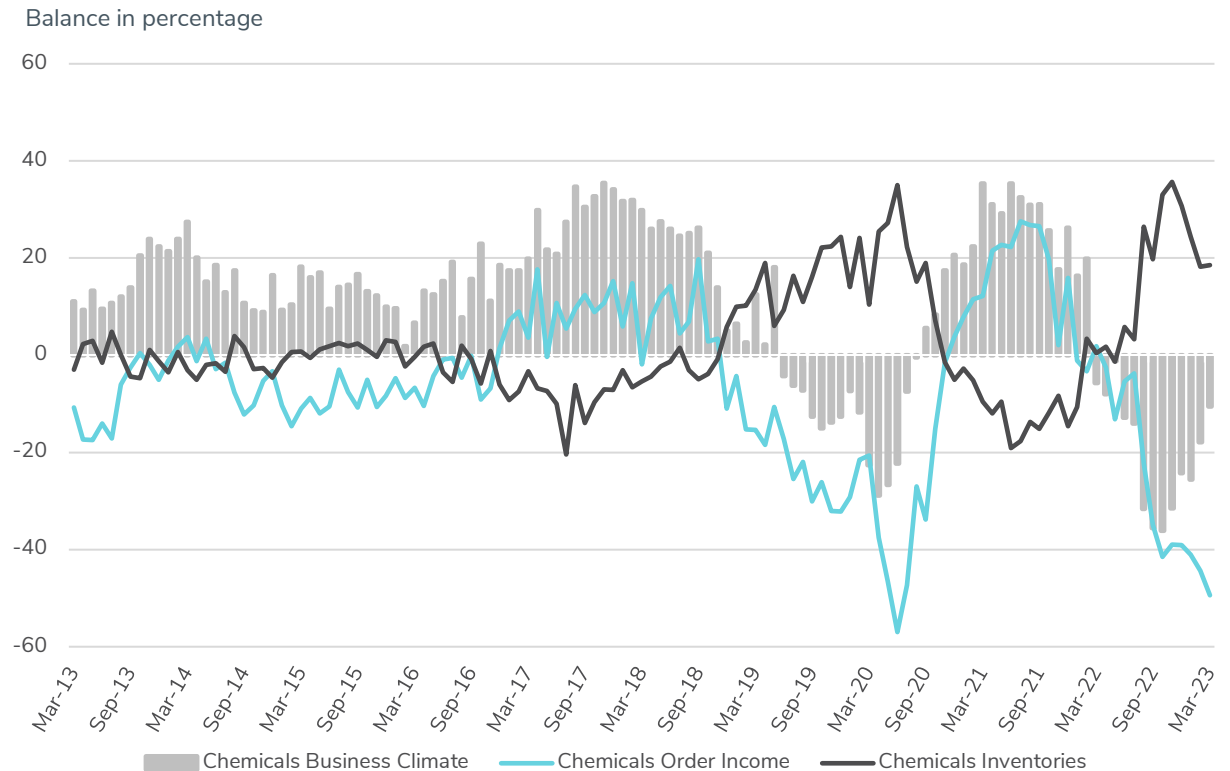
- The chemicals business climate improved from (24.5) in December 2022 to (10.5) in March 2023.
- Order income continues to remain in the negative territory since April 2022.
- Inventory levels continues to be positive but have been falling since November 2022.
- A negative order income level indicates that chemical customers continues to scale back on orders.

Explanatory note

The ifo Business Climate Index is based on ~9,000 monthly survey responses from firms in manufacturing, construction, wholesaling and retailing. The firms are asked to give their assessments of their current business situations and their expectations for the next six months. They can characterize their situations as “good,” “satisfactory” or “poor” and their business expectations for the next six months as “more favorable,” “unchanged” or “more unfavorable.” The balance value of the current business situations is the difference between the percentages of the responses “good” and “poor,” and the balance value of the expectations is the difference between the percentages of the responses “more favorable” and “more unfavorable.” The business climate is a transformed mean of the balances of the business situation and the expectations. For the purpose of calculating the index values, the transformed balances are all normalized to the average of the year 2005.

Source: ifo Institut für Wirtschaftsforschung, Bloomberg as of March 31, 2023.

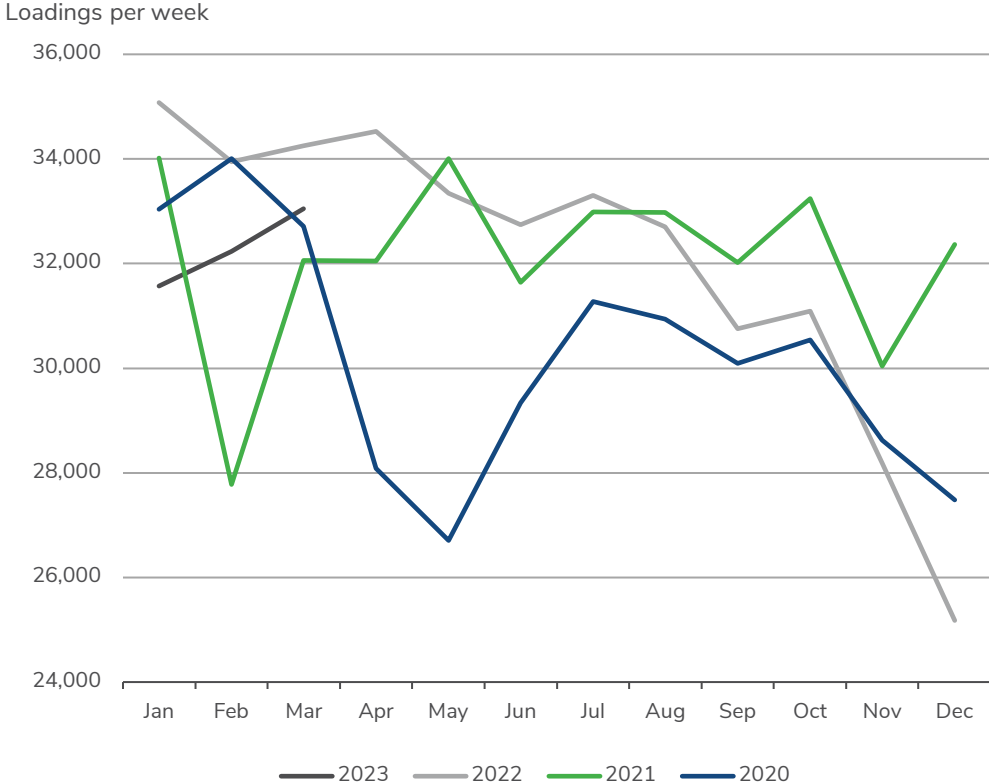
German Chemical Industry | Business Indicators



