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Supply chains - the end of globalisation?

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Abstract

Not just the Ukraine war, but already the Corona pandemic has shown the vulnerability of supply chains. But how are companies networked, and what conclusions can be drawn from this?

Zusammenfassung

Nicht erst der Ukraine-Krieg, sondern schon Corona-Pandemie hat die Verletzlichkeit von Lieferketten gezeigt. Doch wie sind Unternehmen vernetzt, und welche Schlüsse lassen sich daraus ziehen?



The end of globalisation?

What is a small thing for one person can be a big deal for another - this is true in real life as well as in business relationships. This is the case for Rossell India, for example. On the one hand, the company produces tea; on the other, it offers solutions for electronic systems and cable harnesses. And that's where the Indians got into business with Boeing. Rossell recently made almost 5.3 million dollars in quarterly sales with the US aviation giant. For Boeing, that was a mere 0.03 per cent of quarterly costs. For Rossell India, on the other hand, it was enough to secure its existence: the business represented 48.4 per cent of its total revenues in the quarter.

How deeply entrenched the partnership between Rossell and Boeing is remains to be seen. For it is not only since Russia's war of aggression on Ukraine that the global division of labour that has been promoted for decades has been called into question. The Corona pandemic has already shown the vulnerability of global supply chains. Now the word deglobalisation is doing the rounds. Blackrock boss Larry Fink, for example, has joined the chorus of cautioners. Companies are already starting to redesign their supply chains, Fink recently told the Financial Times.

But how networked are globally active companies and what conclusions can be drawn from this? This is a question that, in addition to corporate boards, is certainly also increasingly occupying investors, or at least it should.

Globalisation surge after the fall of the Wall

When exactly the age of globalisation began is a matter of considerable debate. Perhaps it would be Solomonic to claim that there have been several spurts of globalisation in history. Even in Augustus' time, the Roman Empire was engaged in lively trade that reached as far as India. The last big push so far began with the fall of the Berlin Wall and the simultaneous, though unrelated, economic opening of China under Deng Xiaoping, who, among other things, reopened the Shanghai Stock Exchange in 1990. A shift of production began, mainly to Asia, where companies from the industrialised nations not only found cheaper wages and other conditions that were "good" for employers, but also cheaper materials. The high margins of well-known technology and sporting goods manufacturers also stem from this networking.



But if international, widely ramified supply chains with simultaneous low stockholding ("*just in time*") get out of balance, as in the times of Corona, then this has negative consequences. The shortage inflates the prices of goods. In February, for example, the producer prices of industrial products in Germany rose by an average of 25.9 percent compared to the same month last year - the highest increase since 1949. The war in Ukraine did not play a role in this. And material shortages had already slowed down German industry in 2021, according to the Federal Statistical Office.¹

In the USA, producer prices also climbed significantly in February by ten (March: 11.2) per cent compared to the same month last year. The lower increase compared to Germany is probably also due to the United States' lower dependence on foreign supplies. According to a study by the Munich-based ifo Institute commissioned by the Konrad Adenauer Foundation, the degree of integration in value chains of the USA to its gross domestic product is 7.0 per cent (imports) and 6.3 per cent (exports). This is only about one third of Germany's dependence on global value chains.² Nevertheless, a reshoring initiative ("*Bringing Manufacturing at Home*") has formed in the USA. According to the initiative, around 1,800 US companies recently intended to move their entire business or at least parts of it back home.

It is not only the less price-sensitive, usually smaller or medium-sized companies that are affected; corporations are also losing business and revenue because of the supply disruptions. The toy manufacturer Hasbro or the substitute meat producer Beyond Meat, for example, recently complained about massively increased freight costs. The sporting goods manufacturer Nike reported failures in Vietnam in autumn 2021 due to strict corona measures. As a result, 160 million fewer shoes went into production.

Sometimes more, sometimes less dependent

But how do the ramifications show up in detail? On the basis of ten companies each from the USA and Germany (the aircraft manufacturer Airbus is a French-German hermaphrodite), it is possible to trace the extent of the respective global networking and the dependencies that may have arisen from it. The group can be considered representative.

¹ <https://www.destatis.de/DE/Themen/Wirtschaft/Konjunkturindikatoren/lieferketten.html>

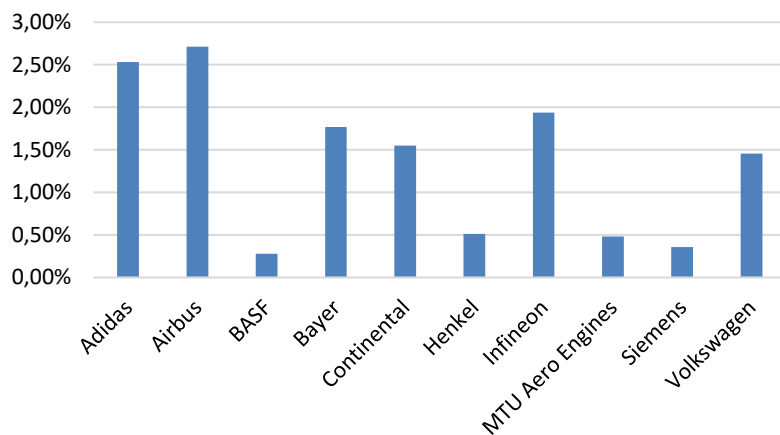
² <https://www.kas.de/de/analysen-und-argumente/detail/-/content/globale-wertschoepfungsketten>



The ten companies from the German share index represent a good 24 percent of the total market capitalisation of all German listed corporations; the ten US companies represent a good eight percent of the market value of all domestic equity securities of the world's heaviest stock exchange. Information on possible dependencies is provided by the business relationships with the ten largest suppliers and customers of each company (in two exceptions the figures are reduced to eight or nine partners).

The first thing to note is that the Dax companies are not particularly dependent on their top suppliers, as can be seen from the average volume of orders placed with the most important suppliers at cost of sales (chart 1).

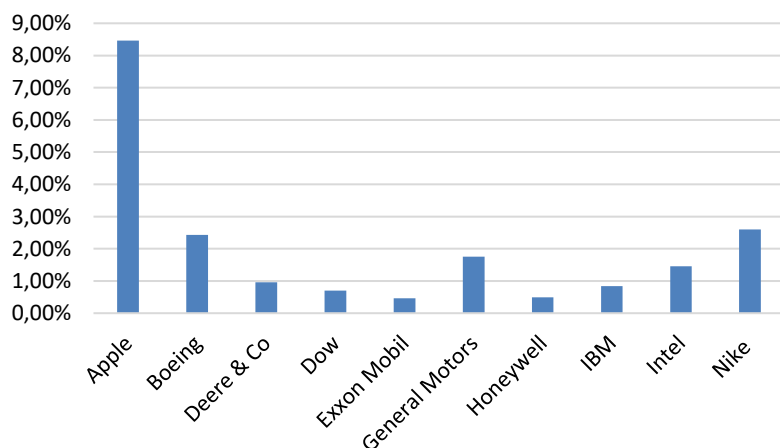
Chart 1: Average order of top suppliers at cost of sales at selected Dax companies



Source: Bloomberg, Flossbach von Storch Research Institute, based on latest available quarterly data, as of April 2022.

The picture is similar for US companies, with the exception of tech company Apple, which has relatively higher order sizes per top supplier (chart 2).

Chart 2: Average order of top suppliers at cost of sales at selected US companies



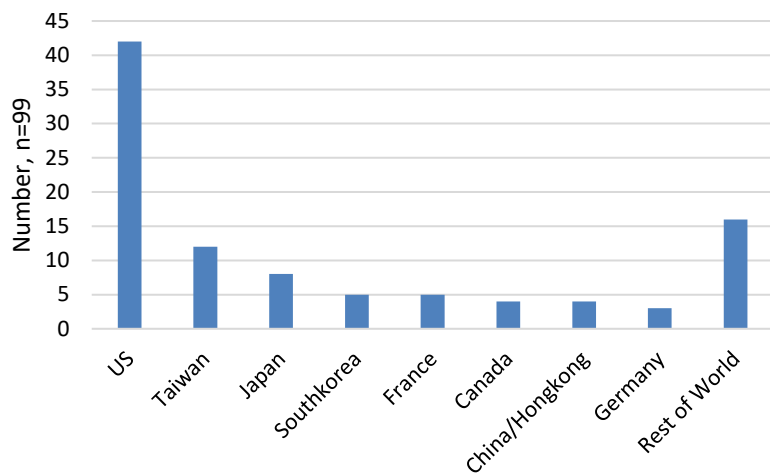
Source: Bloomberg, Flossbach von Storch Research Institute, based on latest available quarterly data, as of April 2022.



But where do the orders come from and who are the demanders for the respective companies' end products? Strong domestic demand would suggest that a disruption of international supply chains should affect an overall economy less. In such a case, companies would presumably cope better with deglobalisation, just as a reduction of supply chains should be less burdensome and not as expensive.

