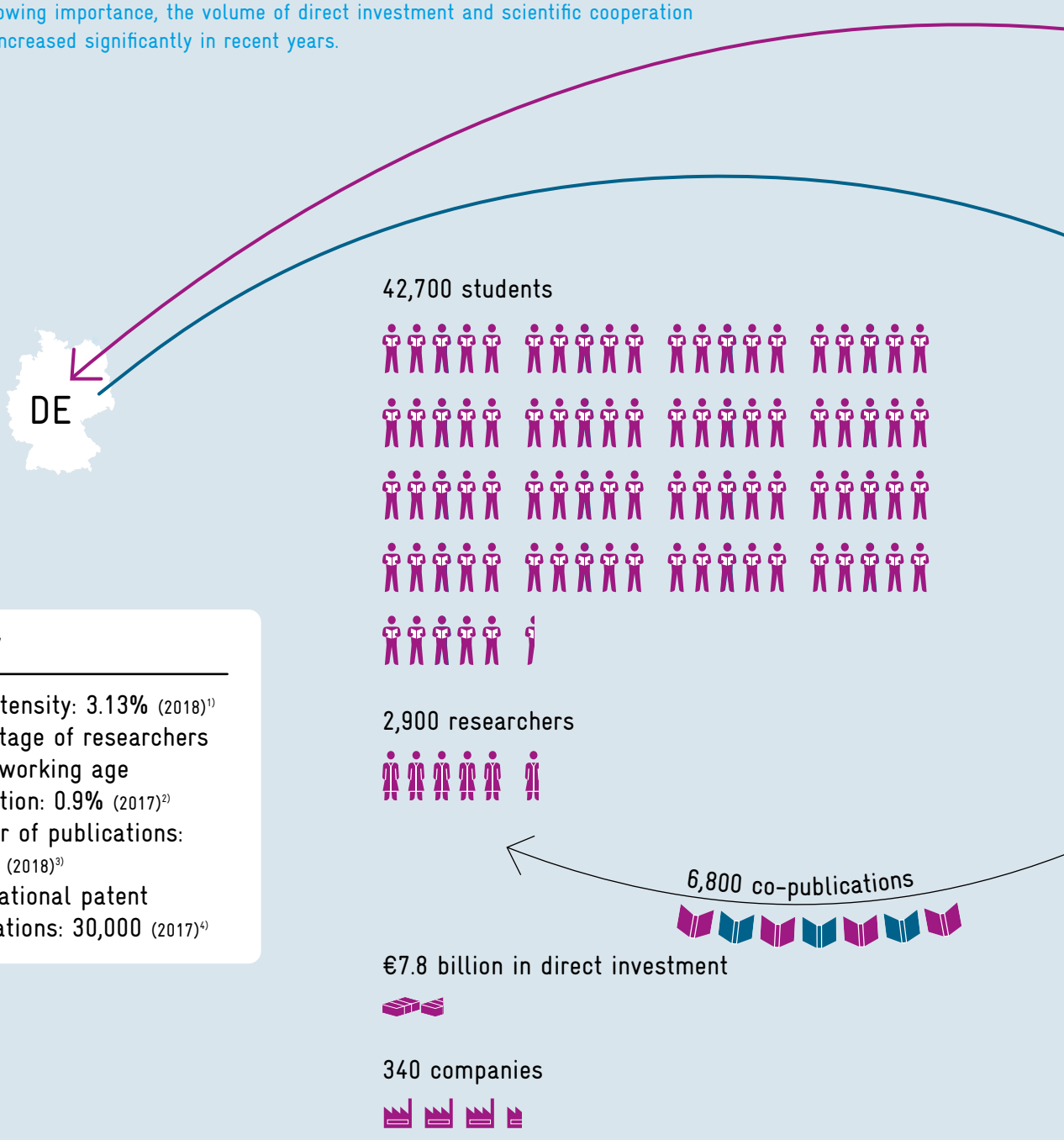
B 3 Exchange of knowledge and technology between Germany and China

Download data

The international exchange of knowledge and technology is a key driver of innovation and value creation. Germany, therefore, has a real interest in good cooperative relations in science and business with the emerging location for innovation, China. With China's rapidly growing importance, the volume of direct investment and scientific cooperation has also increased significantly in recent years.



Germany

- R&D intensity: 3.13% (2018)[1]
- Percentage of researchers in the working age population: 0.9% (2017)[2]
- Number of publications: 74,000 (2018)[3]
- Transnational patent applications: 30,000 (2017)[4]

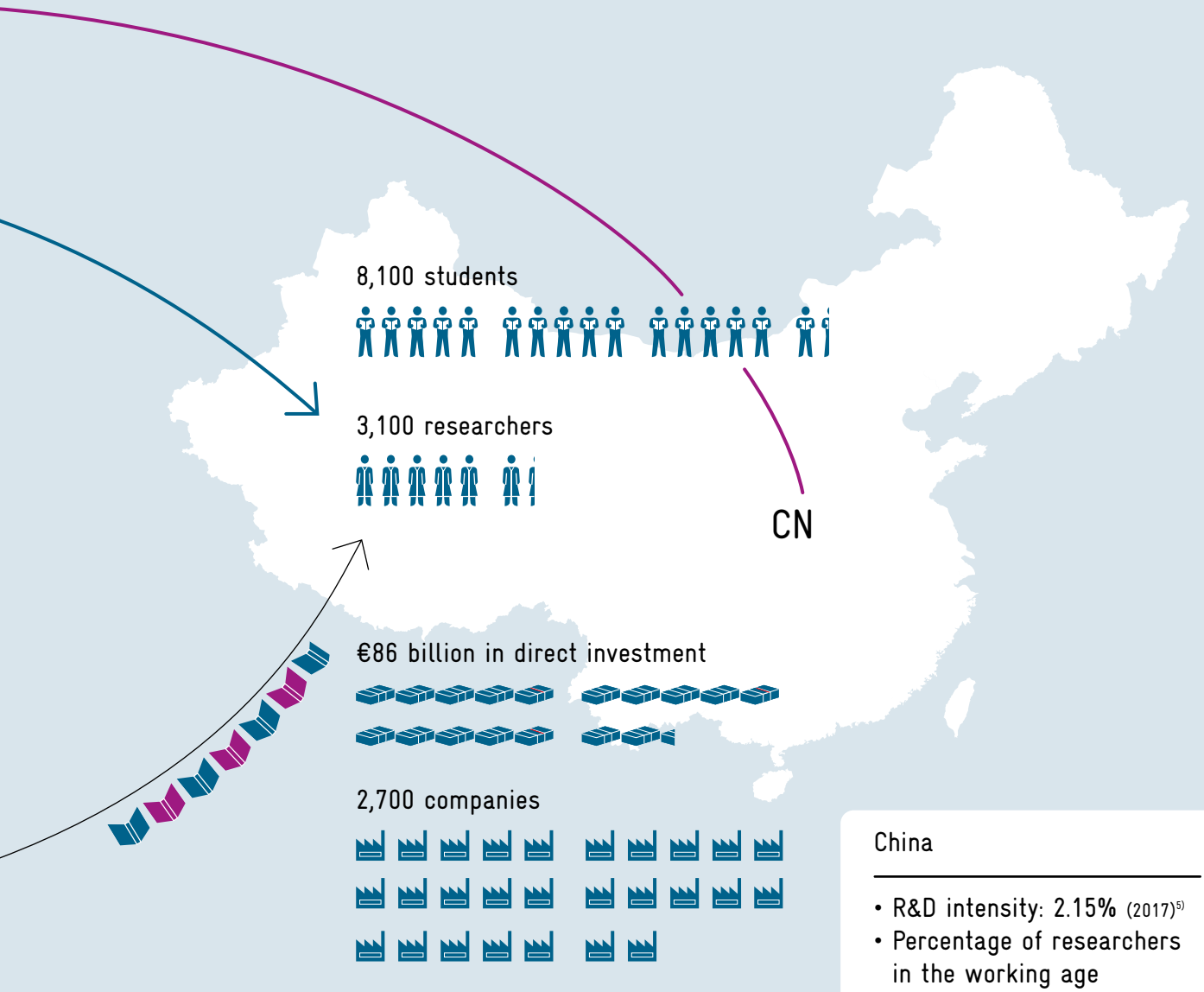
corresponds to 500 students[9]
- Chinese students in Germany (2018/19 winter semester)
- German students in China (2018)

corresponds to 500 researchers[10]
- Publishing scientists affiliated to an institution in the other country (2006 to 2016)

corresponds to 500 co-publications[11]
- Co-publications by Chinese and German scientists (2017)

corresponds to five billion euros[12] in foreign direct investment (FDI)
- Chinese FDI in Germany (2017)
- German FDI in China (2017

corresponds to 100 companies[13]
- Companies in China taken over or launched by a German investor or German shareholders (2017)
- Companies in Germany taken over or launched by a Chinese investor or Chinese shareholders (2017)