Quarterly Market Review

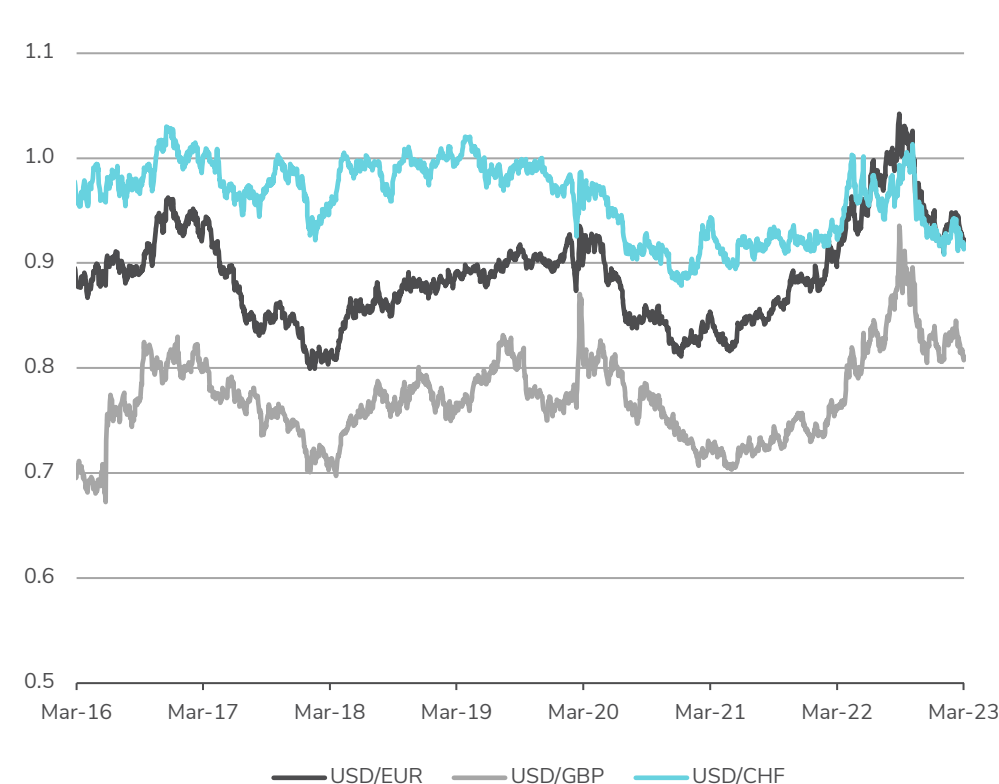
Economic Environment

U.S. Weekly Railcar Chemicals Loadings



Source: Association of American Railroads, Bloomberg as of March 31, 2023

Currency Trends



Source: Bloomberg as of March 31, 2023

Quarterly Market Review

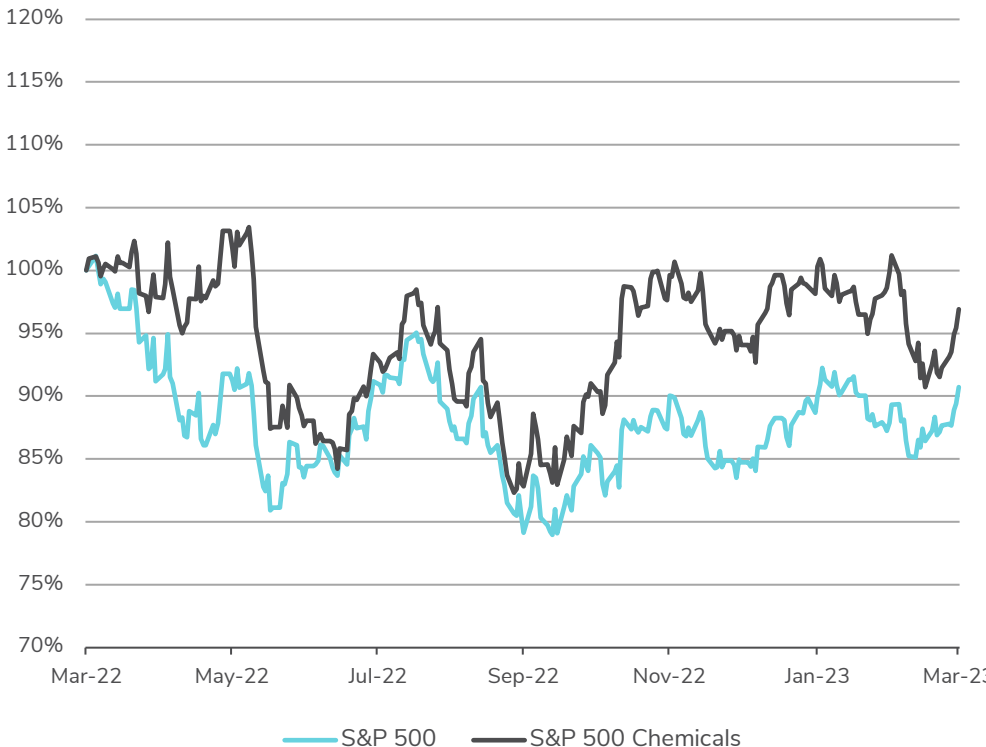
Rebalanced Stock Development in Europe and the U.S.