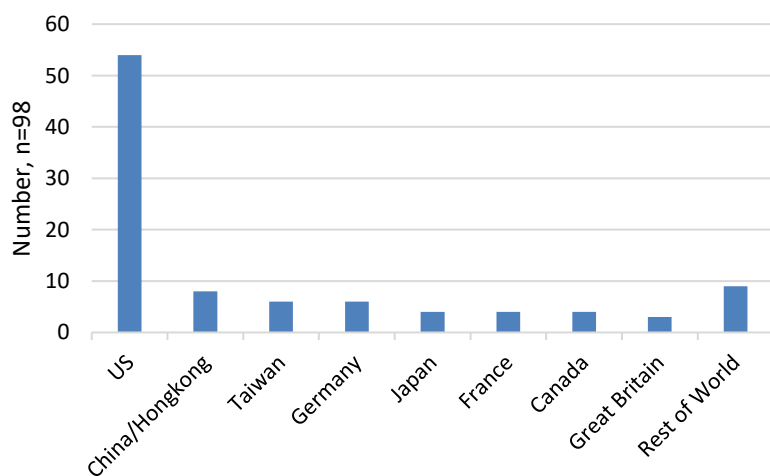
This shows that the USA has clear advantages over Germany. Both the order takers and the customers of US companies are found to a large extent in the domestic market. More than 42 percent of the suppliers and even 54 percent of the customers are American companies (charts 3 and 4).

Chart 3: Origin of top suppliers US companies



Source: Bloomberg, Flossbach von Storch Research Institute, based on latest available quarterly data, as of April 2022.

Chart 4: Origin of top customers US companies

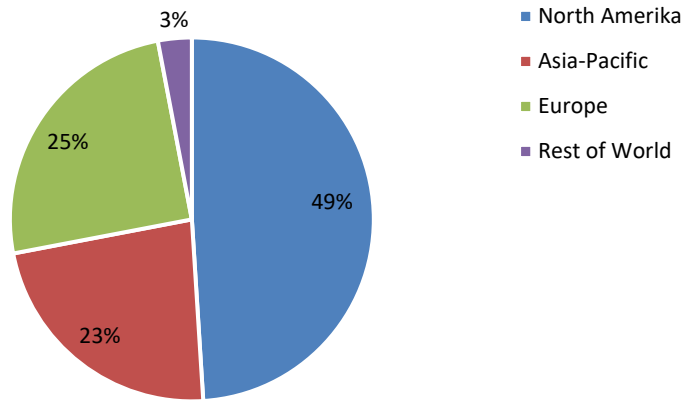


Source: Bloomberg, Flossbach von Storch Research Institute, based on latest available quarterly data, as of April 2022.



The concentration is also confirmed when all revenues are taken into account. Almost half of the US corporations' revenues come from the USA and Canada (chart 5).

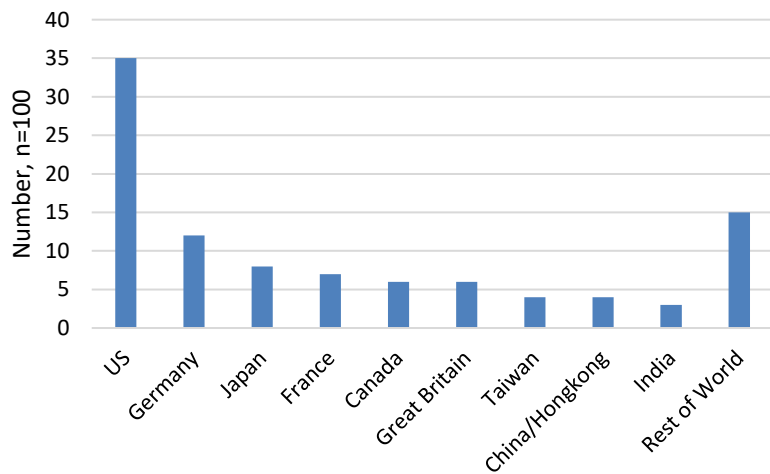
Chart 5: Revenues of selected US companies by origin



Source: Bloomberg, Flossbach von Storch Research Institute, based on latest available data, not volume-weighted, as of April 2022.

In contrast, the selected Dax companies show themselves to be fundamentally more vulnerable to supply chain difficulties, as they are more foreign-oriented, both in terms of supply and sales. However, in addition to the US companies, which are once again predominant, German, European companies and partners from Canada and Japan play a major role (charts 6 & 7). Thus, the Dax companies are based on a strong "Western bloc".

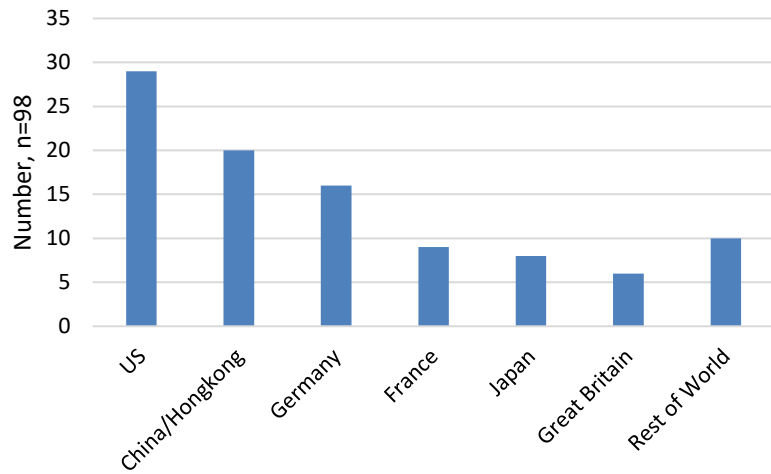
Chart 6: Origin of top suppliers to Dax companies



Source: Bloomberg, Flossbach von Storch Research Institute, based on latest available quarterly data, as of April 2022.



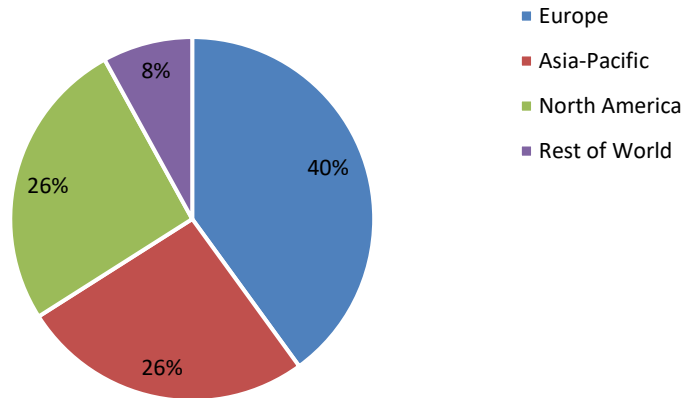
Chart 7: Origin of top customers of Dax companies



Source: Bloomberg, Flossbach von Storch Research Institute, based on latest available quarterly data, as of April 2022.

This is also reflected in the distribution of revenues. On average, two-thirds of the revenues of the selected Dax companies come from Europe and North America (chart 8).

Chart 8: Origin of turnover of selected Dax companies



Source: Bloomberg, Flossbach von Storch Research Institute, based on latest available data, not volume-weighted, as of April 2022.

Big differences in detail

In detail, however, there are major differences. While BASF's most important supplier by volume accounted for only 0.5 per cent of all manufacturing costs of the German chemical company, Apple's top supplier accounted for almost 60 per cent. All of the Californians' most important suppliers come from Asia (Appendix, Tables 1 and 2). In terms of customers, the iPhone manufacturer from California is also much more concentrated than BASF or the German weed killer and

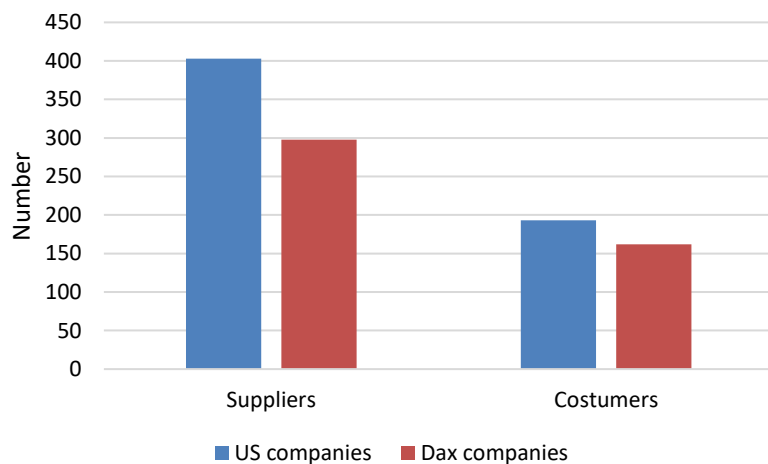


pharmaceutical company Bayer, for example. Globalisation is most strongly reflected in Apple. The Californians are more brand owners and designers than producers of hardware; contract manufacturing is the core of their business model. At BASF it is the other way round: the data strongly suggest that the Ludwigshafen-based company has a very high vertical range of manufacture.

The agricultural machinery manufacturer Deere and the Honeywell Group, known for its ventilation systems, can rely on a solid home base both on a supplier and customer basis. Exxon Mobil has very little dependence on individual customers; the opposite is true of the semiconductor manufacturer Intel.

In terms of sheer numbers, US companies are less dependent on suppliers than their Dax counterparts. The selected US companies have on average about one-third more suppliers and almost one-fifth more customers than the Dax companies (chart 9). Airbus, with a very high number of suppliers that would have skewed the average of the Dax companies sharply upwards, is isolated in this regard.

