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China's long-term development goals: a challenge to productivity

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China has two development goals: to be classified as a high-income country by 2025 and to double its economic output by 2035. In order to achieve the first goal, nominal per capita gross national income will need to grow by only 4% per year on average, which can be regarded as realistic. The second goal is more ambitious. Since shifting the growth model away from investment to consumption means the growth contribution of capital will decrease. This will need to be offset by general productivity gains and human capital formation. China's achievements in the high-tech area mask the fact that it generally still needs to catch up on productivity. If China succeeds with its current innovation strategy it is safe to assume that competition in the global market for high-tech and medium-tech goods will intensify for Germany as well.

China will soon reach high-income country status

Up until the second half of the 1990s, China was ranked as a low-income country. Then, it took the country 12 years to leave the status of low middle-income country behind and in 2019 it was only one fifth away from the threshold above which the World Bank would classify it as a high-income country (see Figure 1). The coronavirus crisis of 2020 slowed the further catching-up process but it did not stop it. After all, China was one of the few economies that was able to record annual growth despite the economic impact of the pandemic. With rates of 2.5 and 2.3%, gross national income and real GDP were both above the population growth rate of 0.4% projected by the UN. Per capita incomes have also increased accordingly.

In a speech before the Central Committee 2020, President Xi Jinping proposed two growth targets:

– Achieving high-income country status by the end of the 14th five-year plan (2021–2025),

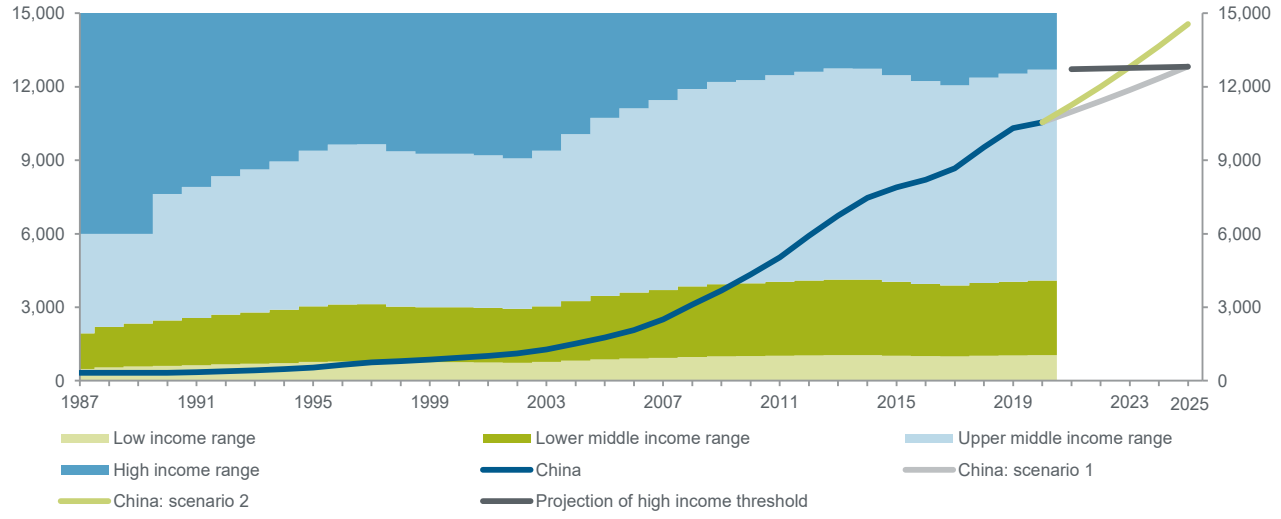
– Doubling economic output or per-capita income by 2035.[1]

Achieving high-income country status by 2025 is definitely a realistic target (see Figure 1). This presupposes that the high-income threshold used by the World Bank in the classification of countries will grow only minimally, as it has on average during the years 2012 to 2020. If gross national income per capita grows as strongly in the coming years as it did on average during the years 2015 to 2019, China would be classified as a high-income country already in 2023. In order to achieve this target exactly in 2025, China needs to grow by an average rate of only 4% per year.