Europe: STOXX 600



Source: Bloomberg as of March 31, 2023

U.S.: S&P 500



Source: Bloomberg as of March 31, 2023

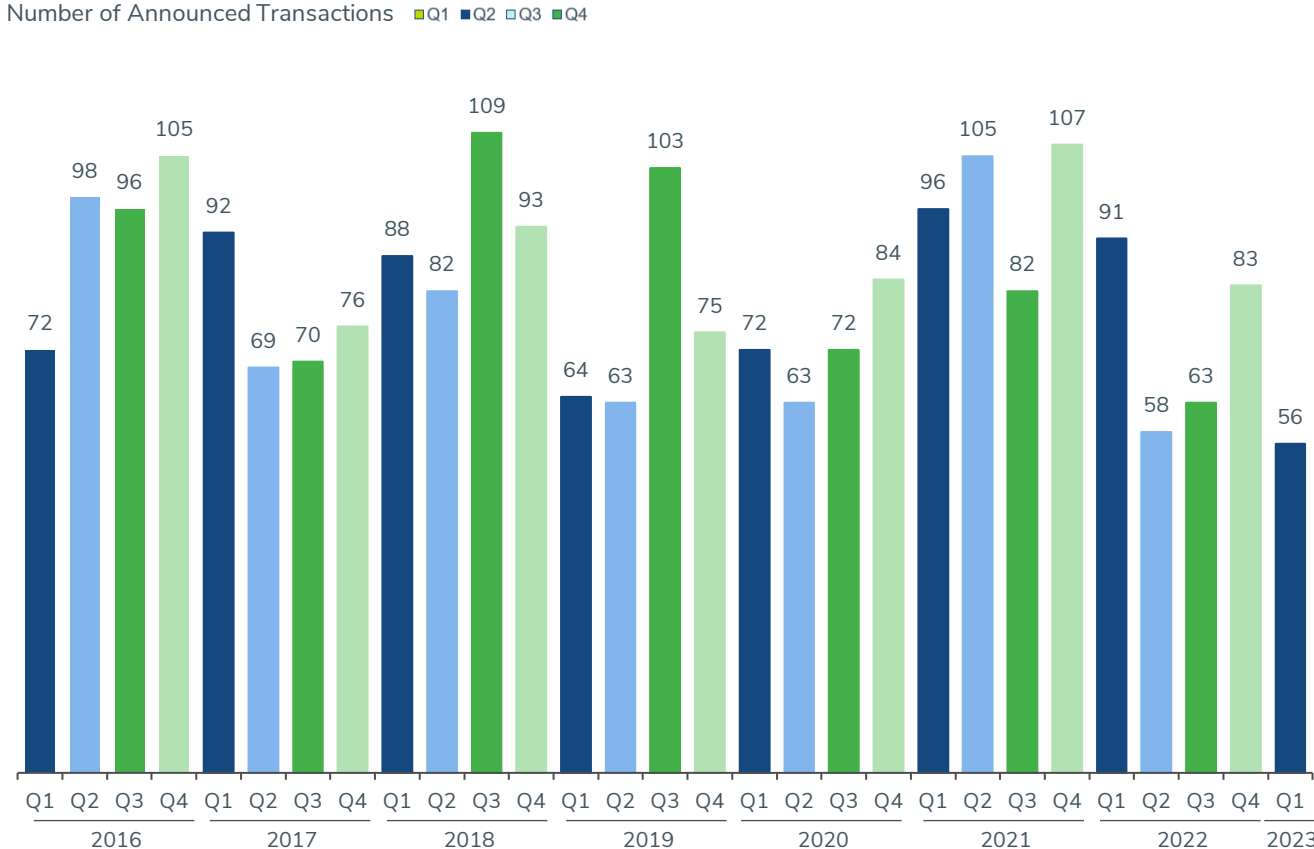
M&A Transaction Review

Announced Deals

Key Observations

- Fifteen of the 56 transactions announced in the last three months had a disclosed value totaling EUR 5.0 bn.
- The top 10 transactions announced in the last six months, based on reported deal values (see table on next page), have a combined value of EUR 13.4 bn.
- Notable transactions include the Novozymes A/S acquisition of Chr. Hansen Holding A/S in the area of biotechnology, and the Croda International Plc acquisition of Solus Biotech Co., Ltd, in the area of specialty chemicals.

European M&A Quarterly Trend



Source: Capital IQ as of March 31, 2023
 Note: Screening includes transactions in which the target, buyer or seller is from Europe. Announced transactions include bids made, letters of intent, definitive agreements and registered offerings (definition by Capital IQ).

M&A Transaction Review

Top 10 European Deals Announced During the Last Six Months

In EUR millions

Announced	Acquirer	HQ	Target	HQ	Target Business Description	Stake Acquired	Enterprise Value	LTM Revenue	LTM EBITDA Margin	EV / LTM Revenue	EV / LTM EBITDA
Dec 12, 2022	Novozymes	DK	Chr. Hansen Holding	DK	Chr. Hansen Holding, a bioscience company, develops natural-ingredient solutions for the food, nutritional, pharmaceutical, and agricultural industries.	100.0%	11,853.7	1,259.3	33.5%	9.4x	28.1x
Feb 06, 2023	Croda International	U.K.	Solus Biotech	KR	Solus Biotech produces powder ceramides for skin and hair care formulations. It also develops biotech-derived retinol.	100.0%	258.5	31.3	(15.5%)	8.2x	n/m
Oct 03, 2022	Centaur Management	MT	Filters business of Essentra	U.K.	Filters business of Essentra plc comprises filters manufacturing business related to specialty plastics. The asset is in the U.K.	100.0%	252.8	n/a	n/a	n/a	n/a
Mar 06, 2023	Aimia, Paladin Private Equity Partners	CA, U.S.	Giovanni Bozzetto	IT	Giovanni Bozzetto manufactures chemical auxiliaries intended for the textiles, construction, water treatment and agrochemistry industries.	100.0%	228.5	224.1	14.4%	1.0x	7.1x
Feb 06, 2023	Stahl Holdings	NL	ICP Industrial	U.S.	ICP Industrial engages in development, application, and technical support of specialty coatings. It offers coatings, adhesives, and silicone release.	100.0%	190.9	130.4	n/a	1.5x	n/a
Nov 30, 2022	Yildirim Holding	TR	Chromium business of Elementis	U.S.	Chromium business of Elementis comprises chromium production and other operations. The asset is located in the U.S.	100.0%	164.9	165.8	13.6%	1.0x	7.3x
Nov 14, 2022	Cathay Industries	HK	Iron oxide business of Venator Materials	U.K.	Iron Oxide Business of Venator Materials comprises colored inorganic pigments. The asset is located in the U.S.	100.0%	135.5	n/a	n/a	n/a	n/a
Nov 02, 2022	HEXPOL	SE	McCann Plastics	U.S.	McCann Plastics, Inc. manufactures thermoplastic custom compounding chemicals and materials.	100.0%	121.7	72.9	n/a	1.7x	n/a
Oct 11, 2022	Safex Chemicals India	IN	Briar Chemicals	U.K.	Briar Chemicals formulates and offers crop protection products and industrial liquids for the agriculture sectors.	100.0%	83.0	n/a	n/a	n/a	n/a
Nov 24, 2022	Hexatronic Group	SE	KNET Co.	KR	KNET Co. manufactures and sells PE pipes, engages in information and communication construction and trading, and develops telecommunications technologies.	100.0%	80.7	n/a	n/a	n/a	n/a

Source: Capital IQ, Merger Market and company information

Note: Transactions ordered by value. Includes announcements through March 2023. Figures converted with exchange rate as per the respective announcement date.

Definitions:

Enterprise Value (EV): Market Capitalization + Total Debt + Preferred Equity + Minority Interest - Cash and Short-Term Liabilities

EBITDA: Earnings Before Interest, Taxes, Depreciation and Amortization; LTM: Last Twelve Months

M&A Transaction Review

Strategic Alliances and Collaborations

Lanxess and Advent International Complete the Formation of Industry-Leading Engineering Materials Joint Venture (JV)

April 2023



Lanxess and private equity investor Advent International have completed the formation of their high-performance engineering polymers JV. The new JV is the result of the combination of DSM's Engineering Materials business and Lanxess's former high-performance materials business. Lanxess holds about 40% and Advent holds about 60% of the JV. The combination creates a strong platform, resulting in opportunities for employees and value for customers.

Umicore and Powerco, the New Battery Company of the Volkswagen Group, Have Obtained Full Regulatory Approvals for Their JV

March 2023



The JV will proceed to prepare for large-scale industrial production of cathode active materials and precursor materials in Europe. From 2025 onward, the JV set up by Umicore and Powerco will supply Powerco's European battery cell factories with key materials for production. The JV will cover a large part of Powerco's EU demand and provide Umicore with secured access to an important part of the European demand for electric vehicle cathode materials.

Wacker Expands Production of Silicone Sealants at Its Nünchritz Site

March 2023



In response to growing demand, the Wacker chemical group is expanding its production and cartridge filling capacities for silicone sealants at its Nünchritz site. The expansion will increase the company's capability to supply customers that contract Wacker to produce ready-to-use silicone sealants for their direct sales. Approximately EUR 20 mn has been budgeted for the new manufacturing lines, which are scheduled to begin production in the fall of 2024.

M&A Transaction Review

Strategic Alliances and Collaborations

Johnson Matthey Chosen for H2H Saltend Low-Carbon Hydrogen Project (LCH) **Johnson Matthey** Inspiring science, enhancing life

March 2023

Johnson Matthey has signed an LCH™ technology license with Equinor and Linde Engineering for H2H Saltend, one of the U.K.'s largest low-carbon hydrogen (ccs-enabled) projects. The Company was selected alongside their EPC partner Linde Engineering for the major FEED contract by Equinor. H2H Saltend is a 600-megawatt low-carbon hydrogen production plant with a carbon capture rate of over 95%, one of the first of its kind and scale in the U.K., helping to establish the Humber as an international hub for low-carbon hydrogen.