Chart 9: Average number of suppliers and customers of selected companies

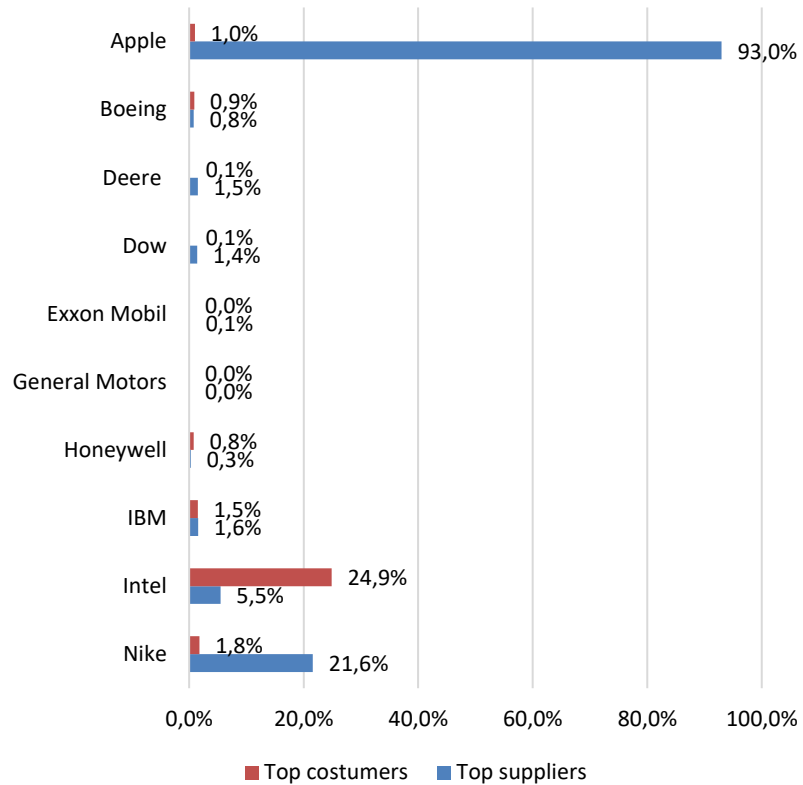


Source: Bloomberg, Flossbach von Storch Research Institute; based on latest available data, not all supplier and customer relationships also led to sales recently; suppliers to Dax companies excluding Airbus, as of April 2022.

Twins, because both highly dependent on supplies from Asia and with a concentrated customer base, are the sporting goods producers Nike and Adidas. The automotive supplier Continental and the semiconductor manufacturer Infineon are also rather concentrated with a below-average number of suppliers and customers. However, Continental is completely independent of Asia (ex Japan) in terms of its main suppliers and customers. At Infineon, on the other hand, Asia plays a weighty role in terms of both suppliers and customers. The situation is similar for Intel (charts 10 and 11).

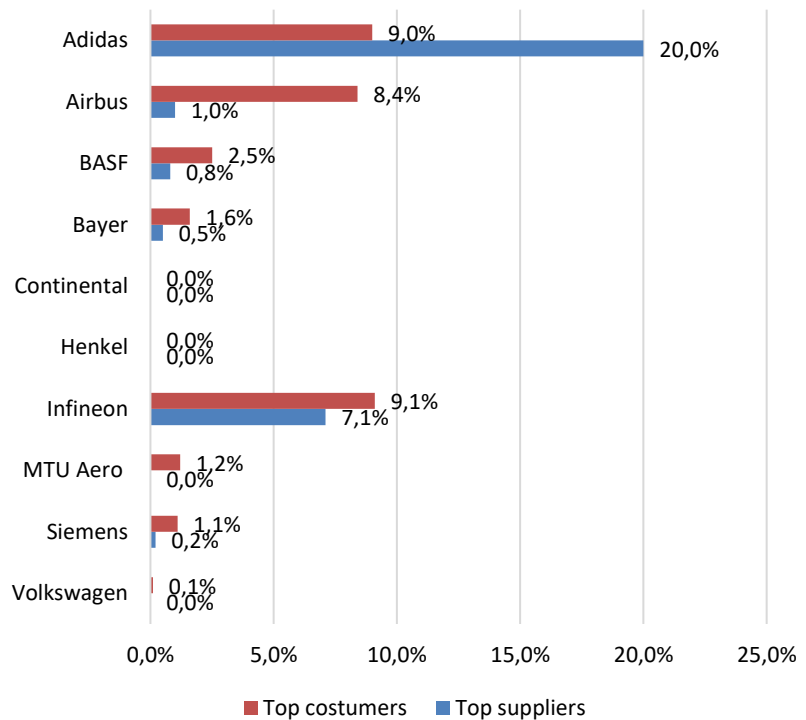


Chart 10: Dependence of selected US companies on Asia (ex Japan)



Source: Bloomberg, Flossbach von Storch Research Institute, based on latest available data, Apple: top four suppliers; as of April 2022.

Chart 11: Dependence of selected Dax companies on Asia (ex Japan)



Source: Bloomberg, Flossbach von Storch Research Institute, based on latest available data, Volkswagen: excluding China Joint Ventures; as of April 2022.



At first glance, the data on Volkswagen, which indicate a low dependence on China (Table 2 and Chart 11), are surprising. However, the overview at VW is incomplete, as the Wolfsburg-based company accounts for its China business, which is largely split into joint ventures, at equity³ - and the (considerable) sales with the Middle Kingdom are therefore not included.

Conclusion

All selected companies rely on a broad supplier base and supply a large number of customers. However, there is a wide range from low to high or higher dependence on individual suppliers and customers. US companies rely primarily on their home market, whereas German companies are mainly active outside their home country. But the western industrialised nations plus Japan are still important for Dax companies.

Overall, the United States is in a superior position. China (including Hong Kong and plus Taiwan) is primarily in demand as a supplier market, less as a sales market (an exception is certainly the German car industry, which needs to be considered in isolation). Overall, the trade of both the US companies and the Dax groups is regionally based on relatively few countries, measured by the respective top suppliers and top customers, so that one can speak of a hub of relations between Germany, France, Great Britain, North America, Japan and China/Hong Kong/Taiwan.

Due to a weaker domestic base, deglobalisation would probably hit German companies harder and lead to higher costs than would be the case for American companies. However, the most valuable company in the world on the stock market - Apple - is highly dependent on its Asian suppliers. This also applies in the opposite direction.

There is no doubt that the difficulties of the past two years will bring a new and special focus to supply chains. This is true for company managers as well as investors. From an investor's perspective, US companies are once again playing out their role as a safe haven due to their strong home base. In addition to the regional connections and concrete corporate linkages presented here, an analysis of the availability

³ In the case of full consolidation, all relevant balance sheet items of a subsidiary are fully included in the figures of a controlling company. In the case of associated subsidiaries, the at-equity method is applied. In each case, only the share of profit (after tax) of the participation is included; in addition, the parent company's share of the net assets is taken into account. Sales revenues are therefore not reflected in the profit and loss account (of a parent company) - as is the case with Volkswagen's Chinese joint ventures.



of important raw materials and parts was certainly also included - both to be able to assess the individual risks of a company and the probabilities of a possible substitution of the goods.

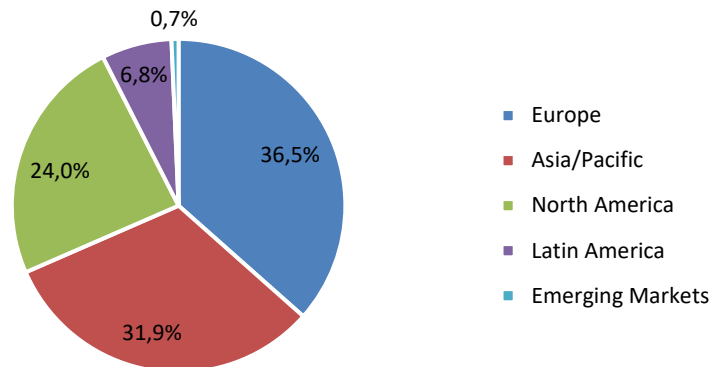
The problems may be great at present, but deglobalisation is likely to be very difficult or impossible in terms of product availability at affordable prices, which would then be in question. This is shown by the far-reaching networking and the resulting dependencies. From the point of view of many companies, time may dictate that improvements be made in important areas, such as considering increased intermediate storage of important components. However, the question may also be asked to what extent it is in the interest of the companies involved on all continents to actually reverse a decades-long development, which has had a positive effect on profits, but also on consumer prices and employment, in a strong and cost-intensive way.

Globalisation may have passed a certain peak for the time being, but the current phase of a possible review of supply chains is unlikely to mean the end of all relationships. So it goes for Rossell India and its liaison with Boeing. At the end of February, the Indian company received an order to manufacture and supply cable harnesses for the T-7A Red Hawk training jet.



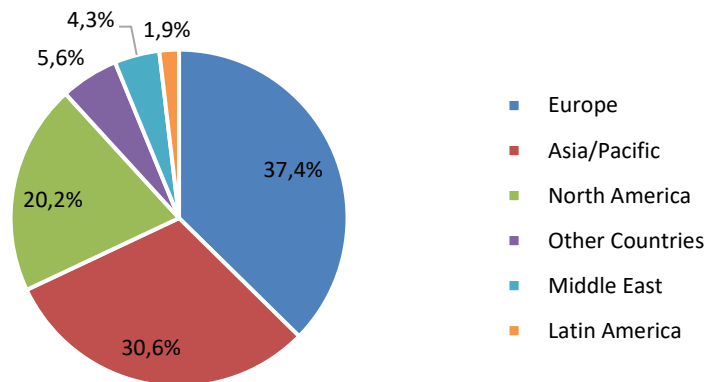
Annex (Tables 1 and 2 and supplementary graphics)

Chart 12 - Adidas: Revenue origin regional distribution



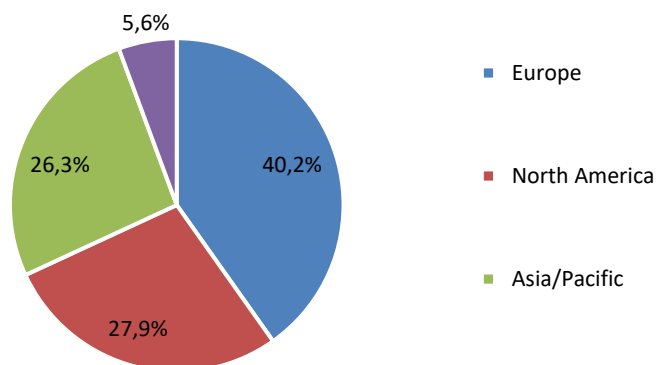
Source: Bloomberg, Flossbach von Storch Research Institute, based on latest available data, as of April 2022.