However, it has to be considered that even if it achieves high-income country status, China's prosperity level will still remain well behind that of the industrialised countries and

Figure 1: Gross national income per capita

In US dollars, Atlas method



Note: Projection 1 assumes 4% annual growth in gross national income per capita between the years 2021 and 2025.
Projection 2 assumes 6.7% annual growth in per capita gross national income during the period under observation.
The World Bank converted the currency to US dollars using the Atlas method. It evens out exchange-rate fluctuations by using a moving three-year average and a price-adjusted conversion factor.

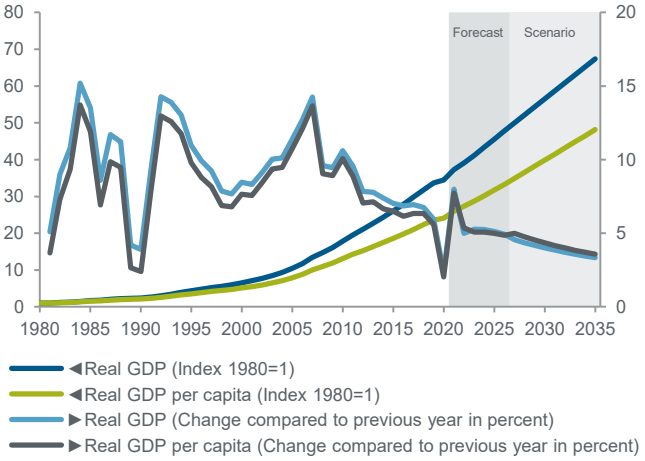
Sources: World Bank, KfW Research.

particularly the US, a frequently used benchmark. In 2019, per-capita gross national income in US dollars was only around 15% of the US average and 26% of the OECD average. Even if it is adjusted by purchasing power, it rises only to 25 and 35%. Even assuming China's continued growth, this substantial gap will be reduced only marginally.

Doubling economic output is a more ambitious goal

At first glance, doubling economic output by 2035 appears to be possible as well. After all, this can also be achieved even if real gross domestic product grows more slowly from year to year (see Figure 2). From the year 2022, which will remain characterised by catching-up effects from the coronavirus crisis, up to 2026 the IMF predicts that growth rates will slow from 5.6 to 4.9%. Thereafter, annual growth rates will be necessary that will slow from 4.6% in 2027 to 3.3% in 2035. This is in alignment with efforts to transform China's growth model. Shifting economic activity away from the strong focus on exports and investment to a greater prioritisation of domestic consumption and the services sector has already resulted in slower growth rates. To be sure, this process was interrupted by the coronavirus crisis because the recovery from the economic slump in the first quarter of 2020 was quicker for capital expenditure than for consumption.[2]

Figure 2: Projection of China's real economic development up to 2035



Note: Forecasts up to 2026.

Sources: IMF, KfW Research.

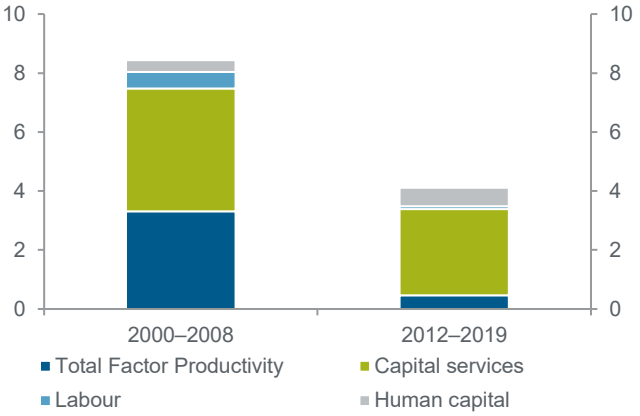
Another factor that contributed to this was that part of the economic support was in the form of public investment and that state-owned enterprises greatly expanded their fixed capital expenditure in the second quarter of 2020.[3] But China's structural transition towards consumption and services is likely to continue in the coming years even if the innovation initiatives are heavily focused on the manufacturing industry.