Merck and Intel Accelerate Sustainable Semiconductor Processes and Manufacturing Technologies Through Academic Research in Europe

March 2023

Merck and Intel Corporation, one of the world's largest semiconductor designers and manufacturers, are enabling more sustainable semiconductor manufacturing solutions by funding a new academic research program in Europe. The program will specifically leverage artificial intelligence and machine learning technologies to drive innovation in semiconductor manufacturing processes and technologies.

Air Liquide and TotalEnergies Join Forces to Develop a Network of Over 100 Hydrogen Stations for Heavy-Duty Vehicles in Europe

February 2023

Air Liquide and TotalEnergies announced their decision to create an equally owned JV to develop a network of hydrogen stations geared toward heavy-duty vehicles on major European road corridors. This initiative will help facilitate access to hydrogen, enabling the development of its use for goods transportation and promoting the hydrogen sector. The partners aim to deploy numerous hydrogen stations on major European roads in France, Benelux and Germany.

Public Trading Analysis

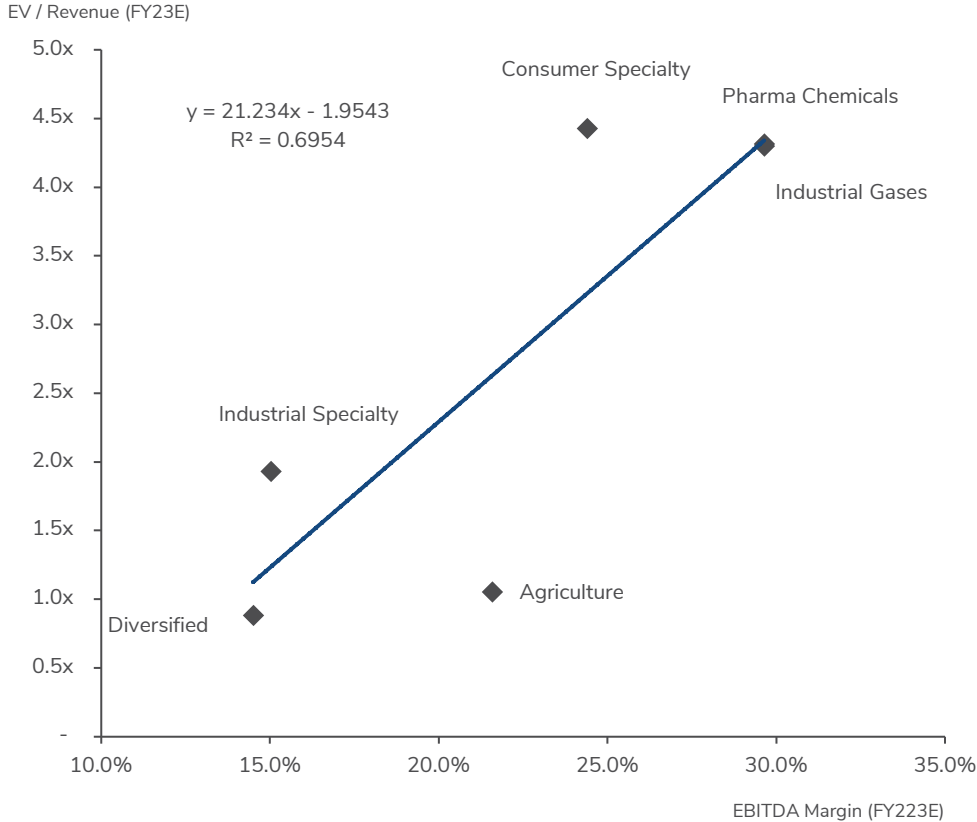
Sub-Sector Summary

Public Trading Analysis

Sub-Sector Summary

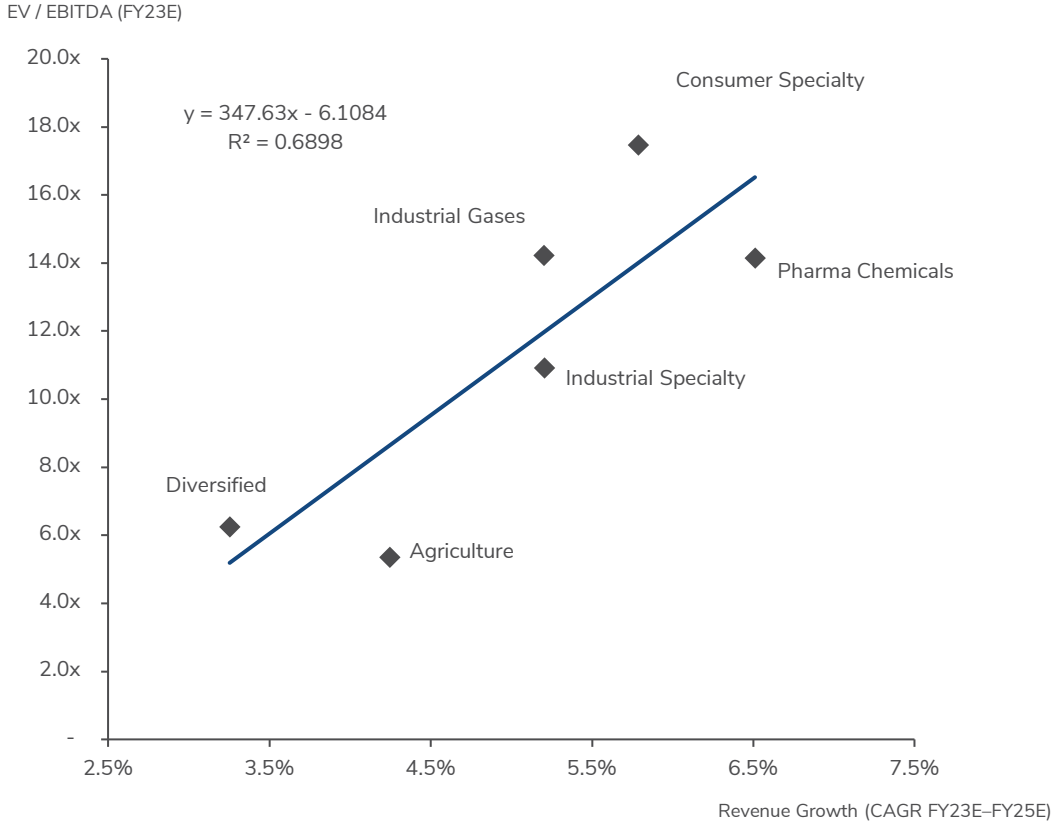
Regression Analysis

EV / Revenue vs. EBITDA Margin



See pages 19–21 for constitution of sub-sectors.
 Source: Capital IQ as of March 31, 2023

EV / EBITDA vs. Revenue Growth



See pages 19–21 for constitution of sub-sectors.
 Source: Capital IQ as of March 31, 2023