Chart 13 - Airbus: Revenue origin regional distribution



Source: Bloomberg, Flossbach von Storch Research Institute, based on latest available data, as of April 2022.

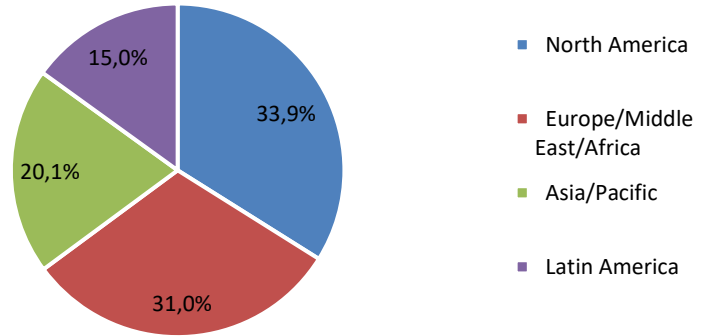
Chart 14 - BASF: Revenue origin regional distribution



Source: Bloomberg, Flossbach von Storch Research Institute, based on latest available data, as of April 2022.

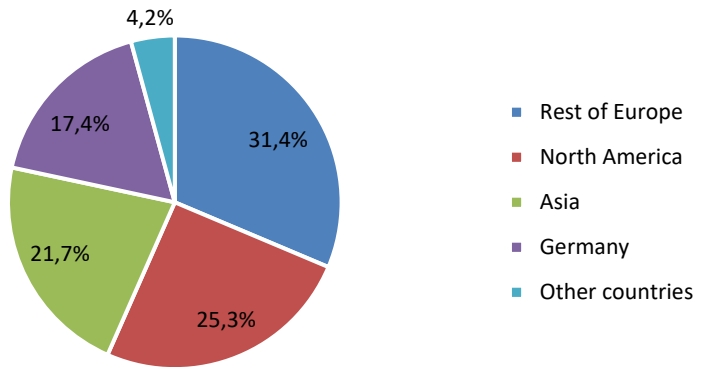


Chart 15 - Bayer: Revenue origin regional distribution



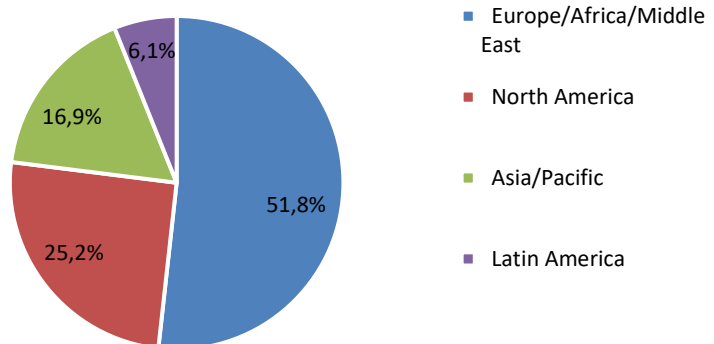
Source: Bloomberg, Flossbach von Storch Research Institute, based on latest available data, as of April 2022.

Chart 16 - Continental: Revenue origin regional distribution



Source: Bloomberg, Flossbach von Storch Research Institute, based on latest available data, as of April 2022.

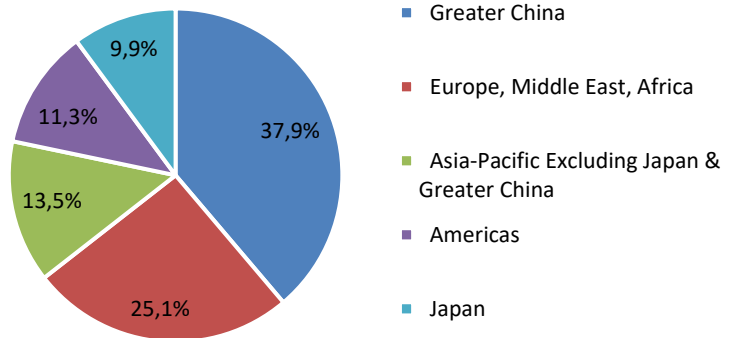
Chart 17 – Henkel: Revenue origin regional distribution



Source: Bloomberg, Flossbach von Storch Research Institute, based on latest available data, as of April 2022.

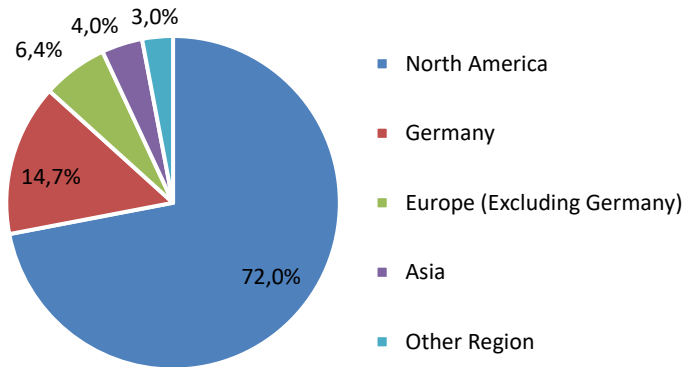


Chart 18 – Infineon: Revenue origin regional distribution



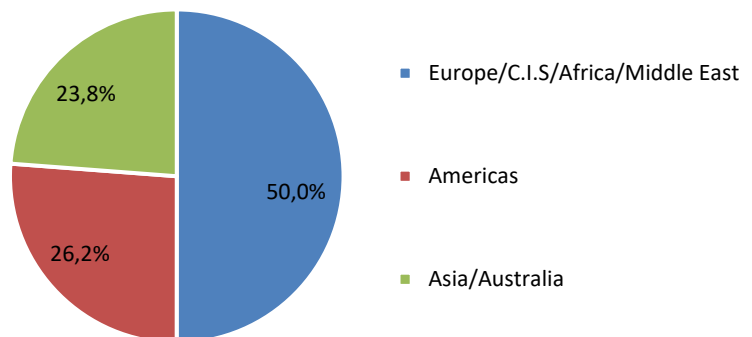
Source: Bloomberg, Flossbach von Storch Research Institute, based on latest available data, as of April 2022.

Chart 19 – MTU Aero Engines: Revenue origin regional distribution



Source: Bloomberg, Flossbach von Storch Research Institute, based on latest available data, as of April 2022.

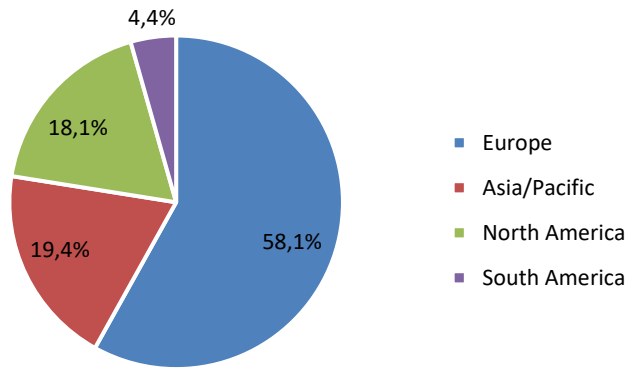
Chart 20 – Siemens: Revenue origin regional distribution



Source: Bloomberg, Flossbach von Storch Research Institute, based on latest available data, as of April 2022.

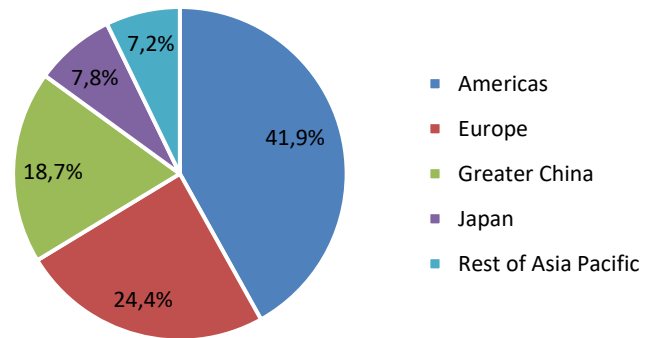


Chart 21 – Volkswagen: Revenue original regional distribution



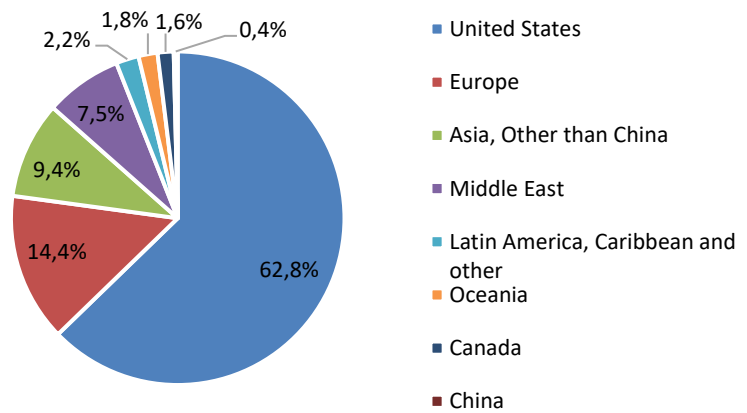
Source: Bloomberg, Flossbach von Storch Research Institute, based on latest available data, excluding Chinese joint ventures, as of April 2022.