Even declining growth rates must also be achieved, however. Therefore, it is worthwhile taking a closer look at the individual sources of economic growth.[4] To this end, we distinguish two different periods. The years 2000 to 2008 were characterised by China's integration into international value chains after the country joined the World Trade Organisation in 2001. During this period it achieved very high average real gross domestic product growth rates of 10% per year. After the recovery from the global economic and financial crisis and up to the coronavirus crisis (2012 to 2019), the average annual growth rate was just 7%.

In both periods, capital services[5] contributed most to growth, even if their growth contribution was lower in the second period (see Figure 3). This illustrates once again how heavily the Chinese growth model is based on the expansion of capital stock. Even after the start of the readjustment of the growth strategy with the 12th five-year plan (2011–2015)[6], capital has continued to play the dominant role for growth.

Figure 3: Growth accounting for China's gross domestic product

Average growth contributions of the components in percentage points



Note: Economic output is measured in constant US dollars so that the average real GDP growth rate was around 8.5% between 2000 and 2008 and around 4.1% between 2012 and 2019. The price-adjusted growth of economic output based on national currency results in the higher growth rates referred to in the text.

Sources: Feenstra, R. C., Inklaar, R. and Timmer, M. P. (2015), 'The Next Generation of the Penn World Table', American Economic Review, 105 (10), 3150–3182, available for download at www.ggdc.net/pwt, KfW Research.

Compared with capital, labour – as a combination of the number of employed persons and hours worked – makes only a low contribution to growth which fell again in the period from 2013 to 2019. The average increase in labour input has dropped from year to year already since the beginning of the 1970s. After 2015, working hours per worker have been nearly constant.

For the factor labour in particular, in addition to direct labour quantity it must be considered that the quality of labour input also plays a role. The skills and abilities of workers embodied in human capital made a higher contribution to the growth of economic output in the period from 2012 to 2019 than in the 2000s. China's good performance in the PISA studies[7] and the expansion of tertiary education[8] underscore this development.

After the global economic and financial crisis, overall productivity growth has declined in China, as it has worldwide. While technical progress in China still contributed 3.3 percentage

points annually to GDP growth in the 2000s, that contribution has averaged a mere 0.5 percentage points after the global economic and financial crisis. The decline in productivity was even more pronounced than at global level, which can be attributed to China-specific factors such as the limited entry of productive manufacturing enterprises to the market and the insufficient reallocation of resources to highly productive enterprises.[9] Other factors were the infrastructure and real estate investment undertaken as part of the policy response to the economic and financial crisis, which typically have lower efficiency.

Capital: high investment rate, low capital intensity and excess capacity

The great importance of capital as a source of growth is reflected in the contribution of gross fixed capital formation to economic growth. It was 4.1 percentage points annually between 1978 and 2010 but still 2.9 percentage points annually between 2011 and 2020. This is also reflected in the investment to gross domestic product ratio. If this ratio is calculated on the basis of gross fixed capital formation, it was 29% in 1980, peaked at 44% in 2013 and decreased to 42% at the current margin in 2020.[10] Over the same period, the investment ratio across the average of the OECD countries did not climb above the 25% mark – with the exception of the first year (see Figure 4).

Despite the high investment ratio, capital intensity – capital stock per worker – remains low in an international comparison. The data of the Penn World Tables shows that China is not just below the global average but also very significantly below the OECD average (see Figure 5). The gap is primarily in the private sector, and although capital stock has grown strongly here it remains substantially below that of industrialised countries.[11] For public sector capital stock, on the other hand, China has already reached the OECD range. But as capital stock continues to grow, it becomes increasingly difficult to generate investment-driven growth. This is particularly clear from the rates of return of infrastructure investment and residential construction.[12]

Figure 4: Investment ratio

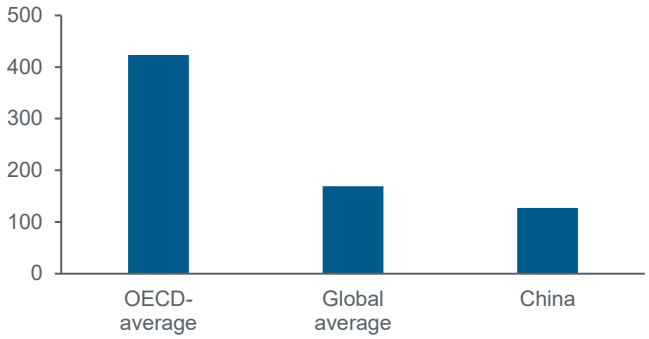
Gross fixed capital formation as a percentage of GDP

Sources: World Bank, KfW Research.