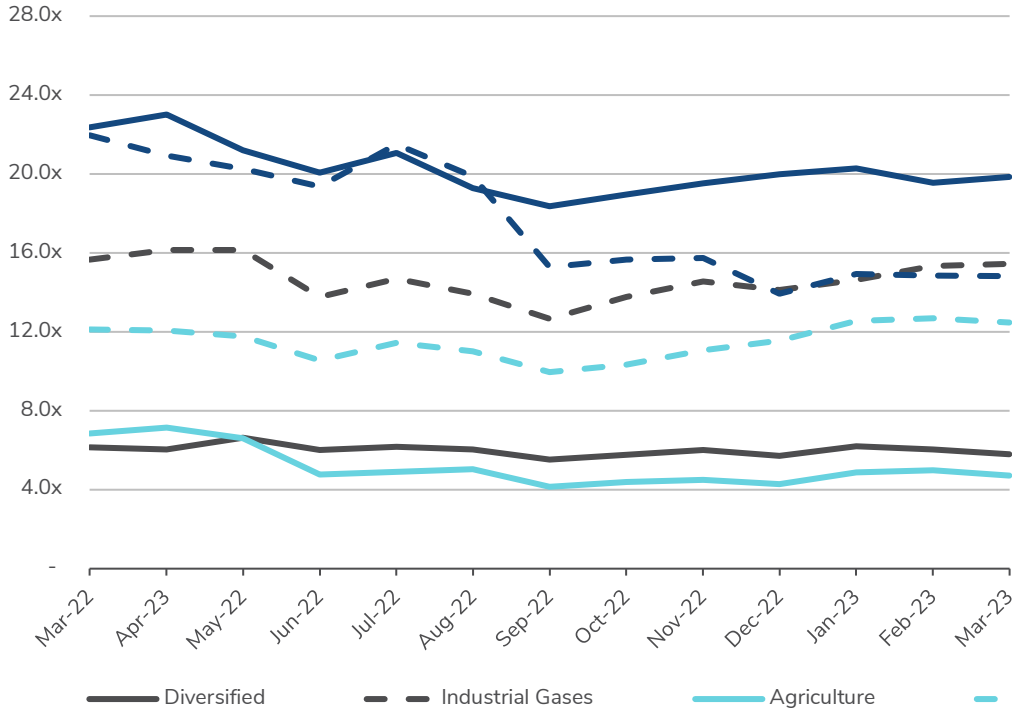
Public Trading Analysis

Sub-Sector Summary

Sub-Sector Trading Multiples (EV / EBITDA)