Chart 22 – Apple: Revenue original regional distribution



Source: Bloomberg, Flossbach von Storch Research Institute, based on latest available data, as of April 2022.

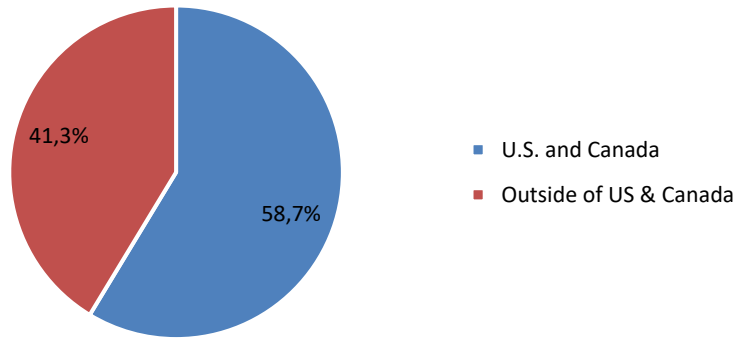
Chart 23 – Boeing: Revenue original regional distribution



Source: Bloomberg, Flossbach von Storch Research Institute, based on latest available data, as of April 2022.

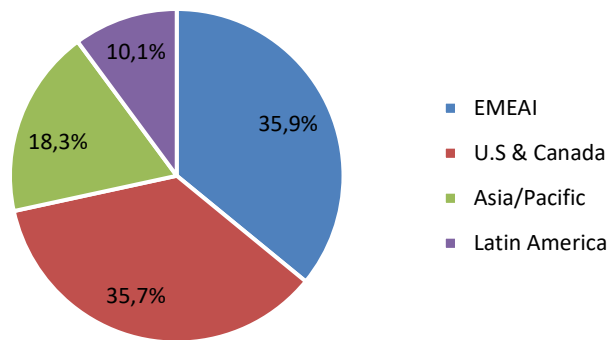


Chart 24 – Deere: Revenue original regional distribution



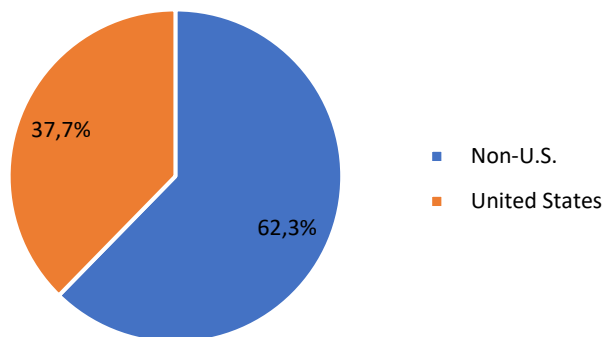
Source: Bloomberg, Flossbach von Storch Research Institute, based on latest available data, as of April 2022.

Chart 25 – Dow: Revenue original regional distribution



Source: Bloomberg, Flossbach von Storch Research Institute, based on latest available data, as of April 2022.

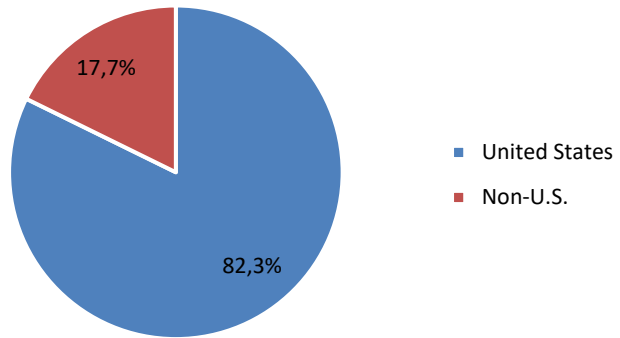
Chart 26 – Exxon Mobil: Revenue original regional distribution



Source: Bloomberg, Flossbach von Storch Research Institute, based on latest available data, as of April 2022.

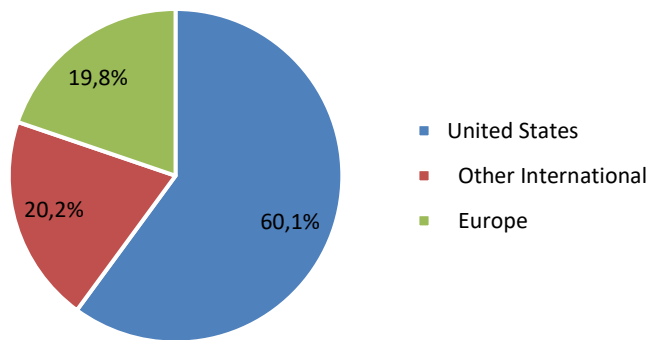


Chart 27 – General Motors: Revenue origin regional distribution



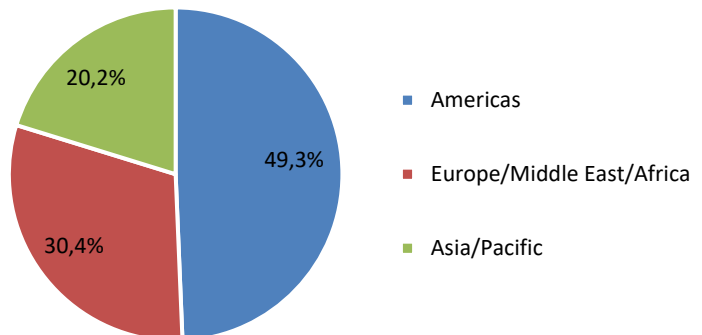
Source: Bloomberg, Flossbach von Storch Research Institute, based on latest available data, as of April 2022.

Chart 28 – Honeywell: Revenue origin regional distribution



Source: Bloomberg, Flossbach von Storch Research Institute, based on latest available data, as of April 2022.

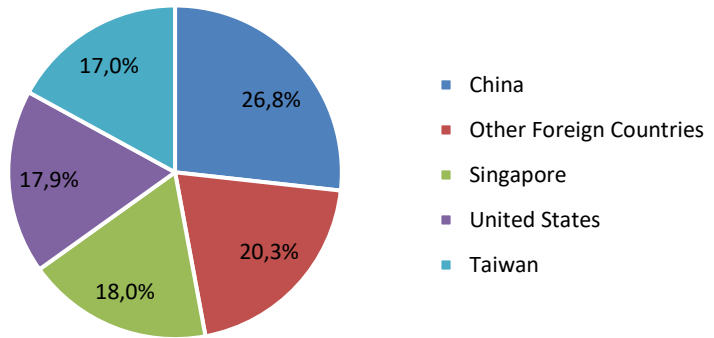
Chart 29 – IBM: Revenue origin regional distribution



Source: Bloomberg, Flossbach von Storch Research Institute, based on latest available data, as of April 2022.

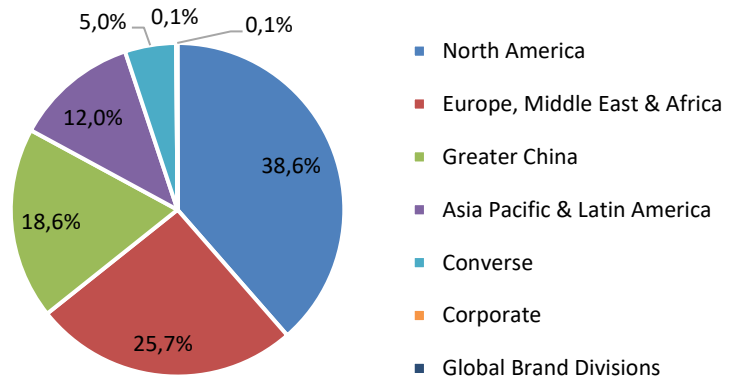


Chart 30 – Intel: Revenue origin regional distribution



Source: Bloomberg, Flossbach von Storch Research Institute, based on latest available data, as of April 2022.

Chart 31 – Nike: Revenue origin regional distribution



Source: Bloomberg, Flossbach von Storch Research Institute, based on latest available data, as of April 2022.