At the same time, various industries are experiencing excess capacity, which was also built up by (state-directed) investment.[13] In particular, this excess capacity came into focus in the coal, steel, aluminium and solar industries, as it has an effect on global markets. However, other industries are also affected.[14] Plans aimed at reducing this excess capacity have been pursued as part of supply-side structural reforms ever since 2015.[15] In April 2018 it was announced that excess capacity was to be reduced by having zombie enterprises leave the market. [16] A proposal from June 2019 pursues the same approach – to improve the mechanism for market exits.[17] Thus, the government has begun to tolerate defaults on bonds from both private and public enterprises in order to strengthen market forces and improve capital allocation.

Figure 5: Capital intensity

Capital stock in thousands 2017 USD and nominal purchasing power parities / employees, 2019, 175 countries.



Sources: Feenstra, R. C., Inklaar, R. and Timmer, M. P. (2015), ‚The Next Generation of the Penn World Table', American Economic Review, 105(10), 3150–3182, available for download at www.ggdc.net/pwt, KfW Research.

But moving away from investment as a growth engine is more easily said than done. After all, during the coronavirus crisis, too, China has again employed the instrument of infrastructure investment even for new and not just traditional infrastructure.[18] Increased infrastructure investment also appears to be the response to the current growth slowdown.[19]

Workforce: population ageing vs. level of education

To determine the growth contribution of the production factor labour, the first thing to look at is the amount of labour that goes into production. Population ageing is highly relevant for China as well. The UN estimates that the working-age population aged between 15 and 64 years in China fell for the first time in 2016 (see Figure 6). The most recent reports of the Chinese Bureau of Statistics show that declines were recorded already since 2014 and were steeper than reported by the UN to date. The increasing shift away from the one-child policy up to the approval of a third child are hardly expected to result in any substantial changes.[20] This is because the decline in fertility began even before the introduction of the one-child policy – also supported by the promotion of later marriage and fewer children – and can generally be observed where prosperity levels rise.[21]

Responses to the loss of labour input can generally address the number of employable persons or the number of hours they spend working:

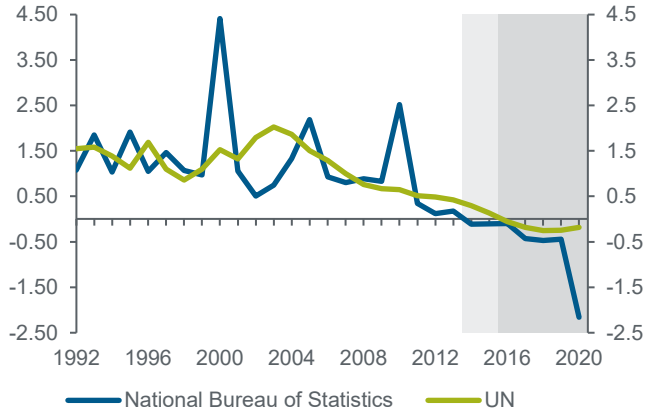
– Labour market participation is already quite high in international comparison. According to the ILO, in 2019 it was 76% among 15 to 64-year-olds in China and 73% in the OECD (men: China 83%, OECD: 80%; women: China 69%, OECD 65%). A further increase therefore appears to hold little promise.

– According to the ILO's calculations, the average weekly working time based on the number of 15 to 64-year-olds in China is 34 hours. This is higher than the global average of 27 hours, as well as the average of higher middle-income countries (30 hours) and high-income countries (28 hours). This, too, suggests little potential for a extensive expansion of labour input.