China

- R&D intensity: 2.15% (2017)[5]
- Percentage of researchers in the working age population: 0.2% (2017)[6]
- Number of publications: 355,000 (2018)[7]
- Transnational patent applications: 52,000 (2017)[8]

See chapter D 7 for a list of sources of the infographics.

B 3 Exchange of knowledge and technology between Germany and China

The People's Republic of China (hereinafter referred to as China) has developed into one of the world's leading industrial nations and one of Germany's most important trading partners.[229] The Chinese government is working systematically to strengthen the country's regional and global power position. To this end, one of its strategic goals in the coming years is to gain technological leadership in key future industries and to become the world's leading location for innovation.[230]

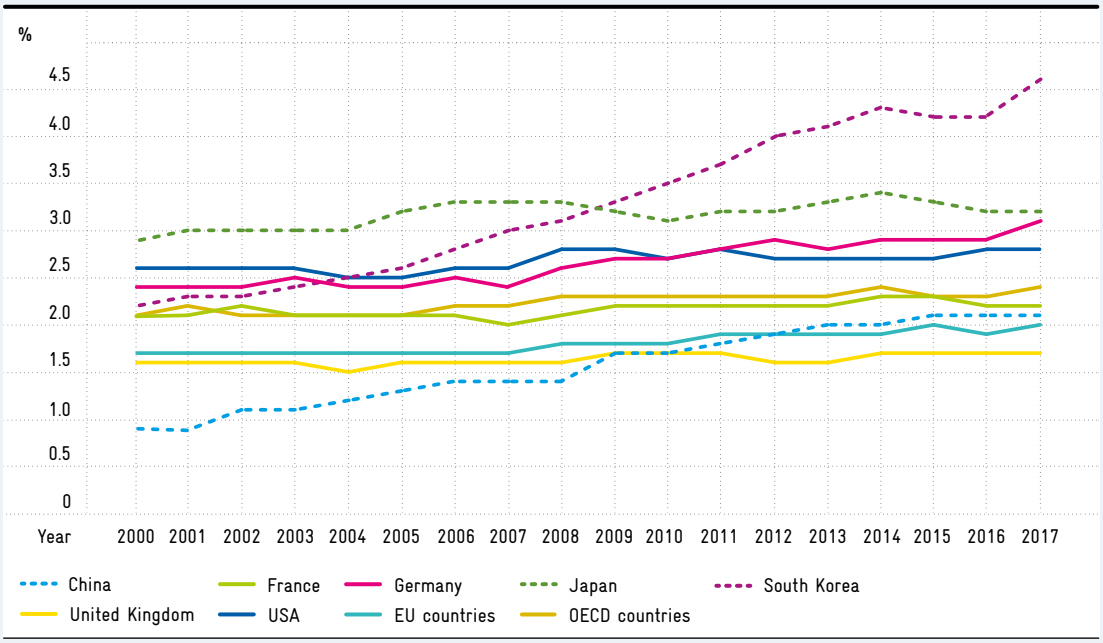
China's research and innovation (R&I) policy is characterized by strong state control. The Chinese Communist Party has a pivotal planning and decision-making role in all policy areas. It also determines the strategy and instruments of China's R&I policy, which is characterized by long-term planning with highly ambitious targets.[231] Examples of this are the Made in China 2025 strategy, which focuses on the development of high-tech sectors, and the 'Belt and Road Initiative', which aims at expanding intercontinental trade and infrastructure networks up to 2049.[232]

The international exchange of knowledge and technology is a key driver of innovation and value creation. Germany therefore has strong interest in good cooperative relations in science and business with China as an emerging location of innovation. However, from the perspective of national and European decision-makers the increasing influence on science and business imposed by the Chinese

Fig. B 3-1

Download data

R&D expenditure as a percentage of gross domestic product 2000–2017

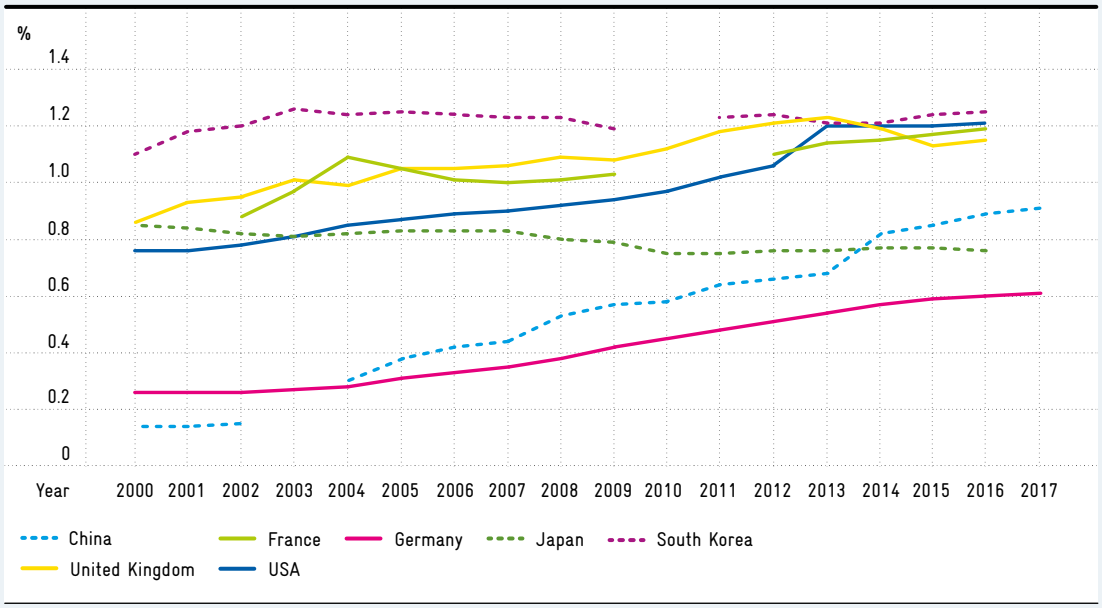


Source: Gehrke et al. (2020b).

Fig. B 3-2

Download data

Tertiary graduates per year as a percentage of the total population 2000–2017



Source: Conlé et al. (2018). Data for APRA monitoring using data from Destatis and the World Bank.

government is putting a strain on cooperation.[233] There is concern that a one-way outflow of scientific, innovation- or security-related know-how[234] and unequal competitive conditions could weaken Germany's scientific and economic performance.[235]

Against this background, the Commission of Experts examines different dimensions of knowledge and technology exchange between Germany and China. It outlines the framework conditions that form the basis for relations between the two countries in science and business.