Table 1: Supply relationships of selected US companies

		Top 10	Countervalue	Share of	Share of turnover
Suppliers 659	Suppliers	Origin	Quarter (\$ mil- lion)	Total costs (%)	Suppliers (%)
Apple	Hon Hai Precision	Taiwan	27.630,0	59,8	57,2
	Pegatron	Taiwan	7.060,0	14,7	61,0
	Quanta Computer	Taiwan	4.910,0	10,6	53,0
	Tawain Semiconductor	Taiwan	3.860,0	8,0	26,0
	Luxshare Precison	China	2.900,0	6,3	69,0
	Samsung Electronics	South Korea	4.230,0	6,1	6,5
	Compal Electronics	Taiwan	2.110,0	4,7	22,2
	Qualcomm	USA	2.150,0	4,5	23,1
	LG Display	South Korea	2.500,0	3,5	40,2
	ASE Technology	Taiwan	1.610,0	3,4	29,8
Customers 335	Top 10		Share of	Share of turnover	
	Customers		Turnover (%)	Customer (%)	
	AT&T	USA	3.260,0	4,0	16,3
	Best Buy	USA	2.200,0	2,6	24,2
	Verizon Communications	USA	2.150,0	2,6	16,0
	T Mobile US	USA	1.690,0	2,1	19,0
	Vodafone	Great Britain	968,0	1,2	10,5
	German Telekom	Germany	846,0	1,0	3,3
	China Unicom Hong Kong	Hong Kong	814,0	1,0	6,8
	Softbank	Japan	692,0	0,9	11,3
	Orange	France	630,0	0,8	4,6
	Telefonica	Spain	613,0	0,8	5,3
		Top 10	Countervalue	Share of	Share of turnover
Suppliers 374	Suppliers		Quarter (\$m)*	Total costs (%)	Suppliers (%)
Boeing	Raytheon Technologies	USA	721,0	4,2	4,2
	Spirit Aerosystems	USA	552,0	3,7	56,0
	General Electric	USA	610,0	3,5	3,0
	Saffron	France	299,0	2,2	7,5
	Honeywell	USA	320,0	1,9	3,7
	Mitsubishi Heavy Industries	Japan	291,0	1,6	3,8
	Leonardo	Italy	205,0	1,2	5,1
	Rolls-Royce	Great Britain	148,0	1,0	4,1
	Hindalo Industries	India	104,0	0,8	2,3
	Sanmina	USA	101,0	0,7	6,2
Customers 319	Top 10		Share of	Share of turnover	
	Customers		Turnover (%)	Customer (%)	
	United States of America	USA	7.630,00	49,0	n.a.
	FedEx	USA	402,0	2,7	32,5
	Ryanair	Ireland	396,0	2,7	73,5
	Air Lease	USA	317,0	2,1	29,4
	United Airlines	USA	300,0	2,0	56,0
	German Post	Germany	284,0	1,9	17,1
	United Parcel Service	USA	257,0	1,7	15,8
	United Kingdom	Great Britain	186,0	1,2	n.a.
	Bank of China	China	128,0	0,9	14,4
	American Airlines	USA	107,0	0,7	58,7



	Top 10		Countervalue	Share of	Share of turnover	
	Suppliers 228	Suppliers	Quarter (\$ mil- lion)	Total costs (%)	Suppliers (%)	
Deere & Co		Nucor	USA	111,0	1,6	1,1
		Hindustan Petroleum	India	118,0	1,5	1,3
		Dana	USA	57,0	0,9	3,2
		Hitachi Construction	Japan	59,0	0,8	2,7
		Cummins	USA	58,0	0,8	1,0
		Flex	USA	57,0	0,7	0,9
		Titan International	USA	53,0	0,7	12,0
		Tenneco	USA	47,0	0,7	1,1
		SKF	Sweden	44,0	0,6	1,9
		Jabil	USA	37,0	0,5	0,4
	Customers 29			Share of	Share of turnover	
				Turnover (%)	Customer (%)	
		Lowe's	USA	258,0	2,3	1,7
		Home Depot	USA	194,0	1,7	0,8
		Hitachi Construction	Japan	108,0	1,0	6,8
		United Rentals	USA	81,0	0,7	5,5
		Corteva	USA	40,0	0,4	2,6
		Tractor Supply	USA	40,0	0,4	2,1
		Kirby	USA	21,0	0,2	4,8
		Wacker Neuson	Germany	17,0	0,2	4,2
		Cervus Equipment	Canada	16,0	0,1	5,9
		Indomobile Sukses	Indonesia	13,0	0,1	4,9

	Top 10		Countervalue	Share of	Share of turnover	
	Suppliers 128	Suppliers	Quarter (\$ mil- lion)	Total costs (%)	Suppliers (%)	
Dow		Trinseo	USA	245,0	1,9	38,1
		MEGlobal	Netherlands	141,0	1,0	n.a.
		Brenntag	Germany	104,0	0,7	2,9
		Hyundai Heavy Industries	South Korea	89,0	0,6	1,6
		Airbus	France	61,0	0,4	0,6
		Taiwan Semiconductor	Taiwan	53,0	0,4	0,7
		Braskem	Brazil	43,0	0,3	1,1
		Sinochem	China	33,0	0,2	1,2
		Univar Solutions	USA	30,0	0,2	1,6
		Nan Ya Plastics	Taiwan	26,0	0,2	0,9
	Customers 71			Share of	Share of turnover	
		Top 10		Turnover (%)	Customer (%)	
				Customers		
		Sadara Chemicals	Saudi Arabia	994,0	9,0	n.a.
		EnLink Midstream	USA	250,0	2,2	14,0
		Olin	USA	158,0	1,9	11,0
		Trinseo	USA	25,0	0,2	3,2
		Johnson Controls	USA	21,0	0,2	0,4
		Air Liquide	France	17,0	0,1	0,3
		Solvay	Belgium	9,0	0,1	0,3
		XPO Logistics	USA	7,0	0,1	0,2
		Formosa Plastics	Taiwan	6,0	0,1	0,3
		Ecovyst	USA	5,0	0,0	3,0



Exxon Mobil	Suppliers 264	Top 9 Suppliers	Country	Countervalue Quarter (\$ million)	Share of Total costs (%)	Share of turnover Suppliers (%)	
		Imperial Oil	Canada	952,0	1,9	24,8	
		Plains GP Holdings	USA	699,0	1,4	12,0	
		Plains All America	USA	699,0	1,4	12,0	
		SBM Offshore	Netherlands	80,0	0,2	10,3	
		Air Liquide	France	81,0	0,2	1,2	
		Calmut Specialty	USA	42,0	0,1	5,2	
		ProPetro Holding	USA	40,0	0,1	20,3	
		Honeywell	USA	41,0	0,1	0,5	
		Ecolab	USA	24,0	0,0	0,8	
	Customers 90	Top 8 Customers	Country	Countervalue Quarter (\$ million)	Share of Turnover (%)	Share of turnover Customer (%)	
		Imperial Oil	Canada	452,0	1,0	11,0	
		Brenntag	Germany	175,0	0,3	4,9	
		Cathay Pacific Airways	Hong Kong	41,0	0,1	2,5	
		Lanxess	Germany	19,0	0,0	1,1	
		Jiangsu Lopal Tech	China	2,0	0,0	3,9	
		Universal Inc	Taiwan	1,0	0,0	4,5	
		Shih Wei Navigation	Taiwan	0,2	0,0	0,9	
		New Zealand Refining	New Zealand	0,0	0,0	0,0	
General Motors	Suppliers 920	Top 10 Suppliers	Country	Countervalue Quarter (\$ million)	Share of Total costs (%)	Share of turnover Suppliers (%)	
		Magna International	Canada	1.220,0	4,9	13,5	
		Lear	USA	876,0	3,5	18,2	
		Tenneco	USA	496,0	2,0	11,0	
		American Axle & Manufacturing	USA	477,0	1,9	37,0	
		ZF Friedrichshafen	Germany	400,0	1,6	3,4	
		Aptiv	Ireland	312,0	1,2	8,0	
		Nexteer Automotive	USA	306,0	1,1	35,0	
		Denso	Japan	268,0	1,1	2,2	
		Adient	USA	249,0	1,0	7,3	
		Schaeffler	Germany	222,0	0,9	5,7	
		Customers 66	Top 10 Customers	Country	Countervalue Quarter (\$ million)	Share of Turnover (%)	Share of turnover Customer (%)
			Hertz	USA	372,0	1,2	18,7
			Avis	USA	216,0	0,7	6,8
			AutoNation	USA	220,0	0,7	4,2
		Lithia	USA	148,0	0,5	2,9	
		Sonic Automotive	USA	80,0	0,3	3,0	
		Group 1 Automotive	USA	72,0	0,2	2,5	
		Asbury Automotive	USA	47,0	0,1	2,2	
		AutoCanada	Canada	35,0	0,1	4,2	
		Penske Automotive	USA	9,0	0,0	0,2	
		China ZhongTong Auto Services	China	9,0	0,0	1,5	



Honeywell	Suppliers 251	Top 10 Suppliers	Countervalue Quarter (\$ million)	Share of Total costs (%)	Share of turnover Suppliers (%)	
		TransDigm Group	USA	58,0	1,0	4,6
		Emerson Electric	USA	45,0	0,8	1,1
		Amphenol	USA	47,0	0,8	17,0
		Celestica	Canada	43,0	0,8	3,1
		Saffron	France	22,0	0,4	0,5
		Kawasaki Heavy Industries	Japan	17,0	0,3	0,6
		Seagate Technology	USA	16,0	0,3	0,5
		Honeywell Automation	India	16,0	0,3	16,0
		Parker-Hannifin	USA	15,0	0,3	0,4
	TTM Technologies	USA	15,0	0,3	2,7	
	Customers 258	Top 10 Customers		Share of Turnover (%)	Share of turnover Customer (%)	
		USA	USA	981,0	11,4	n.a.
		Boeing	USA	320,0	3,7	1,8
		Airbus	France	295,0	3,4	1,8
		Home Depot	USA	111,0	1,4	0,5
		Lockheed Martin	USA	86,0	1,0	0,6
		Best Buy	USA	81,0	1,0	0,9
		Textron	USA	80,0	0,9	3,1
		China National Petroleum	China	65,0	0,8	0,1
		Bombardier	Canada	54,0	0,7	4,3
		General Electric	USA	45,0	0,6	0,3
IBM	Suppliers 713	Top 10 Suppliers	Countervalue Quarter (\$ million)	Share of Total costs (%)	Share of turnover Suppliers (%)	
		Mitsubishi	Japan	175,0	1,8	1,7
		Hon Hai Precision	Taiwan	102,0	1,1	0,2
		Cisco Systems	USA	81,0	0,8	0,6
		Celestica	Canada	64,0	0,6	4,6
		SK Hynix	South Korea	35,0	0,5	0,3
		Oracle	USA	40,0	0,4	0,4
		Flex	USA	37,0	0,4	0,6
		Nvidia	USA	31,0	0,3	0,4
		Arista Networks	USA	20,0	0,3	2,4
	Intel	USA	17,0	0,2	0,1	
	Customers 357	Top 10 Customers		Share of Turnover (%)	Share of turnover Customer (%)	
		Walmart	USA	621,0	3,1	0,5
		Lenovo	China	307,0	1,5	2,1
		Bavarian Motor Works	Germany	281,0	1,4	1,0
		Volkswagen	Germany	269,0	1,3	0,4
		Honda engine	Japan	268,0	1,3	1,0
		Toyota engine	Japan	223,0	1,1	0,4