– The pension age is 60 years for men, 50 years for female blue-collar workers and 55 years for white-collar workers, allowing early retirement for specific groups of persons.[22] As early retirement is widespread, the average retirement age is 54 years.[23] The thresholds were established in the 1950s and are based on the life expectancy and socio-economic conditions prevailing at the time and are well below the OECD average.[24] Accordingly, raising the retirement age offers potential for increasing labour input.

Figure 6: Population aged between 15 and 64 years

Annual growth rate in per cent.



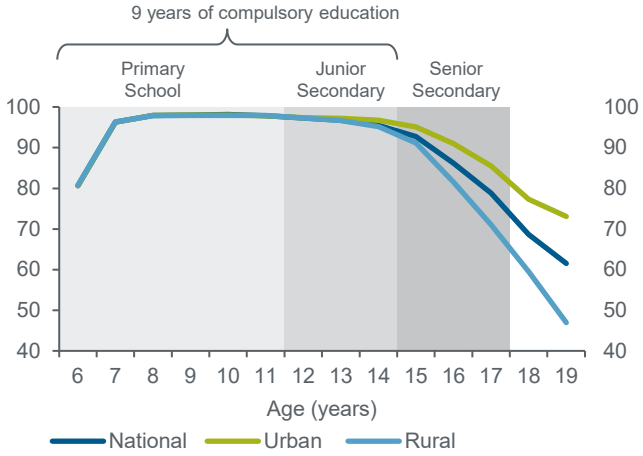
Sources: CEIC, UNCTAD, KfW Research.

Already in recent decades, the contribution of labour quantity had little significance for growth and will tend to become a liability rather than a driver in the future. Furthermore, the gradual increase of the pension age that has been decided will take long to have an impact.[25]

The second option, which addresses labour input, is to improve its quality. This would further increase the contribution of human capital to economic growth. China has made great progress in education and achieved nearly universal access to primary and lower secondary school education. In the subjects of mathematics, science and literacy, the four provinces participating in the PISA study (Peking, Shanghai, Jiangsu und Zhejiang)[26] clearly scored higher than other high-performance countries. However, the urban-rural divide is wider than in other high-performance countries.[27] This is also visible in the school attendance rate after the end of compulsory education (see Figure 7).

Figure 7: School attendance rate of children and teenagers

In per cent.



Compulsory schooling usually begins at the age of six, but in some areas not until seven years, which explains the low rate among six-year-olds.

Source: UNICEF, National Bureau of Statistics of China, UNFPA (2015), Population Status of Children in China in 2015. Facts and Figures, p. 14.

There is also upside potential in early childhood education and care in China. The ECEC enrolment rate for children under the age of three is estimated at less than 10%, while it averages 33% in the OECD countries. Chinese parents and society at large both value vocational training qualifications in higher secondary schooling less than general tertiary education degrees.

High share of high technology, low productivity

The decline in total factor productivity following the economic and financial crisis is a phenomenon that was evident around the world. The decline in China was the result of global influencing factors as well as country-specific developments. Thus, at the beginning of the global economic and financial crisis in 2008, China's productivity gains were determined not just by improvements within the sectors but by the reallocation of resources away from agriculture to more productive industrial and services sectors. The reallocation from inefficient state-owned enterprises to more productive private enterprises was also of significance, however.[28] The subsequent decline in productivity in manufacturing was caused by a lack of market entries and exits of enterprises and a lack of reallocation from inefficient to efficient enterprises. The reform-induced convergence of state-owned enterprises towards the efficiency level of the private sector also came to a halt.

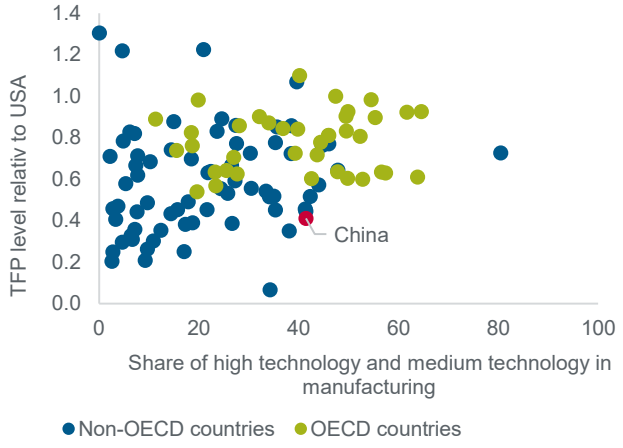
In industrial countries the reallocation of resources towards more efficient enterprises constitutes the main source of productivity growth. In this regard, China would have potential to grow more strongly. The defaults on bonds by both private and public sector enterprises which have been permitted

since 2018 could definitely be rated as a sign that market forces are being given a stronger role in this area.