B 3-1 China's research and innovation system

China is a rapidly emerging location for innovation, as selected input and output indicators of the research and innovation system (R&I system) show.[236]

An important input indicator of the performance of an R&I system is the expenditure on research and development (R&D). China's R&D expenditure has multiplied from around US$33 billion in 2000 to about US$496 billion in 2017.[237] China is thus only behind the US in terms of absolute R&D expenditure[238] and nowadays invests a higher percentage of its gross domestic product in R&D than the average of the EU countries (cf. figure B 3-1). China has become the world's biggest exporter in the field of research-intensive goods.[239]

A distinctive feature of the Chinese R&I system is the low percentage of R&D spending on basic research, just 5.5 percent in 2017. By contrast, 10.5 percent was spent on applied research, and 84 percent of R&D spending on product development and commercialization.[240]

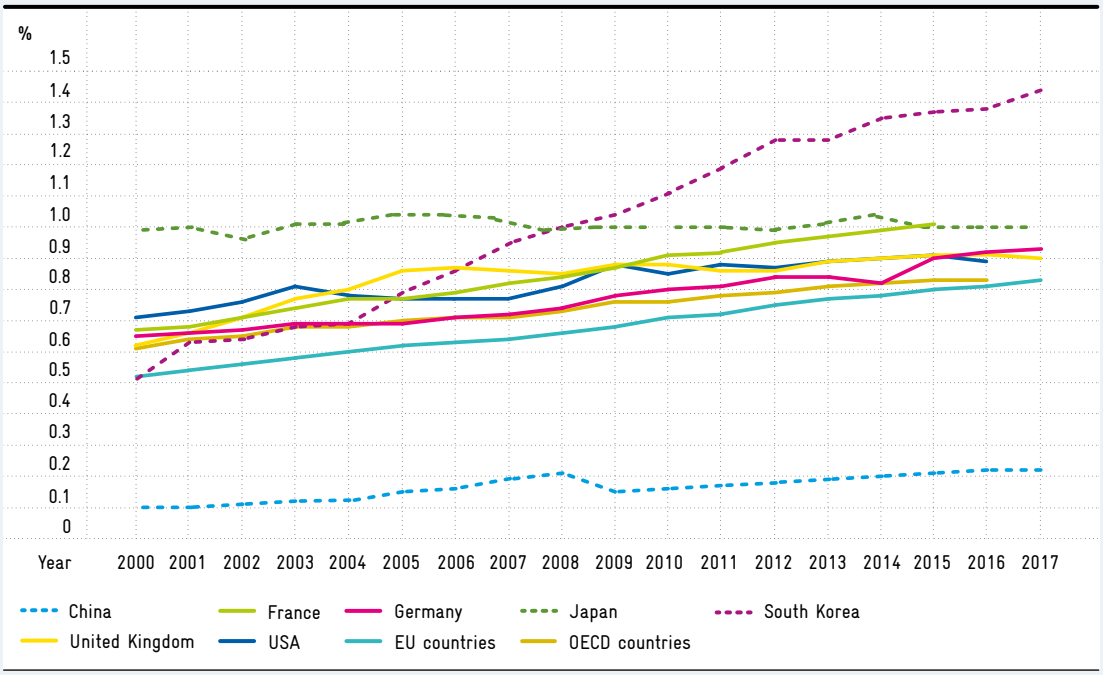
The bulk of Chinese government research funding is concentrated on a (relative to population size) small number of selected institutions that engage in cutting-edge research. These include the institutes of the Chinese Academy of Sciences (CAS) and several leading universities. In international rankings, a handful of Chinese universities achieve top 100 positions.[241] Since 2015, the Chinese government has established several funding programs in which selected tertiary education institutions receive additional financial support with the aim of developing them into world-leading universities.[242]

Another important indicator of an R&I system's performance is the number of university graduates as a percentage of the total population. This figure has been growing faster in China than in important OECD countries since 1997 (cf. figure B 3-2). In 2017, over seven million tertiary students completed

Fig. B 3-3

Download data

Number of scientists per 100 employees 2000–2017

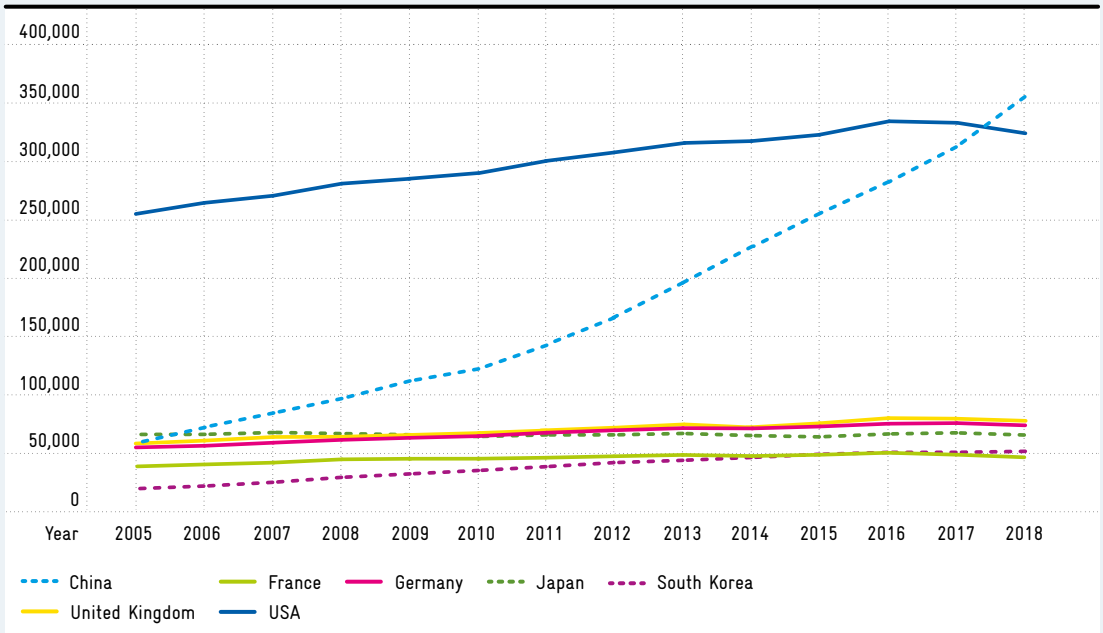


Source: https://data.oecd.org/rd/researchers.htm (last accessed on 17 January 2020).

Fig. B 3-4

Download data

Number of scientific publications, fractional counting 2005–2018[1)2)]



[1)] Publication development that can be assigned to individual countries by the authors' addresses.
[2)] Fractional counting is used in cases where several co-authors from different countries contribute to a publication. If there are four authors from four countries, each country receives 0.25 credits for a publication.
Source: Web of Science. Calculations by DZHW.

their studies – more than 40 percent of them in the fields of science, technology, engineering and mathematics (STEM).[243] However, the rapid increase in the number of graduates is in parts not well-aligned with the development of labour demand. This shows in many university graduates having difficulties in finding jobs that match their qualifications.[244]

Besides the share of university graduates in the total population, another indicator of R&I system performance is the number of scientists as a percentage of the working age population. At 0.2 percent, this proportion in China is still well below the OECD average, despite a rising trend (cf. figure B 3-3). The share of scientists in the working age population is about 1 percent in Germany, and as high as 1.4 percent in South Korea, the front runner in this field.