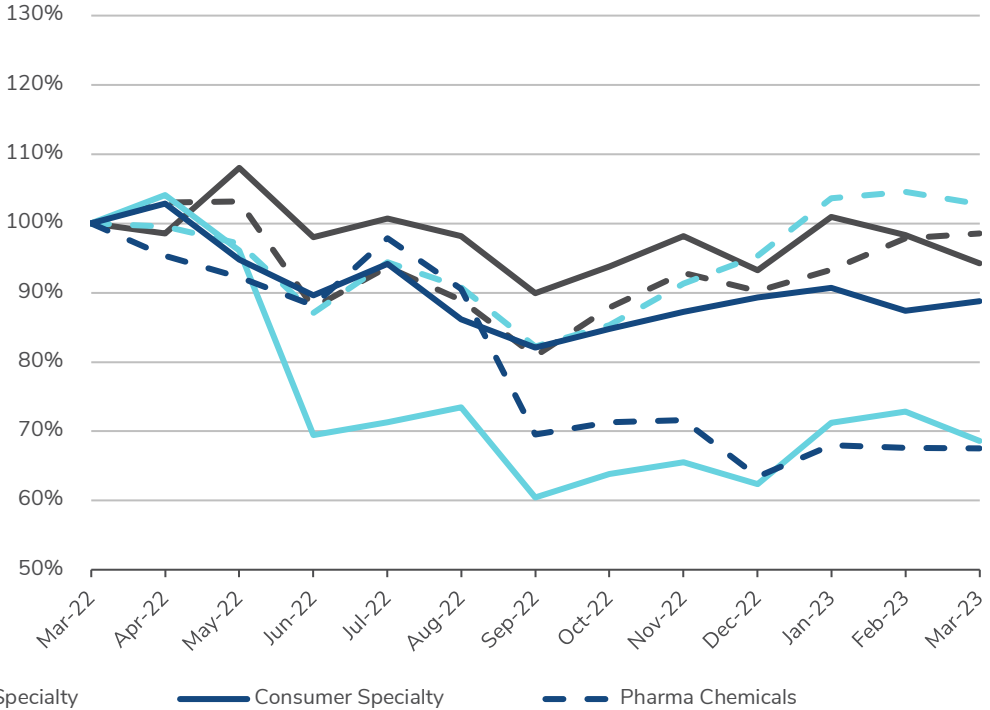
LTM Actual

EV / EBITDA



LTM Rebased

EV / EBITDA



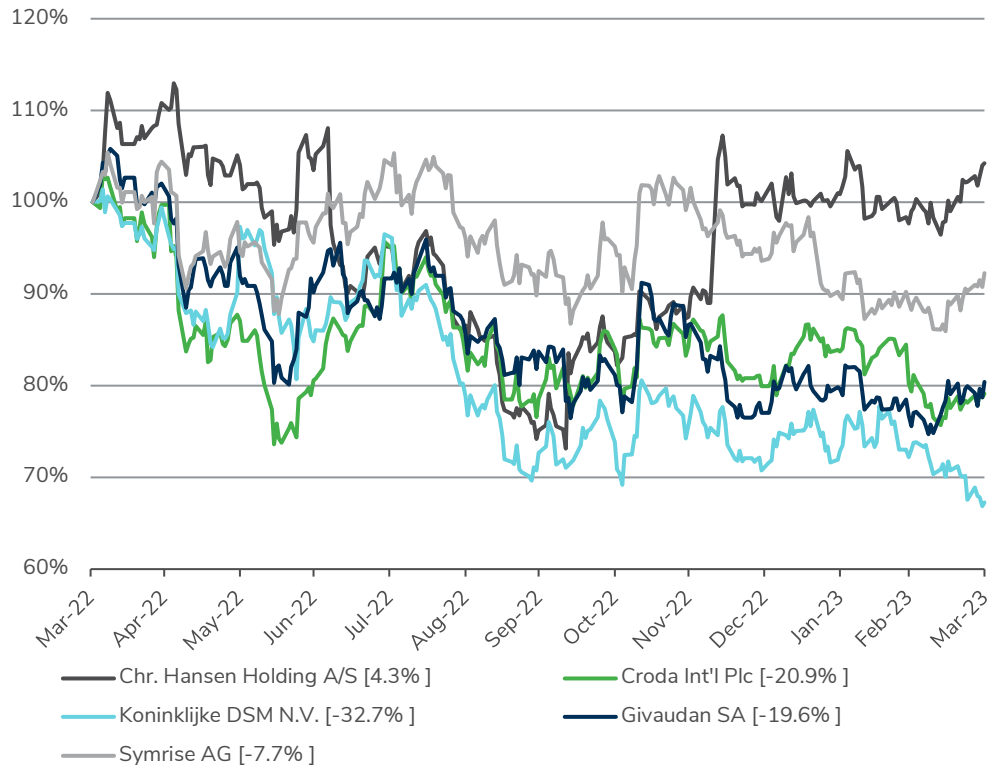
Source: Capital IQ as of March 31, 2023

Public Trading Analysis

Sub-Sector Focus: Consumer Specialty

Share Price Development and Regression Analysis

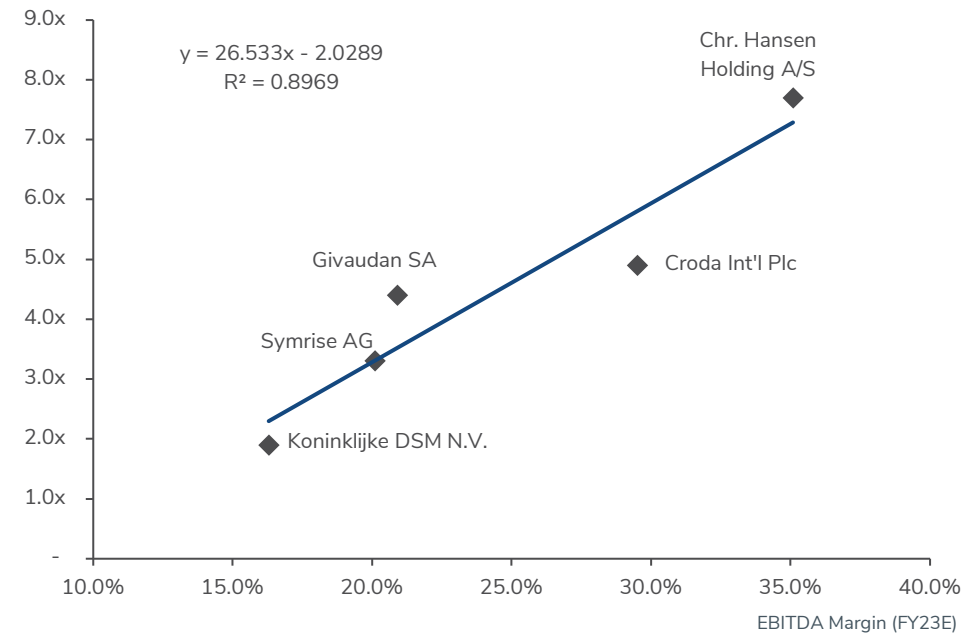
Share Price Development Rebased



Source: Bloomberg as of March 31, 2023

EV / Revenue vs. EBITDA Margin

EV / Revenue (FY23E)



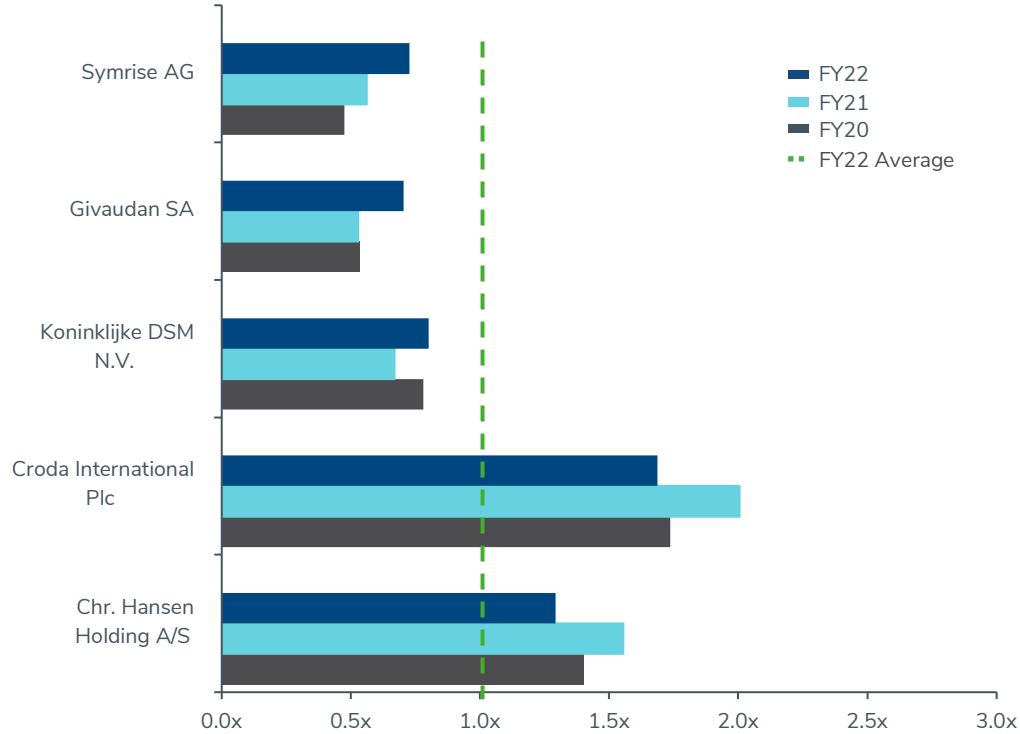
Source: Capital IQ as of See pages 19–21 for constitution of sub-sectors. March 31, 2023

Public Trading Analysis

Sub-Sector Focus: Consumer Specialty

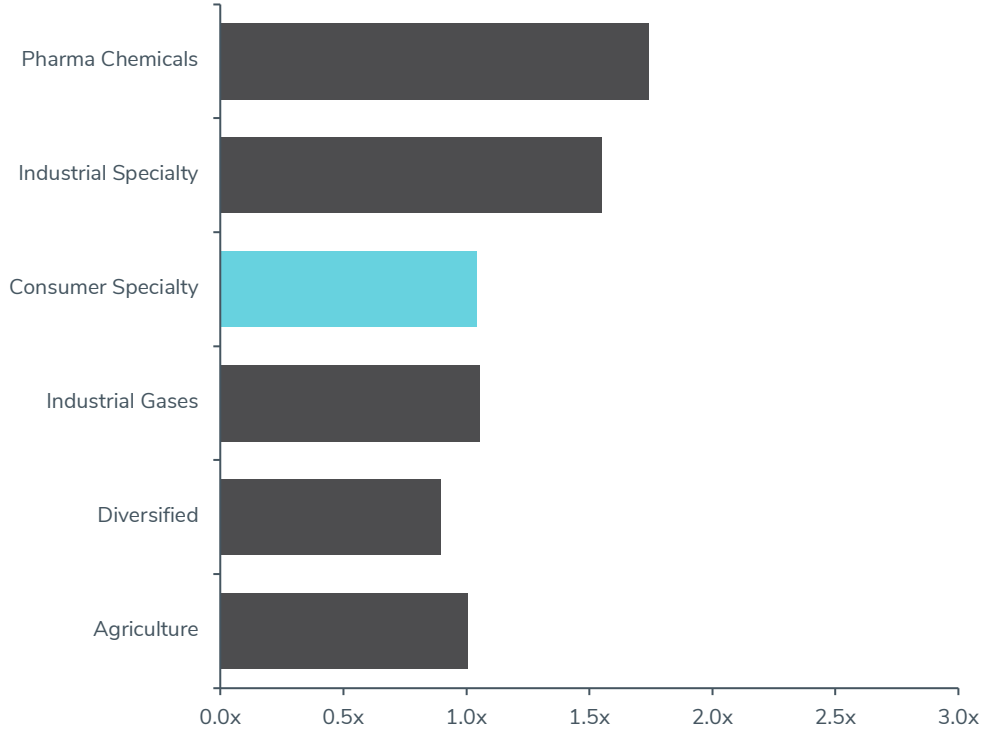
Capital Expenditure / Depreciation

Consumer Specialty



Source: Bloomberg as of March 31, 2023

Chemicals Sub-Sector Average (FY22)