In general terms, however, China is pursuing the approach of aiming for productivity gains by strengthening innovation activity, even if the correlation between the two is not very robust.[29] This has been occurring under the Medium- and Long-Term Program for Science and Technology Development since 2006. The 13th and the current 14th five-year plan also emphasise the importance of research and development as well as innovation. Most recently, a 32-point vision was published according to which productivity is to be strengthened through industrial modernisation, further urbanisation and reforms.[30]

After all, China has already achieved the OECD level for the importance of high and medium technology in manufacturing (see Figure 8). In particular, achievements in e-commerce, FinTechs, high-speed trains, renewable energy and electric vehicles deserve to be emphasised. At the same time, total factor productivity is below OECD level and weak innovative capacity as well as low technological intensity and general efficiency have been noted even for high technology industrial sectors.

Figure 8: Productivity level and importance of high-technology sectors

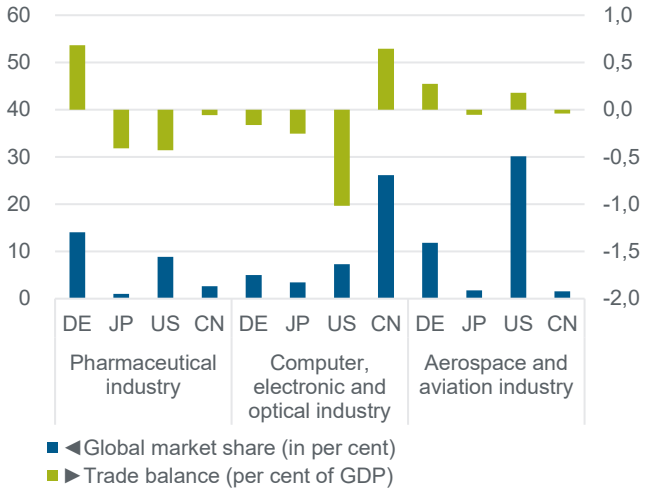


Sources: Feenstra, R. C., Inklaar, R. and Timmer, M. P. (2015), ‚The Next Generation of the Penn World Table', American Economic Review, 105(10), 3150–3182, available for download at www.ggdc.net/pwt, Weltbank, KfW Research.

A major indicator of innovation input is expenditure on research and development (R&D). In 2019, China was below the OECD average of 2.5%, with 2.2% of GDP, while Germany recorded a significantly higher 3.2%.[31] At the same time, in China the greatest portion of this – 83% – goes into experimental R&D, the most intensely applied area. That is the highest percentage compared with the 36 countries for which data is available, with the average being around 64%.

The heavy orientation towards application and strong sector focus are also evident in foreign trade. China has a significant trade surplus in computers and electronic devices. This is also associated with a substantial global market share (see Figure 9).

Figure 9: Trade balance and global market share of selected industries



Sources: OECD, KfW Research.

In other sectors such as pharmaceuticals, on the other hand, the balance is negative. And in general, the dependence on imported high-technology products – with the exception of computers and telecommunications devices – remains, where imports of such goods exceed exports.[32]

China therefore still needs to enhance its capacity in basic technologies. But this definitely does not mean that China's innovative capacity should be underestimated. The country is the number one higher middle-income country on the global innovation ranking, far ahead of all others. This ranking is higher than what would be in line with its level of development and rank 12 globally.[33] In an international comparison, China is particularly strong in the generation and diffusion of knowledge.