A relevant output indicator of the performance of an R&I system is the number of scientific publications. In 2018, 355,000 scientific publications were attributed to scientists affiliated with China – a six fold increase over 2005 (cf. figure B 3-4).[245] For the first time, China had thus overtaken the US as the country with the most scientific publications. This rise was associated with an increase in the average quality of publications – as measured by the excellence rate.[246]

The excellence rate of Chinese publications rose from 6.7 to 9.7 percent between 2005 and 2016. Most recently it was above the excellence rate of Japanese (5.8) and South Korean publications (6.3), but still below that of German (10.9 percent), US-American (13.2) and British publications (13.5 percent).[247]

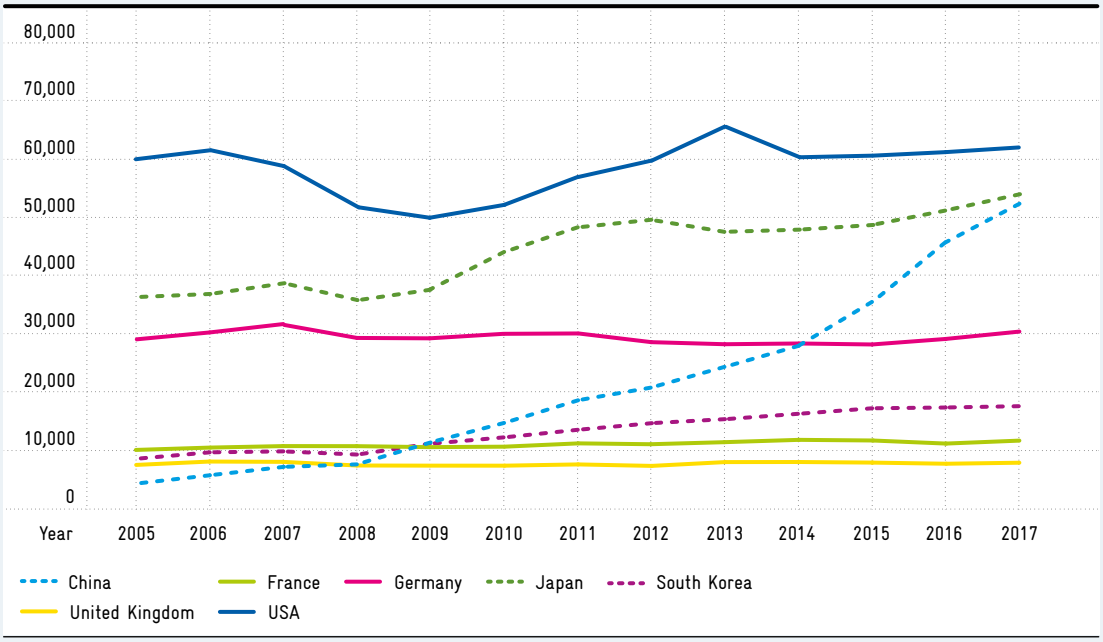
The number of transnational patent applications from China has also increased massively since 2005 (cf. figure B 3-5). With around 52,000 transnational patent applications in 2017, China was ahead of Germany (with 30,000), but still behind the US (64,000) and Japan (54,000).[248] However, only 69 transnational patents per million workers were registered in China in 2017. The number was significantly higher in Germany (730), Japan (826) and the US (404).[249] Chinese transnational patent applications concentrate in particular on information and telecommunications technologies.[250]

There are indications that the average quality of Chinese transnational patent applications is still rather low. That they are cited comparatively seldom abroad supports this impression.[251] In terms of content, these patents often only reflect the current state of the art or describe simple technical solutions.[252]

Transnational patent applications 2005–2017

Fig. B 3-5

Download data



Source: EPO (PATSTAT). Calculations by Fraunhofer ISI in Neuhäusler et al. (2020)

Box B 3-6

Explanation of key terms

Foreign Direct Investment (FDI): Cross-border capital investment to exercise control over – or significantly influence – the management of the target of the direct investment. Direct investments are defined as cross-border holdings of the capital and reserves of companies, provided that at least ten percent of the shares or voting rights are directly attributable – or more than 50 percent of the shares or voting rights are directly and indirectly attributable – to the investor.[253] FDI essentially comprises four types of transactions: mergers and acquisitions (M&A), start-ups (greenfield investments), capital expansion (additional new investments) or financial restructuring.[254]

Net direct investment: Inflow of equity capital, reinvested earnings, purchases of land and property, and newly issued direct investment loans minus liquidation of previously paid-in equity capital, profit withdrawals, and repayment of direct investment loans.[255]

Majority interest: Investment in a company in which an investor holds more than 50 percent of the capital shares.[256]

Acquisition or takeover: The purchase of a company by another company. The acquiring company receives all the assets and liabilities of the target company.[257]

Joint venture: A contractual arrangement between two or more parties to execute a transaction in which the parties share the profits and losses of the transaction and jointly pay for the provision of capital, working capital and costs. A joint venture does not necessarily lead to the creation of a new legal entity.[258]

Knowledge and technology exchange through direct investment B 3–2

Chinese direct investment in Germany

Chinese direct investment in Germany has increased sharply in the last ten years.[259] The impression in Europe and the US is that these FDI activities serve the strategic goal of Chinese policy-makers to establish a dominant position in key technology areas. This is associated with the concern that the countries affected will lose considerably in terms of technological sovereignty and international competitiveness in the long term (cf. p. 58).[260]

Compared to investors from other countries, Chinese investors worldwide more often acquire companies that are larger and hold more patents. They also often take over less profitable and more indebted companies.[261] This could mean that Chinese investors are pursuing objectives other than return on their investments with their takeovers. Other possible explanations are that they have longer time horizons for their investment decisions or take advantage of more favourable financing possibilities due to state aid, enabling them to pursue riskier investment strategies.[262]

According to a recent empirical study, the areas of Chinese acquisitions abroad differ significantly depending on whether the investors are private or public. State-owned companies as investors engage primarily in industries that are key to the politically defined strategies, i.e. Made in China 2025 and the Belt and Road Initiative. This orientation of investment behaviour cannot be observed among private investors.[263]

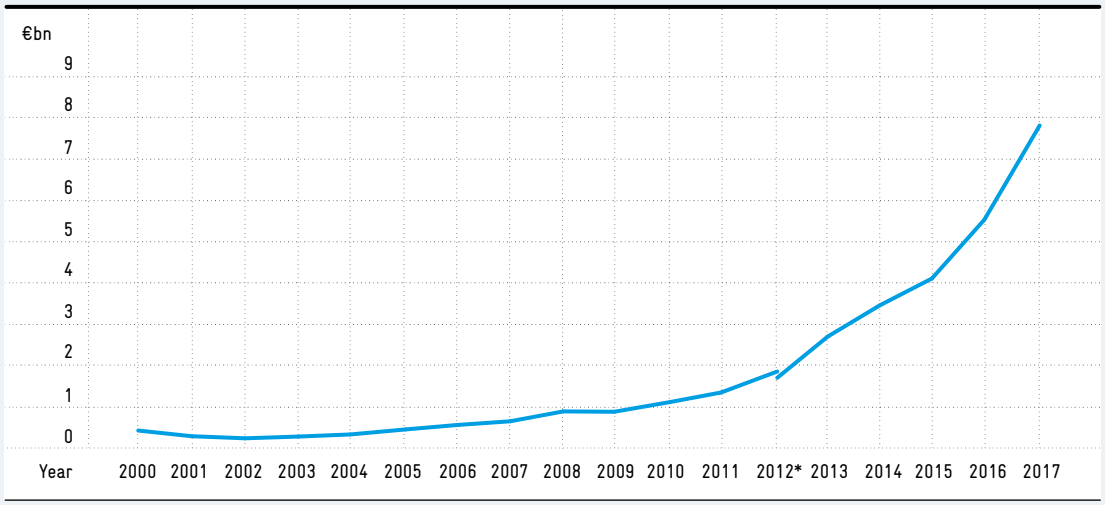
The direct investment statistics of the Deutsche Bundesbank documented a total of 342 companies with Chinese shareholders in Germany in 2017. The level of Chinese direct investment has been growing faster and faster since the mid-2000s (cf. figure B 3-7). In 2010, it exceeded the one billion euro mark for the first time and reached a value of €7.8 billion in 2017.[264] However, this still lay well behind total direct investment in Germany from other EU countries (€320 billion) and the US (€98 billion).[265]

A study by the ZEW – Leibniz Centre for European Economic Research (ZEW) has examined a selection of 261 German companies that were taken over by Chinese investors, or in which Chinese investors had shareholdings, between 2002 and early 2019.[266]

Fig. B 3-7

Download data

Total Chinese direct investment in Germany 2000–2017 in €bn



*since 2012: calculated according to the OECD Benchmark Definition, 4th edition.
Source: own diagram based on Dürr et al. (2020: 9) based on data from the Deutsche Bundesbank.