General Motors	USA	209,0	1,0	0,9
Airbus	France	190,0	0,9	1,0
Raytheon Technologies	USA	136,0	0,7	1,0
Accenture	Ireland	134,0	0,7	1,8

Suppliers 314	Top 10 Suppliers		Countervalue Quarter (\$ million)	Share of Total costs (%)	Share of turnover Suppliers (%)
	Ibiden	Japan	272,0	3,1	35,7
	Shinko Electric Industries	Japan	164,0	1,9	37,0
	SK Hynix	South Korea	175,0	1,8	1,7
	Hewlett Packard	USA	149,0	1,7	2,2
	Micron Technology	USA	127,0	1,5	1,5
	Taiwan Semiconductor	Taiwan	125,0	1,5	0,8
	Lenovo	China	131,0	1,4	0,6
	Shin-Etsu Chemical	Japan	91,0	1,0	1,9
	Glencore	Switzerland	83,0	0,9	0,2
	Hon Hai Precision	Taiwan	67,0	0,8	0,1

Intel

Customers 329	Top 10 Customers		Countervalue Quarter (\$ million)	Share of Turnover (%)	Share of turnover Customer (%)
	Dell	USA	4.150,0	21,0	22,7
	Lenovo	China	3.220,0	15,7	19,2
	HP	USA	1.980,0	10,0	15,8
	WPG Holdings	Taiwan	869,0	4,5	14,5
	Alphabet	USA	858,0	4,2	2,6
	Apple	USA	594,0	2,9	0,9
	HNA Technology	China	525,0	2,7	4,3
	Arrow Electronics	USA	439,0	2,2	5,8
	Hewlett Packard Enterprise	USA	412,0	2,0	8,3
	Inspur Electronic	China	385,0	2,0	25,0

Nike

Suppliers 178	Top 10 Suppliers		Countervalue Quarter (\$ million)	Share of Total costs (%)	Share of turnover Suppliers (%)
	Feng Tay Enterprise	Taiwan	620,0	9,2	88,0
	Yue Yuen Industrial	Hong Kong	460,0	6,9	19,2
	Shenzhou International	China	217,0	3,3	24,7
	Stella International	Hong Kong	93,0	1,4	32,6
	Eclat Textile	Taiwan	46,0	0,8	16,0
	Gildan Activewear	Canada	20,0	0,3	2,6
	Lenzing	Austria	18,0	0,3	2,7
	Arkema	France	12,0	0,2	0,4
	Huntsman	USA	11,0	0,2	0,5
	Avient	USA	11,0	0,2	1,3

Customers 73	Top 10 Customers		Countervalue Quarter (\$ million)	Share of Turnover (%)	Share of turnover Customer (%)
	Foot Locker	USA	866,0	7,1	58,6
	JD Sports Fashion	Great Britain	454,0	3,7	32,5
	Dick's Sporting Goods	USA	320,0	2,9	20,4
	Hibbett	USA	200,0	1,6	67,5
	Academy Sports & Outdoors	USA	124,0	1,0	12,2



Pou Chen	Taiwan	109,0	0,9	6,4
Pou Sheng International	Hong Kong	106,0	0,9	16,5
Caleres	USA	86,0	0,7	24,4
TJX Cos	USA	68,0	0,6	0,8
Kohl's	USA	52,0	0,4	2,2

Total costs = Direct costs for the production of goods, *For customers: Capex; Not all supplier and customer relationships recently led to sales | Source: Bloomberg, Flossbach von Storch Research Institute; latest available quarterly data in each case, therefore deviations between the shares of costs or sales are possible, as are added values >100% in individual cases (Apple), all figures rounded, as at: April 2022



Table 2: Supply relationships of selected German companies

	Top 10		Countervalue	Share of	Share of turnover	
	Suppliers 386	Suppliers	Quarter (\$ million)	Total costs (%)	Suppliers (%)	
Adidas		Yue Yuen Industrial	Hong Kong	358,0	12,5	14,9
		Shenzhou International	China	179,0	5,9	20,4
		Quant Viet Enterprises	Taiwan	39,0	1,3	38,0
		BASF	Germany	32,0	0,9	0,2
		Toray Industries	Japan	18,0	0,6	0,4
		Gildan Activewear	Canada	13,0	0,5	1,7
		Eclat Textile	Taiwan	10,0	0,3	3,4
		XPO Logistics	USA	6,0	0,2	0,2
		Huntsman	USA	5,0	0,2	0,2
		Eaton	USA	3,0	0,1	0,1
	Customers 80	Top 10		Share of	Share of turnover	
		Customers		Turnover (%)	Customer (%)	
		JP Sports Fashion	Great Britain	282,0	4,6	20,2
		JD.com	China	187,0	3,2	0,6
		Foot Locker	USA	172,0	2,9	12,0
		Alibaba	China	164,0	2,8	0,8
		Topsports International	China	114,0	1,9	17,2
		Amazon.com	USA	101,0	1,7	0,2
		Zalando	Germany	67,0	1,1	4,9
		Pou Sheng International	Hong Kong	65,0	1,1	10,3
		Academy Sports & Outdoors	USA	58,0	1,0	5,6
		Kohl's	USA	55,0	1,0	2,1
	Suppliers 2286	Top 10	Countervalue	Share of	Share of turnover	
		Suppliers	Quarter (\$m)*	Total costs (%)	Suppliers (%)	
Airbus		Raytheon Technologies	USA	1.930,0	15,4	12,0
		Saffron	France	243,0	2,4	6,1
		Honeywell	USA	295,0	1,9	3,4
		Spirit Aerosystems	USA	236,0	1,8	24,0
		General Electric	USA	229,0	1,7	1,3
		Rolls-Royce	Great Britain	189,0	1,4	5,2
		Leonardo	Italy	197,0	1,2	4,9
		Rio Tinto	Great Britain	195,0	1,2	1,2
		PPG Industries	USA	153,0	1,2	3,5
		Hindalo Industries	India	104,0	1,0	2,4



Customers 488	Top 10 Customers		Share of Turnover (%)	Share of turnover Customer (%)	
	Delta Air Lines	USA	653,0	3,8	85,8
	Air Lease	USA	467,0	2,7	54,7
	China Eastern Air Lines	China	441,0	2,6	80,6
	China Southern Airlines	China	385,0	2,3	83,4
	Air France-KLM	France	378,0	2,2	49,5
	Tokyo Century	Japan	368,0	2,2	48,8
	Industrial & Commercial Bank of China	China	328,0	1,9	27,4
	United Kingdom	Great Britain	302,0	1,9	n.a.
	AerCap Holdings	Ireland	277,0	1,7	67,4
	China Merchants Bank	China	267,0	1,6	29,5

Suppliers 228	Top 10 Suppliers		Countervalue Quarter (\$ mil- lion)	Share of Total costs (%)	Share of turnover Suppliers (%)
	Petronas Chemicals	Malaysia	66,0	0,5	7,7
	Thyssenkrupp	Germany	68,0	0,4	0,6
	Canadian National Railway	Canada	67,0	0,4	2,3
	Ashai Holdings	Japan	40,0	0,3	10,2
	Hanwha	South Korea	41,0	0,3	0,4
	Venator Materials	Great Britain	37,0	0,2	6,7
	Kumiai Chemical Industriy	Japan	24,0	0,2	9,7
	Nippon Shokubai	Japan	31,0	0,1	3,8
	Methanex	Canada	24,0	0,1	1,9
	Transcontinental	Canada	22,0	0,1	3,7

BASF

Customers 180	Top 10 Customers		Share of Turnover (%)	Share of turnover Customer (%)	
	SAIC engine	China	211,0	1,1	0,7
	BASF India	India	181,0	0,9	72,6
	Unilever	Great Britain	162,0	0,9	1,9
	Ford engine	USA	121,0	0,6	0,4
	General Motors	USA	95,0	0,5	0,4
	Huayu Automotive Systems	China	93,0	0,5	1,9
	Bavarian Motor Works	Germany	79,0	0,4	0,3
	Takeda Pharmaceuticals	Japan	75,0	0,4	3,1
	Airbus	France	51,0	0,2	0,4
	Adidas	Germany	32,0	0,2	0,9