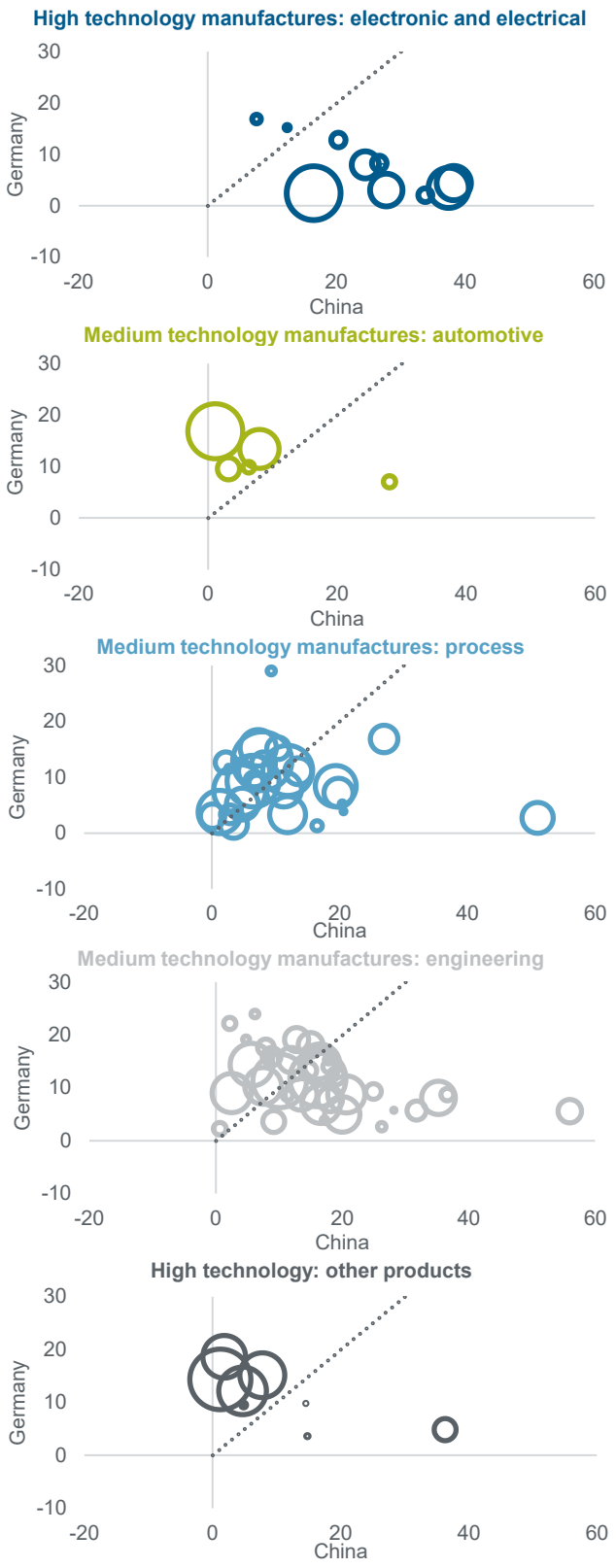
Technological leadership would change export structure further

China has added 43 new goods to its export portfolio since 2003 and over the past years its export growth has been driven primarily by electronics, electrical machinery and devices and industrial machinery.[34] The greater diversification of exports has now allowed the country to rise to 18th rank on the Economic Complexity Index (ECI).

Overall, China exports goods from all sectors with high productivity and its global market share of high and medium technology goods grew by two percentage points to 17% between 2016 and 2020. By comparison, Germany's global market share of these goods is 10%, one percentage point lower than five years ago. Compared with Germany, China is particularly strong in the segment of electronic and electrical goods (see Figure 10). Germany, in turn, has an advantage in motor vehicles and vehicle parts as well as other high technology goods such as, among others, pharmaceutical products, aircraft and spacecraft and optical instruments and devices. Both countries have relatively similar global market shares in many categories of mechanical engineering and process manufactures[35].

Figure 10: Exports of high medium technology products

Global market shares without respective target country China and Germany in per cent, size of circles: global export value in 2019



Other products: (veterinary) medicines, pharmaceuticals, turbines, aircraft and spacecraft, optical instruments, measuring, analysis and inspection devices, photographic equipment.