187 of these companies were taken over completely by Chinese investors or had a Chinese majority shareholding.

Of the 261 companies in the sample, 48 percent had less than 100 employees at the time of the takeover, 38 percent were medium-sized (100 to 1,000 employees), and the rest had more than 1,000 employees.[267] One in ten companies were involved in insolvency proceedings.[268] Just over three-quarters of the Chinese takeovers and shareholdings examined are concentrated in the manufacturing sector. 28 percent of the companies examined here belong to the mechanical engineering sector, 16 percent to the automotive sector, and 10 percent to the electronics sector (cf. figure B 3-8).[269]

According to a study by the Bertelsmann Stiftung, companies that can be assigned to one of the ten key sectors of the Made in China 2025 strategy account for almost two-thirds of Chinese investments and takeovers in Germany.[270]

72 percent of the companies with Chinese direct investment covered in the ZEW study are engaged in R&D. This percentage of R&D-active companies is thus significantly higher than among the German economy as a whole. However, the R&D intensity[271] of these companies is below the respective sectoral average of the German economy (cf. figure B 3-9). Mechanical engineering companies are an exception. In this sector, the R&D intensity of companies with Chinese investors (5.2 percent) is significantly higher than in German mechanical engineering as a whole (3.6 percent).[272]

More than half of the companies examined had applied for patents in the ten years prior to the investors' involvement.[273] In total (and consolidated) they applied for approximately 5,700 patents[274], corresponding to an average of around 43 patents per patent-active company.[275] However, this high figure is due to the fact that a small number of companies are responsible for most of the patent applications observed. The median of patent applications by patent-active companies was only two per year before the Chinese acquisition or shareholding.

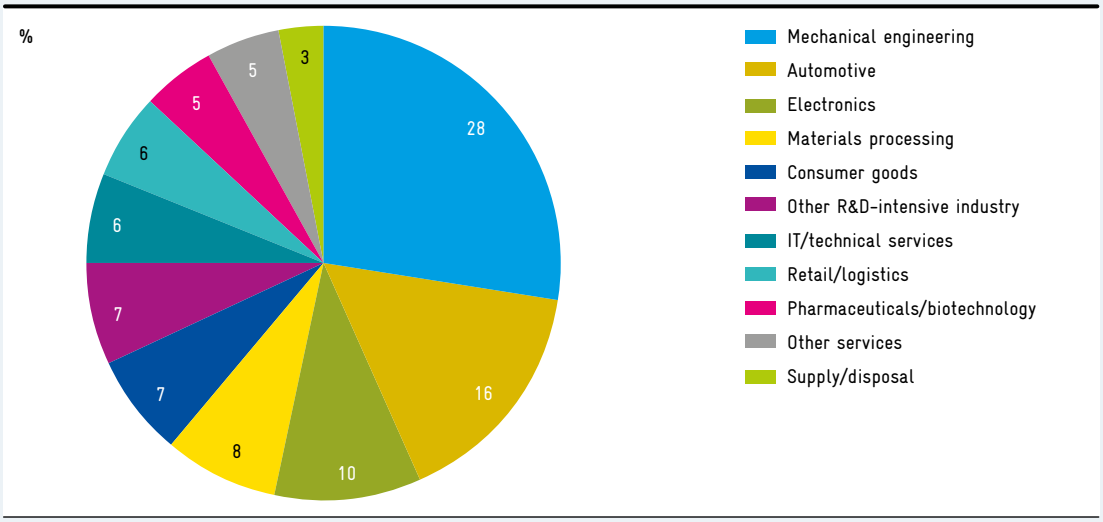
The ZEW study also analyses whether the 187 companies that were taken over by Chinese investors either completely or by more than 50 percent developed differently after the takeover than companies taken over by investors from the rest of the EU, Japan or the US. It does not find evidence of significant differences in terms of the development of the number of employees, turnover or the number of patent applications.[276]

Furthermore, a descriptive data analysis by the Wissenschaftsstatistik GmbH of the Stifterverband, commissioned by the Commission of Experts, of the R&D statistics for the period 2007 to 2017 suggests

Fig. B 3-8

Download data

Percentage of German companies taken over by Chinese investors or with Chinese shareholdings by sector

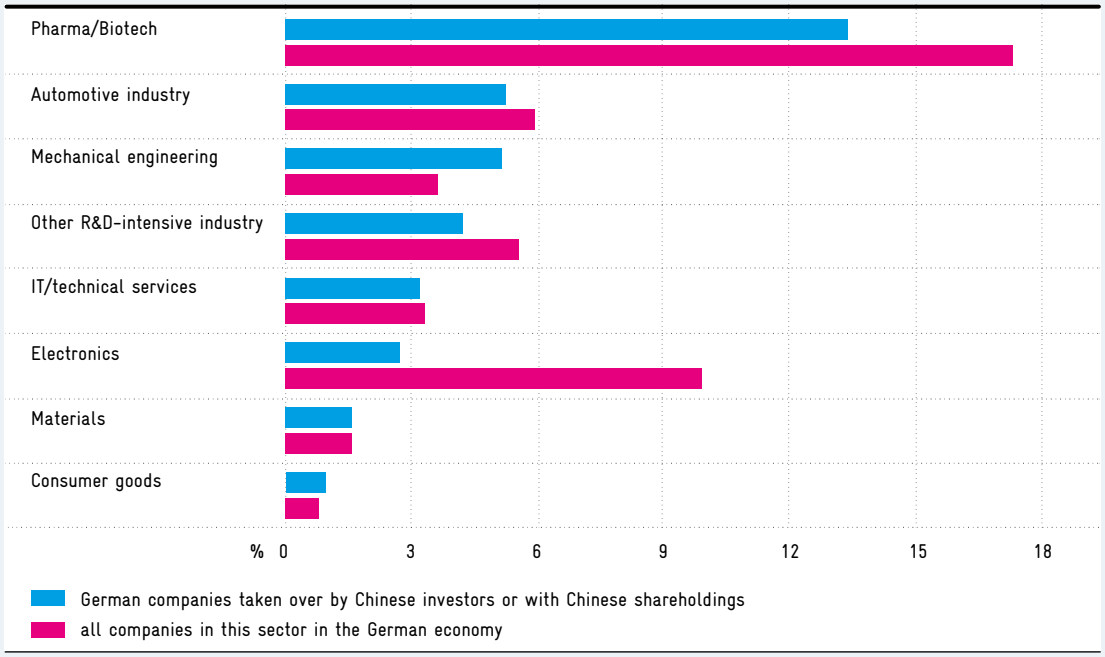


Source: own diagram following Dürr et al. (2020: 22) based on data from the Mannheim Innovation Panel.