		Top 10	Countervalue	Share of	Share of turnover
Suppliers 244	Suppliers		Quarter (\$ mil- lion)	Total costs (%)	Suppliers (%)
Bayer	Cigna	USA	122,0	1,0	0,3
	Medipal Holdings	Japan	112,0	1,0	1,7
	McKesson	USA	105,0	0,9	0,2
	Cardinal Health	USA	80,0	0,7	0,2
	Bayer CropScience Ltd.	India	76,0	0,6	64,0
	CVS Health	USA	64,0	0,5	0,1
	CQ Pharmaceutical Holding	China	30,0	0,3	2,0
	Pengdu Agriculture & Animal Hus- bandry	China	22,0	0,2	0,8
	Nufarm	Australia	20,0	0,2	3,8
	WM Morrison Supermarkets	Great Britain	20,0	0,2	0,3
Customers 84	Top 10		Share of	Share of turnover	
	Customers		Turnover (%)	Customer (%)	
Bayer	Covestro	Germany	124,0	2,8	3,1
	Indorama Ventures	Thailand	31,0	0,7	1,1
	AGC	Japan	21,0	0,5	0,6
	Jiangsu Yangnong Chemical	China	18,0	0,4	3,2
	Sartorius Stedim Biotech	France	16,0	0,4	1,8
	Lier Chemical	China	13,0	0,3	5,9
	Gerresheimer	Germany	15,0	0,3	3,3
	AptarGroup	USA	11,0	0,2	1,5
	Limin Group	China	10,0	0,2	4,9
	Mitsui Chemicals	Japan	9,0	0,2	0,3
		Top 10	Countervalue	Share of	Share of turnover
Suppliers 265	Suppliers		Quarter (\$ mil- lion)	Total costs (%)	Suppliers (%)
Continental	Vitesco Technologies	Germany	474,0	5,5	17,9
	NXP Semiconductors	Netherlands	250,0	3,4	8,2
	Infineon Technologies	Germany	77,0	1,1	2,1
	STMicroelectronics	Switzerland	77,0	1,1	2,1
	ITT	USA	69,0	0,8	10,0
	ON Semiconductor	USA	33,0	0,4	1,8
	IBM	USA	43,0	0,4	0,2
	Nidec	Japan	25,0	0,3	0,6
	Bekaert	Belgium	25,0	0,3	1,8
	DuPont de Nemours	USA	17,0	0,2	0,4
Customers 79	Top 10		Share of	Share of turnover	
	Customers		Turnover (%)	Customer (%)	
Continental	Volkswagen	Germany	908,0	9,0	1,4
	Stellantis	Netherlands	839,0	8,3	2,9



Mercedes-Benz	Germany	825,0	8,2	2,0
Ford engine	USA	622,0	6,2	1,9
Renault	France	370,0	3,7	3,2
Vitesco Technologies	Germany	376,0	3,3	16,7
General Motors	USA	198,0	2,0	0,8
Bavarian Motor Works	Germany	167,0	1,7	0,6
Hyundai engine	Japan	154,0	1,5	0,7
Toyota engine	Japan	148,0	1,5	0,3

Handle	Suppliers 139	Top 10 Suppliers	Countervalue Quarter (\$ million)	Share of Total costs (%)	Share of turnover Suppliers (%)	
		International Flavors	USA	48,0	1,5	1,6
		DuPont de Nemours	USA	16,0	0,5	0,4
		Silgan	USA	13,0	0,4	1,0
		Huntsman	USA	13,0	0,4	0,6
		AptarGroup	USA	11,0	0,3	1,5
		Ardagh Group	Luxembourg	10,0	0,3	0,6
		Symrise	Germany	9,0	0,3	0,9
		Graphic Packaging Holding	USA	8,0	0,3	0,5
		BASF	Germany	6,0	0,2	0,0
		Berry Global Group	USA	5,0	0,2	0,1
	Customers 101	Top 10 Customers		Share of Turnover (%)	Share of turnover Customer (%)	
		Walmart	USA	254,0	4,2	0,2
		Rewe Retail Group	Germany	187,0	3,1	0,9
		Carrefour	France	149,0	2,5	0,9
		CVS Health	USA	145,0	2,4	0,2
		Costco Wholesale	USA	140,0	2,4	0,3
		Kroger	USA	111,0	1,9	0,4
		Edeka Head Office Foundation	Germany	102,0	1,7	0,9
		Tesco	Great Britain	79,0	1,3	0,4
		Koninklijke Ahold Delhaize	Netherlands	73,0	1,2	0,4
		Cencosud	Chile	65,0	1,1	2,5

Infineon	Suppliers 80	Top 10 Suppliers	Countervalue Quarter (\$ million)	Share of Total costs (%)	Share of turnover Suppliers (%)	
		Taiwan Semiconductor	Taiwan	104,0	5,0	0,7
		Amkor Technology	USA	62,0	2,9	3,6
		SK Hynix	South Korea	44,0	2,0	0,4
		Micron Technology	USA	28,0	1,4	0,3
		Sumco	Japan	26,0	1,2	3,6
		Tower Semiconductor	Israel	23,0	1,2	6,5



Siltronic	Germany	22,0	1,0	5,1
Globalwafers	Taiwan	20,0	0,1	3,7
II-VI Inc	USA	15,0	0,7	1,9
TongFu Microelectronics	Canada	14,0	0,7	2,4

Customers 148	Top 10 Customers		Share of	Share of turnover	
			Turnover (%)	Customer (%)	
	ZF Friedrichshafen	Germany	145,0	4,0	1,6
	Robert Bosch	Germany	140,0	3,9	1,0
	Lenovo Group	China	125,0	3,8	0,9
	Apple	USA	123,0	3,4	0,2
	WPG Holdings	Taiwan	108,0	3,0	1,6
	Denso	Japan	89,0	2,5	0,8
	Samsung Electronics	South Korea	84,0	2,3	0,2
	Marubun	Japan	66,0	2,3	10,3
	Arrow Electronics	USA	69,0	2,2	0,9
	Lear	USA	78,0	2,2	1,7

Suppliers 33	Top 10 Suppliers		Countervalue	Share of	Share of turnover
			Quarter (\$ mil- lion)	Total costs (%)	Suppliers (%)
	Mitsubishi Heavy Industries	Japan	18,0	1,8	0,2
	Raytheon Technologies	USA	14,0	1,0	0,1
	Senior	Great Britain	6,0	0,6	2,7
	LISI	France	3,0	0,3	0,8
	Saffron	France	2,0	0,2	0,1
	OC Oerlikon	Switzerland	2,0	0,2	0,3
	AAR	USA	1,0	0,1	0,3
	Triumph Group	USA	1,0	0,1	0,2
	Meggitt	Great Britain	1,0	0,1	0,1
	Barnes Group	USA	0,3	0,0	0,0

MTU Aero Engines

Customers 78	Top 10 Customers		Share of	Share of turnover	
			Turnover (%)	Customer (%)	
	Raytheon Technologies	USA	284,0	24,0	2,2
	General Electric	USA	184,0	15,5	1,4
	Rolls-Royce	Great Britain	126,0	10,7	4,3
	Saffron	France	53,0	4,5	1,3
	United Parcel Service	USA	32,0	2,7	0,2
	Airbus	France	28,0	2,4	0,3
	Delta Air Lines	USA	21,0	1,8	0,3
	Air France-KLM	France	17,0	1,4	0,3
	Boeing	USA	15,0	1,3	0,1
	China Southern Airlines	China	14,0	1,2	0,4



Siemens

Suppliers 487	Top 10 Suppliers		Countervalue Quarter (\$ million)	Share of Total costs (%)	Share of turnover Suppliers (%)
	Siemens Healthineers	Germany	91,0	0,8	1,7
	Westinghouse Air Brake	USA	61,0	0,5	2,9
	Infineon Technologies	Germany	34,0	0,3	0,9
	Renesas Electronics	Japan	33,0	0,3	1,7
	Thyssenkrupp	Germany	36,0	0,3	0,3
	Microship Technology	USA	26,0	0,2	1,6
	Siemens Ltd.	India	24,0	0,2	5,2
	Parker-Hannifin	USA	26,0	0,2	0,7
	Norsk Hydro	Norway	18,0	0,2	0,5
	Nvidia	USA	18,0	0,2	0,3
Customers 279	Top 8 Customers			Share in Turnover (%)	Share of turnover Customer (%)
	Siemens Healthineers	Germany	149,0	0,8	4,5
	Alibaba	China	132,0	0,6	0,7
	Siemens Gamesa	Germany	102,0	0,5	3,4
	Siemens Ltd.	India	93,0	0,5	22,1
	China Railway Signal & Communication	China	3,0	0,0	0,3
	BAIC BluePark New Energy Technology	China	2,0	0,0	0,6
	Harbin Jiuzhou Group	China	2,0	0,0	4,5
	Chips&Media	South Korea	0,1	0,0	2,2

Volkswagen

Suppliers 818	Top 10 Suppliers		Countervalue Quarter (\$ million)	Share of Total costs (%)	Share of turnover Suppliers (%)
	Magna International	Canada	929,0	1,5	10,3
	Continental	Germany	909,0	1,4	9,0
	ZF Friedrichshafen	Germany	905,0	1,4	7,8
	Faurecia	France	737,0	1,2	16,0
	Valco	France	676,0	1,2	12,8
	Burelle	France	572,0	1,1	25,9
	Gestam Automocion	Spain	636,0	1,0	26,8
	Lear	USA	568,0	0,9	11,8
	Cie Plastic Omnium	France	556,0	0,9	26,0
	Thyssenkrupp	Germany	508,0	0,9	4,6
Customers 105	Top 10 Customers			Share of Turnover (%)	Share of turnover Customer (%)
	Penske Automotive Group	USA	440,0	0,7	8,3
	MAN	Germany	280,0	0,4	10,3
	Group 1 Automotive	USA	173,0	0,3	6,1
	Sonic Automotive	USA	139,0	0,2	5,2



Lithia Motors	USA	131,0	0,2	2,6
AutoNation	USA	111,0	0,2	2,1
Inchcape	Great Britain	127,0	0,2	6,1
China ZhengTong Auto Services	China	69,0	0,1	12,1
Asbury Automotive Group	USA	56,0	0,1	2,7
Traton	Germany	49,0	0,1	0,9

Total costs = direct costs for the production of goods, *For customers: Capex; not all supplier and customer relationships led to sales in the end

Source: Bloomberg, Flossbach von Storch Research Institute, in each case latest available quarterly data, therefore deviations between the shares of costs or turnover possible, all figures rounded, as of April 2022.



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