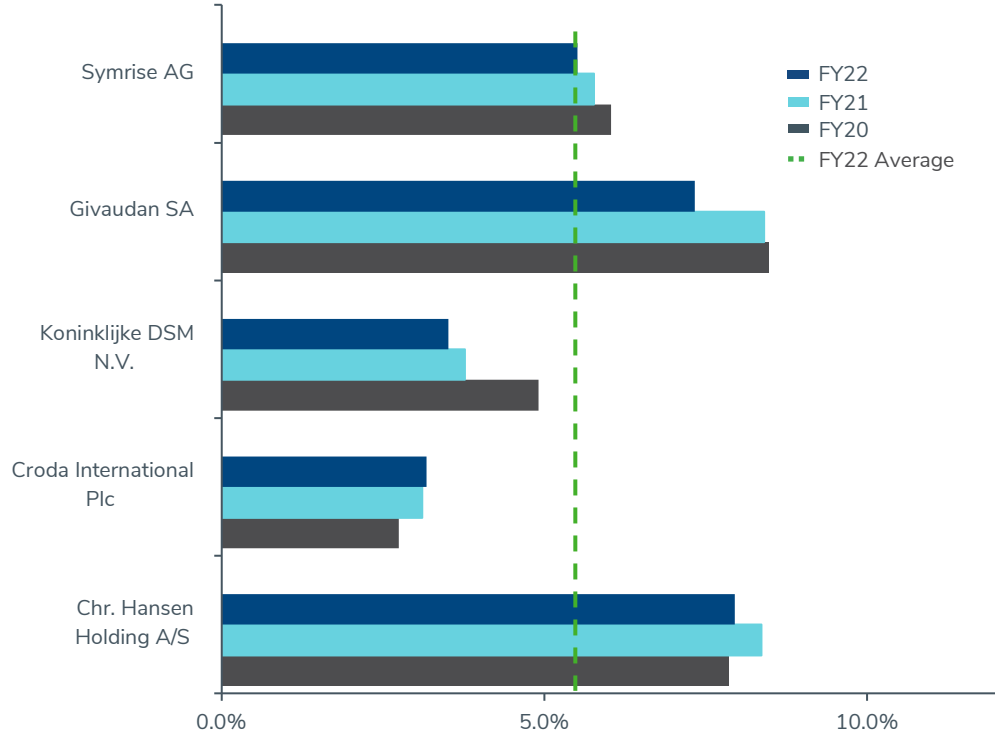
Source: Capital IQ as of March 31, 2023

Public Trading Analysis

Sub-Sector Focus: Consumer Specialty

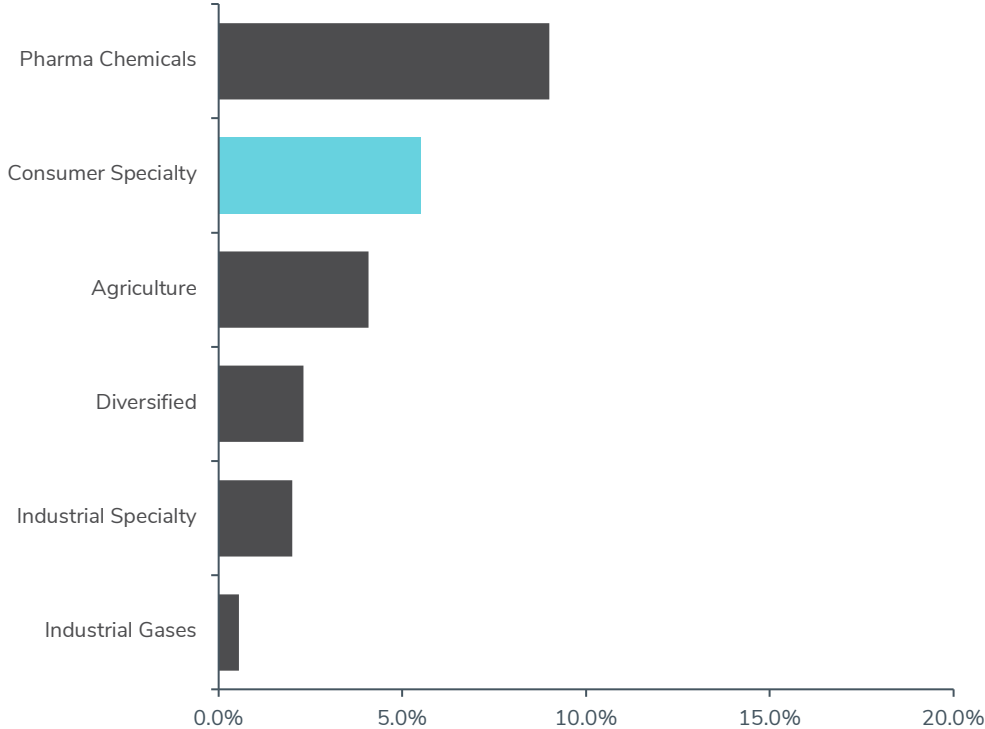
Research and Development Expenditures in Percentage of Sales

Consumer Specialty



Source: Bloomberg as of March 31, 2023

Chemicals Sub-Sector Average (FY22)



Source: Capital IQ as of March 31, 2023

Public Trading Analysis

Company Trading Statistics

Company Name	Share Price (in EUR)	52-Week Share Price (in EUR)			Market Cap	Enterprise Value	Revenues			EBITDA		EV / EBITDA	
	31-Mar-23	Low	High	% of High			LTM	LTM	FY2023E	Margin LTM	LTM	FY2023E	
Diversified													
Arkema SA	90.8	71.2	121.2	75%	6,792.9	8,497.9	11,550.0	2,017.0	1,483.4	17.5%	4.2x	5.7x	
BASF SE	48.4	37.9	54.2	89%	43,197.4	60,809.4	87,327.0	10,229.0	8,966.7	11.7%	5.9x	6.8x	
Clariant AG	15.2	14.2	19.9	77%	5,013.8	5,939.7	5,260.0	822.7	849.9	15.6%	7.2x	7.0x	
Evonik Industries AG	19.4	16.5	26.4	73%	9,021.8	12,300.8	18,488.0	2,370.0	2,209.2	12.8%	5.2x	5.6x	
Lanxess AG	37.8	28.2	47.8	79%	3,266.5	7,116.5	8,088.0	855.0	907.1	10.6%	8.3x	7.8x	
Solvay SA	105.4	74.0	113.0	93%	10,918.2	12,801.2	16,071.0	3,361.0	2,799.7	20.9%	3.8x	4.6x	
Average										14.9%	5.8x	6.2x	
Agriculture													
Israel Chemicals Ltd.	6.2	6.0	10.7	58%	7,975.9	10,313.5	9,371.0	3,685.7	2,180.9	39.3%	2.8x	4.7x	
K+S AG	19.6	17.5	36.5	54%	3,750.5	3,664.5	5,676.6	2,422.9	1,529.7	42.7%	1.5x	2.4x	
KWS Saat SE	61.1	53.5	70.4	87%	2,016.3	2,775.1	1,671.6	264.0	288.8	15.8%	10.5x	9.6x	
Tessenderlo Group NV	28.8	28.0	34.5	84%	2,460.7	2,571.7	2,587.5	457.4	447.0	17.8%	5.6x	5.8x	
Yara International ASA	39.9	32.6	44.5	90%	10,171.4	12,963.8	22,365.1	4,215.3	3,040.2	18.8%	3.1x	4.3x	
Average										26.9%	4.7x	5.4x	