Fig. B 3-9

Download data

R&D intensity of companies taken over by Chinese investors or with Chinese shareholdings, and of all companies in the German economy by sector, as percentages



Only companies that were still part of a Chinese corporate group and economically active at the beginning of 2019 are included.
R&D intensity: total R&D expenditure as a percentage of turnover, in the case of internationally active companies only in relation to Germany as a business location; for German companies taken over by Chinese investors or with Chinese shareholdings in 2018 or the most recent available year, for German industry as a whole in 2017.
Source: own diagram following Dürr et al. (2020: 26) based on data from the Mannheim Innovation Panel.

that companies taken over by Chinese investors or with Chinese shareholdings do not reduce their R&D expenditure or R&D personnel.[277]

Current measures to control Chinese direct investment

Chinese direct investment, like FDI from other non-EU countries, is subject to several forms of government regulation at the national and European level. Current efforts are aimed at strengthening the control mechanisms on FDI.[278]

In Germany, the 'Foreign Trade and Payments Ordinance' was amended in 2017 and 2018. With the amendments, the Federal Government aimed at improved protection for German companies from takeovers whenever important know-how might be lost as a result.[279] Another objective was to strengthen national security.[280] The amended Foreign Trade and Payments Ordinance stipulates that the acquisition of company shares by non-EU investors should be reviewed if the intention is to acquire at least 25 percent of the voting rights in a company located in Germany. The review criterion is whether the acquisition endangers public order, security or Germany's essential security interests. Furthermore, the amendments lowered the threshold for the examination of shareholdings in critical infrastructure operators, in security and defence-related companies, and in media companies from 25 to 10 percent of the voting rights.[281]

The Federal Ministry of Economics and Energy (Bundesministerium für Wirtschaft und Energie, BMWi) presented further proposals for controlling FDI in November 2019 with its Industrial Strategy 2030. The aim of investment control is to maintain Germany's technological sovereignty. FDI is to be reviewed to determine whether it affects security-related or so-called sensitive technologies. To enable rapid action, the BMWi proposes the establishment of a standing committee called 'National Recourse Option' at the state secretary level.[282]

In April 2019, the Regulation of the European Parliament and of the Council establishing a framework for screening foreign direct investment into the European Union came into effect. It aims to improve information exchange and cooperation between the member states with respect to screening foreign direct investment from non-EU countries. Furthermore, the European Commission can issue statements if an investment poses a threat to security or public order in more than one member state.[283] The EU member states are not obliged to comply with these statements but must give specific reasons if they do not.[284] National screening procedures, like those that already exist in Germany and some other member states, remain unaffected by this regulation.[285]

German direct investment in China

The volume of German direct investment in China has increased significantly since the early 2000s. In 2017, it reached a value of €86 billion – an increase of more than €75 billion (cf. figure B 3-10). Hence, German FDI in China at that time was about eleven times higher than Chinese FDI in Germany.[286]

The development of German FDI in China can be divided into several phases (cf. figure B 3-11). From 2000 to 2008, there was comparatively little activity. The annual volume of net direct investment was around €2 billion. After that, there was a strong expansion. In a peak phase that lasted from 2010 to 2016, German FDI in China almost continuously exceeded €7 billion per year. The peak was reached in 2014 with a volume of €10 billion. Most recently, the volume of annual net direct investment has declined sharply, amounting to only €1.6 billion in 2018.

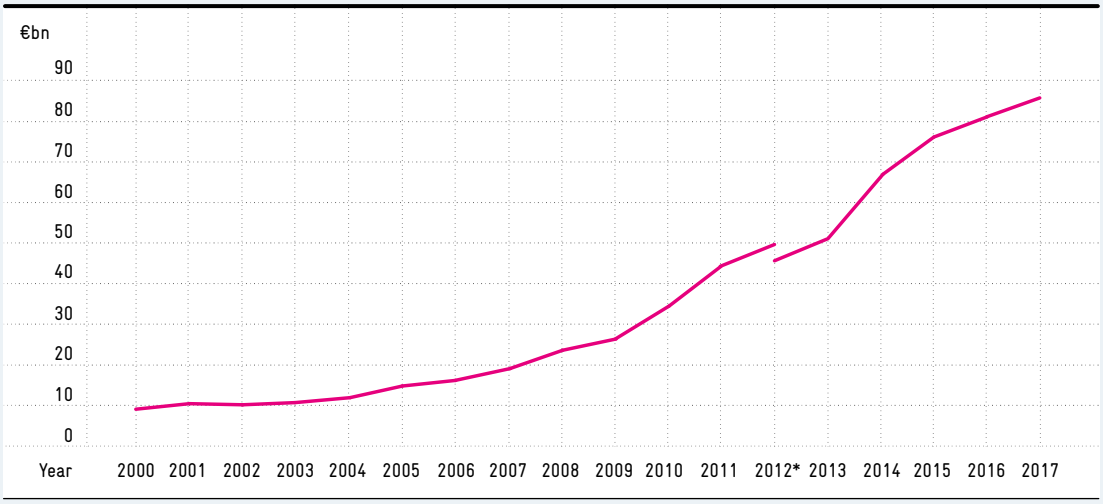
According to direct investment statistics of the Deutsche Bundesbank, there were almost 2,700 companies in China with German investors or a German shareholding in 2017 – about eight times as many as companies in Germany with Chinese investors or a Chinese shareholding. Most of them were sales outlets or representative offices of German companies.

Takeovers of Chinese companies by German investors or majority shareholdings in companies in China are an exception. In the entire period from 2004 to 2018, in only 42 cases did German investors gain far-reaching control over Chinese companies in this way. In the same period, there were 351 majority shareholdings or takeovers in China from all EU countries together. Relative to Germany's economic output, the participation of German investors in these takeovers and investments is well below average. By comparison, investors from the UK in particular, but also from France, were more active in this realm than German investors (cf. figure B 3-12).

Fig. B 3-10

Download data

Total German direct investment in China 2000–2017 in €bn

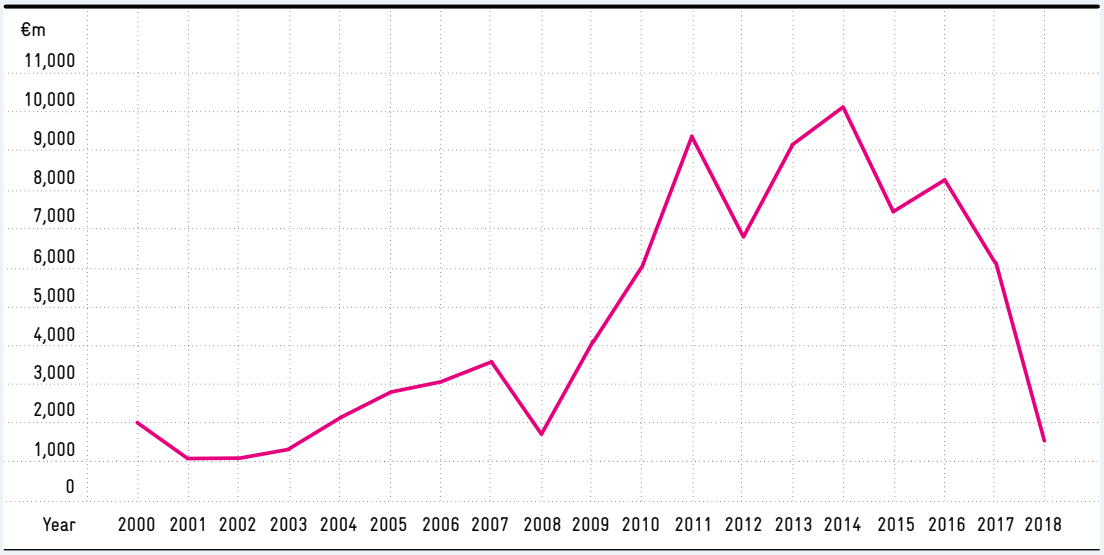


*since 2012: calculated according to the OECD Benchmark Definition, 4th edition.
Source: own diagram following Dürr et al. (2020: 9) based on data from the Deutsche Bundesbank.

Fig. B 3-11

Download data

Total net direct investment by German companies in China 2000–2018 in €m



Source: own diagram following Dürr et al. (2020: 14) based on data from the Deutsche Bundesbank.