Sources: UNCTAD, KfW Research.

Another consequence is increased competition between European and Chinese exporters, for example in Latin American target markets, particularly in the areas of electrical machinery and motor vehicles.[36] The quality of export goods used to make a difference, with industrialised countries performing better. The competitive pressure from the identical export structure of the countries therefore fell into perspective when the vertical value chain links were included in the assessment. In principle, technological progress and productivity gains can shift the comparative advantages between countries.[37]

If China modifies its production structure and becomes more active in more highly productive economic sectors, that has the potential to redistribute the flow of trading profits from industrialised countries such as Germany to China, which would then also have negative effects on per-capita income in Germany.

Among other things, the segment of industrial machinery along with optical and medical equipment has been identified as a potential starting point for China's further export diversification.[38] Germany has an above-average share of global exports in many categories of machinery and equipment. This applies in particular to printing and bookbinding machines and machine tools for the removal of all kinds of materials. For some of these products, China's global market share is also above average already. Looking ahead, if China opts to not focus solely on technologies of the future, more competition from China can probably be expected in these areas too, merely because of the path dependency of development. [39] For optical instruments and devices, however, China already has a strong comparative advantage over Germany.

Outlook

The Chinese economy had initially recovered swiftly from the coronavirus crisis and was one of the few major economies to achieve a positive growth rate in the year 2020. That prompted policymakers to roll back economic stimulus measures and swiftly resume the fight against financial vulnerabilities. In addition to the described longer-term growth targets, they are also seeking to establish a more equitable distribution of wealth and achieve climate action and environmental targets.

In other words, the list of reform and regulatory projects is long. So it is perfectly plausible to expect friction in their implementation. The approach taken by China's economic policymakers to more strongly regulate the construction and real estate sector is therefore also being watched closely at international level. After all, major policy mistakes in this area could create substantial international spillover effects. A further current trend is that the strict implementation of emission thresholds and energy consumption targets – in combination with energy shortages – has led to energy rationing in energy-intensive sectors. These include, among others, steel and, more broadly, metal production, cement production and textile production, where China commands significant global

market shares. It is to be expected that this will additionally disrupt already strained international value chains.

The goal of promoting the development of domestic technology will also have international ramifications. From the perspective of China's policymakers, technological leadership is expressed by setting standards.[40] The research project China Standards 2035 formulates the recommendation of developing a Chinese standardisation strategy with one standard of national relevance and another standard of global relevance. Stronger influence on international standardisation can therefore be expected, which is likely to favour demand for Chinese technologies.[41] These aspirations are reflected in, for example, the emergence of new market players from China with declarations of patent families for 5G technology.[42] It is possible that these patent declarations will lead to such patents, which would then have to be used and applied in the implementation of the 5G standard.

As capital will likely contribute increasingly less to economic growth in coming years, it will be necessary to achieve productivity gains and, consequently, upgrade the skills and abilities of workers. In the pursuit of this goal, improving the productivity growth rate is a noble undertaking. China is currently focusing on achieving this through state guidelines and regulations on technological development and innovation activity, including the automation of factories and the development of urban mega-clusters.[43] What also needs to be considered, however, is that innovation and technological diffusion are also necessary outside the high-technology manufacturing domain to drive forward productivity growth across the economy as a whole. Complementary reforms to support competition and improve the allocation of resources are further starting points for improving overall production efficiency.

Irrespective of whether China succeeds in speeding up overall productivity growth, it will continue to sell its products in the global market. The heavy emphasis on selected technologies and the promotion of innovative activity under the current direction of China's economic policy suggest that the country will expand its exports in high and medium technology – at least in selected segments. This is relevant for countries such as Germany, especially in areas in which it has had a comparative advantage so far, or in which comparable market shares indicate that international competition has not yet chosen a clear winner. German enterprises also have to rely on the framework set by policymakers in order to be able to face up to this increased competition. This applies on the one hand to supporting innovation in Germany and on the other hand - with all the associated difficulties - to working toward a level playing field internationally.

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