Source: Capital IQ as of March 31, 2023; includes the most actively traded European chemical companies for respective covered sectors

Public Trading Analysis

Company Trading Statistics

Company Name	Share Price (in EUR)		52-Week Share Price (in EUR)		Market Cap	Enterprise Value	Revenues			EBITDA		EV / EBITDA	
	31-Mar-23	Low	High	% of High			LTM	LTM	FY2023E	Margin LTM	LTM	FY2023E	
Industrial Specialty													
AkzoNobel NV	72.0	55.0	85.1	85%	12,267.4	16,571.4	10,846.0	996.0	1,343.7	9.2%	16.6x	12.3x	
Covestro AG	38.1	27.7	46.8	82%	7,242.7	9,737.7	17,968.0	1,576.0	1,238.9	8.8%	6.2x	7.9x	
EMS-Chemie Holding AG	760.4	596.5	912.2	83%	17,785.7	17,473.9	2,504.6	664.7	704.3	26.5%	26.3x	24.8x	
Johnson Matthey Plc	22.6	20.0	28.9	78%	4,126.7	5,258.5	16,874.9	638.6	749.7	3.8%	8.2x	7.0x	
Kemira Oyj	16.2	11.0	18.2	89%	2,491.5	3,277.4	3,571.6	511.0	559.2	14.3%	6.4x	5.9x	
Lenzing AG	69.5	44.1	94.4	74%	1,845.2	3,994.1	2,565.7	218.4	351.3	8.5%	18.3x	11.4x	
Sika AG	257.7	191.7	321.6	80%	39,597.6	41,667.5	10,617.0	1,799.3	2,256.0	16.9%	23.2x	18.5x	
Synthomer Plc	1.3	0.9	3.8	35%	621.0	1,855.8	2,687.7	215.6	261.8	8.0%	8.6x	7.1x	
Umicore SA	31.2	28.8	44.4	70%	7,496.7	8,649.8	25,449.4	1,086.5	1,075.1	4.3%	8.0x	8.0x	
Victrex Plc	18.1	17.3	22.2	82%	1,576.8	1,537.1	387.5	132.3	138.4	34.1%	11.6x	11.1x	
Wacker Chemie AG	149.4	98.6	187.1	80%	7,421.9	7,363.6	8,209.3	1,808.2	1,230.3	22.0%	4.1x	6.0x	
Average										14.2%	12.5x	10.9x	
Industrial Gases													
Air Liquide SA	154.2	114.4	154.9	100%	80,529.4	92,934.5	29,934.0	6,782.3	7,676.2	22.7%	13.7x	12.1x	
Linde Plc ⁽¹⁾	327.1	241.6	333.9	98%	161,008.9	174,551.7	31,218.7	10,162.6	10,682.7	32.6%	17.2x	16.3x	
Average										27.6%	15.4x	14.2x	

Source: Capital IQ as of March 31, 2023; includes the most actively traded European chemical companies for respective covered sectors

Note: (1) Based on company filings and press releases, following the merger of Praxair, Inc. and Linde AG, a new legal entity, Linde Plc, has been established with headquarters in the U.K. and shares listed in both the Frankfurt Stock Exchange (XETRA:LIN) and New York Stock Exchange (NYSE:LIN). In accordance, our coverage for Linde AG has been replaced by Linde Plc.

Public Trading Analysis

Company Trading Statistics

EUR in mn
(except for share price)

Company Name	Share Price (in EUR)	52-Week Share Price (in EUR)			Market Cap	Enterprise Value	Revenues			EBITDA		EV / EBITDA	
	31-Mar-23	Low	High	% of High			LTM	LTM	FY2023E	Margin LTM	LTM	FY2023E	
Consumer Specialty													
Chr. Hansen Holding A/S	69.9	48.3	81.1	86%	9,203.3	10,199.4	1,259.3	426.4	466.9	33.3%	23.9x	21.8x	
Croda International Plc	74.0	66.7	92.0	80%	10,249.8	10,603.6	2,355.5	581.7	643.7	24.7%	18.2x	16.5x	
Koninklijke DSM NV	108.7	105.8	165.5	66%	18,824.9	19,114.2	8,390.0	1,234.0	1,654.9	14.7%	15.5x	11.5x	
Givaudan SA	2,998.3	2,694.8	4,067.4	74%	27,665.2	32,225.7	7,201.9	1,382.3	1,542.7	19.2%	23.3x	20.9x	
Symrise AG	100.2	91.5	115.7	87%	14,005.2	16,296.8	4,618.5	907.6	983.5	19.7%	18.0x	16.6x	
Average										22.2%	19.8x	17.5x	

Pharma Chemicals

Bayer AG	58.7	46.7	68.0	86%	57,687.9	89,339.9	50,739.0	12,705.0	12,916.3	25.0%	7.0x	6.9x
Lonza Group Ltd.	552.1	440.5	689.8	80%	41,008.4	41,443.1	6,297.2	1,920.6	2,072.0	30.5%	21.6x	20.0x
Novozymes A/S	47.1	43.9	67.2	70%	13,027.9	13,873.4	2,359.8	769.1	816.3	32.6%	18.0x	17.0x
Merck KGaA	171.6	153.1	202.8	85%	74,586.1	82,993.1	22,232.0	6,556.0	6,565.3	29.5%	12.7x	12.6x
Average										29.4%	14.8x	14.1x

Source: Capital IQ as of March 31, 2023; includes the most actively traded European chemical companies for respective covered sectors



For more information, please contact:

Germany



Andreas Stoecklin, Frankfurt
Head of EMEA Corporate Finance, M&A
+ 49 (0) 69 719 184 0
andreas.stoecklin@kroll.com



Philipp Bose, Munich
Director, M&A
+49 (0) 89 388 884 280
philipp.bose@kroll.com

United Kingdom



Dafydd Evans, London
Managing Director, M&A
+44 (0) 20 7089 4850
dafydd.evans@kroll.com



Paul Teuten, London
Managing Director, M&A
+44 (0) 20 7089 4840
paul.teuten@kroll.com

Spain



Javier Zoido, Madrid
Head of Latin America & Iberia Valuation
Advisory Services
+34 910 389 000
javier.zoido@kroll.com

France



Jacques Giard, Paris
Country Head France, Transaction Advisory
Services
+33 (0) 6 50 74 67 20
jacques.giard@kroll.com

Brazil



Alexandre Pierantoni, Sao Paulo
Managing Director, M&A
+55 11 3192 8103
alexandre.pierantoni@kroll.com

North America



David Althoff, Chicago
Managing Director, M&A
+1 312 697 4625
david.althoff@kroll.com



Steve Burt, Chicago
Global Head of M&A Advisory
+1 312 697 4620
steve.burt@kroll.com



Howard Johnson, Toronto
Canada Leader, M&A
+1 416 597 4500
howard.johnson@kroll.com



Chris Janssen, Chicago
Managing Director, Transaction Opinions
+1 3126974643
chris.janssen@kroll.com



Jeffrey Schiedemeyer, Chicago
Managing Director, Transaction Opinions
+1 3126974655
jeff.schiedemeyer@kroll.com

China



David Lu, Shanghai
Head of Asia Pacific Corporate Finance,
M&A
+86 21 6032 0608
david.lu@kroll.com

Japan



Katsumi Asai, Tokyo
Managing Director, Valuation Services
+81 (0) 33 593 0183
katsumi.asai@kroll.com

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