Takeovers or majority shareholdings in Chinese companies by German investors between 2004 and 2018 concentrated on the technology sector (cf. figure B 3-13). Over a third were in the area of cutting-edge and high-value technology, and just under a third in non-research-intensive technology.

German FDI in China also flows into joint ventures with Chinese companies. For a long time, the formation of joint ventures was almost the only way for foreign companies to produce in China, and joint ventures remain obligatory in some industries – e.g. the automotive industry, mining, energy and telecommunications, healthcare, publishing and education. However, this obligation is expected to expire in the automotive industry by 2022.[287]

A total of 32 joint ventures involving Chinese and German partners were established in China between 2004 and 2018. This form of cooperation has, however, become noticeably less important in recent times. 20 of the Chinese-German joint ventures were set up before 2008; only 12 additional joint ventures were created in the following ten years.[288]

Current measures to control German direct investment

The activities of German companies in China have hitherto been hampered by restrictions on foreign FDI and by regulations on forced technology transfer.

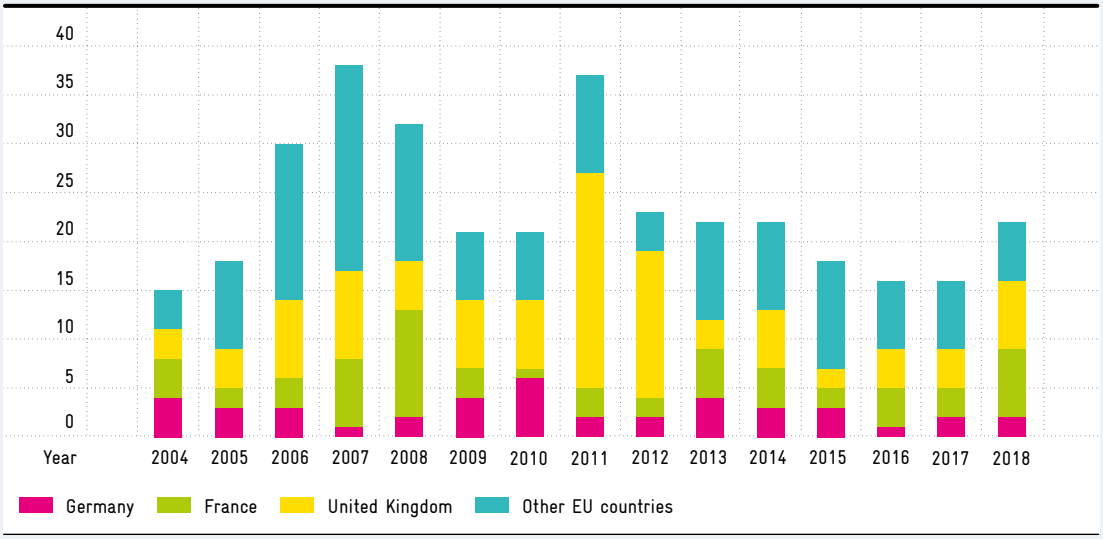
Although China took on far-reaching commitments to open up its markets when it joined the WTO in 2001, so far it has removed restrictions on FDI to only a relatively small degree.[289] The OECD's FDI Regulatory Restrictiveness Index for 2018 rates China's regulatory barriers at 0.251 on a scale from 0 to 1 – with higher index values indicating stricter regulatory restrictions on foreign direct investment. The average index value for all OECD countries was 0.065 – for Germany 0.023.[290]

The Investment Law, which came into force on 1 January 2020, is supposed to remove the regulatory barriers to FDI in China. For the first time, as a matter of principle it provides for equal treatment for foreign and Chinese companies investing in the Chinese market. However, the scope of application of this general rule is substantially limited by a so-called negative list. This list prohibits or restricts the activities of foreign companies in 40 sectors,[291] for example by means of upper limits on shareholdings and the joint-venture obligation.[292]

Fig. B 3-12

Download data

Number of takeovers of Chinese companies by European investors by selected countries of origin 2004–2018

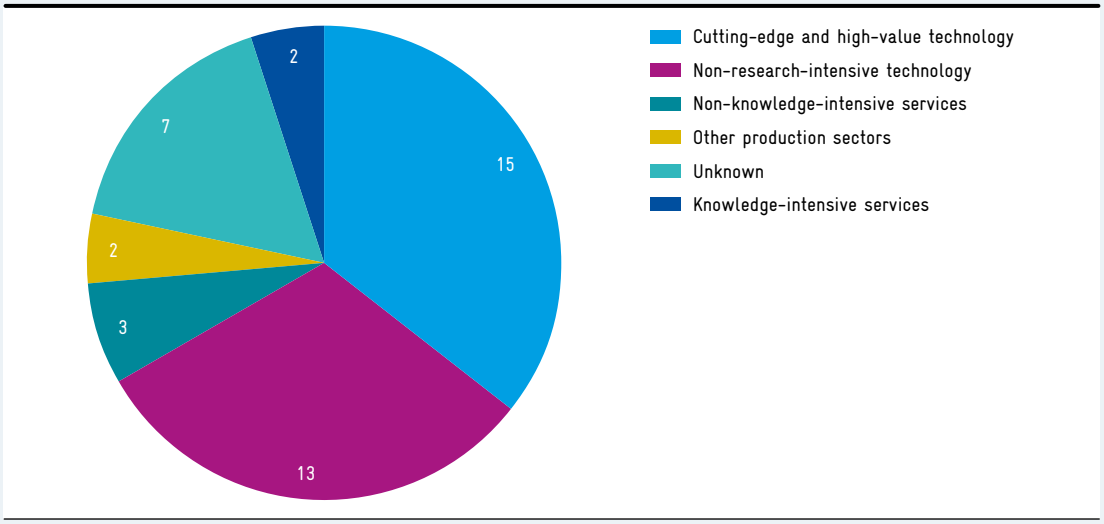


Source: own diagram following Dürr et al. (2020: 47) based on data from Bureau van Dijk, Zephyr database.

Fig. B 3-13

Download data

Number of takeovers of Chinese companies by investors from Germany 2004–2018 by sector



Source: own diagram following Dürr et al. (2020: 48) based on data from Bureau van Dijk, Zephyr database.

The Investment Law also relaxes the rules on the import and export of technologies and reduces the requirements for the transfer of technology. Furthermore, the Chinese authorities are prohibited from forcing the transfer of technology by administrative means. The Chinese government is thus responding to the concerns of foreign investors about forced technology transfer.[293]

Besides the unequal framework conditions for FDI, the insufficient protection of intellectual property rights in China is often criticized, despite some progress in recent years.[294] This problem also affects German investors in China. For example, a survey conducted by the German Chamber of Foreign Trade in China in 2019 concluded that German companies doing business in China still regard the enforcement of intellectual property rights on the Chinese market as a key challenge.[295]

Another challenge increasingly reported by German companies is that the willingness of their employees to spend longer periods in China has been declining. One factor here is that China's image as a destination for secondments has suffered recently. Employees have reservations about internet censorship, state supervision, and the introduction of the so-called social credit system.[296]

Knowledge and technology exchange through direct investment B 3-3

With China's rapidly growing scientific importance, the number of cooperation agreements between German and Chinese academic institutions has increased significantly in recent years. The number of cooperation agreements between German and Chinese tertiary education institutions increased from around 900 in 2013[297] to almost 1,400 in 2019.[298] Non-university research institutions also maintain cooperative relations with China, and some are even represented by their own representative offices in China.[299]

The exchange of students between Germany and China has also intensified. For example, the number of Chinese students in Germany rose from 24,000 in the 2010/11 winter semester to 42,700 in the 2018/19 winter semester.[300] The number of German students in China grew from 4,200 in 2010 to 8,200 in 2014[301] and has remained almost unchanged since then.[302]

The extent of the German-Chinese exchange of scientists has also increased. Although there are no official statistics on the mobility of scientists and academics, it can be estimated using bibliometric methods.[303] In the period from 1996 to 2011, there were fewer than 2,000 publications by German or

Chinese scientists affiliated with an institution in the other country. In the next period covered, from 2006 to 2016, there were already more than 6,000 in total, distributed roughly equally between the two countries.[304] The growing cooperation is also reflected in the number of jointly published research papers.[305] In 2017, 6,800 Sino-German co-publications were counted – a fourfold increase over 2005 (1,700). In terms of joint publications, China is the fourth most important partner country for researchers with German affiliations after the US, the UK and France. Conversely, Germany ranks third for researchers with Chinese affiliations – together with Japan.[306]

Academic cooperation between Germany and China faces a number of challenges. In particular, it is often difficult to select suitable institutional Chinese partners or to initiate and draft cooperation agreements, partly due to a lack of language skills and legal knowledge, partly due to cultural differences.[307] At present, there is no competence centre in Germany that systematically collects and evaluates information on problems with the implementation and design of Sino-German academic cooperation to inform, advise and educate German actors and scientific institutions. Discussions are currently underway between the BMBF, the BMWi, the Federal Foreign Office and the Alliance of Science Organisations on a competence centre for providing advice to scientists in Germany. However, this has not yet been implemented.[308]

In addition, the academic landscape in China is subject to increasing state control and supervision.[309] This also affects the activities of German academic organizations in China. One example of this is the law on the regulation of foreign non-governmental organizations (NGOs), which came into force in 2017. Since then, German non-university research institutions registered on the basis of the NGO law have had to undergo intensive approval procedures that restrict the content of their work and tie up a lot of staff time.[310]

A different kind of challenge in Sino-German scientific cooperation is how to handle dual-use technology.[311] The Chinese government specifically promotes the combination of civil and military research. By contrast, military-related research in Germany is restricted by comprehensive regulations;[312] similarly, goods and technologies that can be used for military purposes are subject to strict export controls. The Federal Government and German scientific organizations are working to raise awareness of the dual-use problem among German scientists through information measures. The intention is to prevent the outflow of dual-use-relevant knowledge abroad – and thus also to China – in the course of international scientific cooperation.[313]

Knowledge and expertise about China in Germany B 3–4

A productive academic and economic exchange with China requires individuals who are well acquainted with Chinese language and culture, as well as with the local markets, institutional framework conditions, and political structures. However, people with such comprehensive expertise about China are hard to find in Germany.[314] This shortcoming affects both science and business. However, it is often easier for large companies to manage this than for other actors such as SMEs or tertiary education institutions.

The declared aim of the recently expired China Strategy 2015–2020 of the BMBF was to create broader-based expertise about China in Germany.[315] In order to achieve this, the BMBF is funding a total of eleven projects between 2017 and 2022 in the context of an initiative called 'Innovative concepts for expanding China expertise at German tertiary education institutions'.[316] Box B 3-14 describes two of these projects in more detail. The initiative aims to equip more people to work in the field of academic and economic exchange with China and thus to expand and consolidate Sino-German- cooperation in science and business.[317] It is currently still unclear whether and within what framework the BMBF is planning to continue this initiative after 2022.

A recent study lists 19 universities and six universities of applied sciences in Germany with a total of 66 courses of study related to China, divided equally between Bachelor's and Master's courses.[318] One third of these courses of study are in classical sinology. Courses in modern sinology and interdisciplinary courses with a focus on China make up another third, respectively.[319] In the past decade, an average of 500 students per year have begun studying sinology. In contrast to other courses of study relating to East Asia (Japanese or Korean studies), where the number of first-year students is rising, the number of first-year students of sinology is stagnating in Germany.[320]

Box B 3-14

Examples of BMBF-funded projects to expand expertise about China at German tertiary education institutions

Expertise about China in Hohenheim (CHIKOH) at the University of Hohenheim

The 'China Expertise in Hohenheim' project at the Faculty of Economics and Social Sciences at the University of Hohenheim, which is funded from October 2017 to September 2020, is designed to promote exchange and networking between German and Chinese universities and industrial partners. The implementation of this objective varies according to the different target groups. For example, students are offered workshops, topic-specific seminars, case-study trips and intercultural training courses. Entrepreneurs and researchers can take part in the annual Hohenheim China Dialogue on intercultural exchange.[321]

The KIT Competence Network for Innovative Cultural Learning and Training in the Environment of University and Research (CuLTURE China) at the Karlsruhe Institute of Technology (KIT)

The 'CuLTURE China' project at KIT is being funded by the BMBF from March 2018 to February 2021. CuLTURE China aims to establish a competence network with a focus on China and, in the course of this, to promote the intercultural and international networking of the actors involved. The project is primarily aimed at students and scientists from the fields of mechanical engineering, electrical engineering and information technology, geo- and environmental sciences, as well as the cross-sectional sciences in the fields of energy and entrepreneurship. The objectives are being implemented, among other things, through the establishment of a Sino-German summer school and tandem field research projects in China and Karlsruhe, and the development of a China expertise centre in Suzhou.[322]

Students of China-oriented fields of study in Germany quite often do not attain good oral, reading and writing skills in Chinese. One reason for this is that curricula – especially in those interdisciplinary courses of study with a focus on China – often do not set particular language level requirements.[323]

Recommendations B 3–5

Create a level playing field for German and Chinese companies

Chinese direct investment in Germany is a relatively recent phenomenon and so far only accounts for a small share of FDI in the country. The sectoral and technological priorities for Chinese investment are influenced by strategic economic and innovation policies such as Made in China 2025 and the Belt and Road Initiative. The empirical evidence available to date does not support the hypothesis that Chinese direct investment in Germany has led to a weakening of the economic performance by the affected companies. Nonetheless, corporate investments and takeovers by Chinese investors in principle involve the risk of political and strategic influence being exerted. At the same time, compared to other countries, China is difficult to access for German direct investments. Technology exchange on equal terms is still challenging, and the protection of intellectual property rights is not always guaranteed.

- The Federal Government should push strongly for equal competitive conditions (i.e. a level playing field) for German and Chinese companies in direct investment.
- The Commission of Experts supports the BMWi's plans to examine corporate takeovers by foreign investors more thoroughly in the field of sensitive technologies. The areas of technology to be included here should be announced first. In addition, clear and transparent auditing criteria need be developed. This should be coordinated with the ongoing European efforts to establish a framework for reviewing foreign direct investment.

Shape scientific cooperation with China for mutual benefit

Science in China serves the political and economic goals of the government. For this reason, German actors involved in scientific cooperation with China are in need of appropriate information and awareness raising in order to ensure benefits on both sides.

- The measures envisaged by the Federal Government to better inform German scientists and make them more aware of the special features of scientific cooperation with China should be intensified and widely disseminated. The dual-use problem, in particular, should be highlighted.
- A central competence centre should be set up to advise German scientists and provide expertise on legal issues relevant to cooperation and research, for example with regard to the protection of intellectual property rights and data. Furthermore, this competence centre should systematically collect and evaluate information on experience and problems with Sino-German cooperation and process it for research and administrative staff at research institutions. The competence centre should also have enough capacity to meet the increased information and consulting needs of SMEs in Sino-German research projects.
- Research and teaching that contribute to the understanding of current political, societal and economic developments in China should be strengthened. In this context, attention should be paid on teaching good Chinese language skills. The current BMBF initiative 'Innovative Concepts for expanding China expertise at German tertiary education institutions' should be further developed, based on sound impact evaluation.
- There should be an intensive and continuous exchange on the framework conditions and prospects of scientific cooperation between Germany and China; this should be coordinated with the European partners. The Commission of Experts recommends that suitable formats for further cooperation should be created soon following the expiry of the BMBF's China Strategy and the termination of the Sino-German Innovation Platform (SGIP).