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Chinese Economic and Trade Challenges to the West: Prospects and Consequences from a U.S.-German Perspective

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Introduction

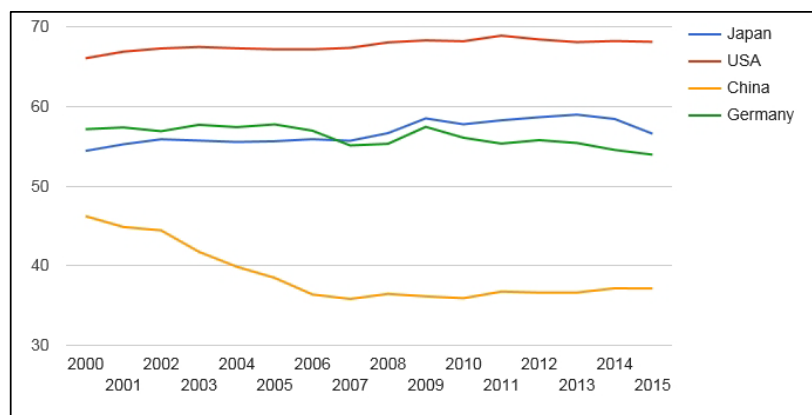
Over the past 60 years Germany has built one of the strongest and most durable economies in the world. After the seminal event of German Unification, it has rebuilt the Eastern sector and integrated it into the economic structures of the industrialized West, albeit at a steep price. After weathering the storm of the Great Recession, it has regained its footing and established a solid growth path. Its economy is a pillar of the Eurozone and the European Union (EU). The backbone of the German miracle is manufacturing, a technologically sophisticated leader in the goods sector, which is symbolized by strong balances of trade over recent decades. German workers are among the best trained in the world. The German social contract has established one of the most harmonious traditions in the industrialized world of cooperation among labor, companies, and government.

Despite the success of the German economy, there remain certain imbalances and weaknesses in its economy and its trade with the rest of the EU and the world. Among these are over reliance on traditional manufacturing, a slow pace of investment, weak internal demand, slow growth in wages, an inefficient services sector, lack of success in some areas of the emerging digital economy, and a large imbalance in the current account (due to trade in goods) that is unsustainable in the long run. Added to and potentially exacerbating some of these problems is the challenge presented by the rising Chinese economic superpower. China's ambitions are aimed clearly at new competition in the manufacturing and high technology sectors, and in winning greater global market share in many logistical, materials, industrial process, and digital services sectors related to the goods sector. China is at an early stage of its advanced technology challenge, but better understanding of this challenge and the means to address it are needed not only in Germany but in other industrialized nations as well. This paper outlines the challenge and suggests some ways to address it in a constructive and cooperative way.

The Structure of the Germany Economy

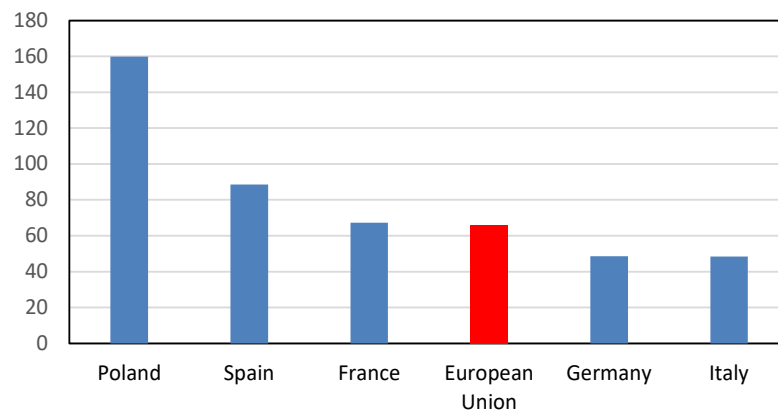
Germany has built one of the world's strongest economies largely on the strength of its manufacturing sector. While most other industrialized economies have seen a shrinking share of their economies in manufacturing, Germany has held a steady proportion of around 23 percent of total GDP since German unification lowered their rate from the upper twenties in 1991.ⁱ The comparable U.S. number is around 12-13 percent. German productivity overall, measured as output per hour worked, is comparable to that of the United States and France, and higher than that of other industrialized nations.ⁱⁱ As we shall see, this achievement is entirely due to the industrial sector. GDP per capita, measured on a purchasing power parity basis, is around \$48,000 per person, ranked 31st in the world. Germans work fewer hours than the Americans or British, which is one reason for somewhat lower output per person. Germany has an aging population, with a median age of 47 years, the third oldest in the world. Its population is declining, although the workforce remains stable.ⁱⁱⁱ Overall economic growth has remained below 2 percent of GDP, higher than other nations in the Eurozone but below that of the United States and the United Kingdom and well below China.

Germany has maintained a high rate of savings over many years, including personal, corporate, and government savings, and a relatively low rate of investment and consumption. Consumption in Germany at the household level is around 55 percent of GDP, below that of other nations, including slow growing and aging Japan, and well below that of the United States, as shown in Figure 1.



Source: TheGlobalEconomy.com, World Bank

Figure 1. Household Consumption as Percent of GDP.



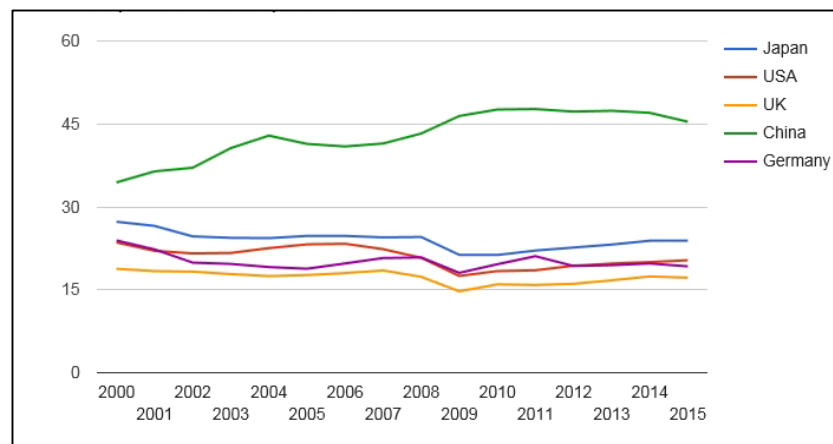
Source: *World Development Indicators*, World Bank

Figure 2. Growth in Consumer Spending, 1999-2016 (percent).

China is the outlier with well below 50 percent of GDP, which is one reason for its persistent trade surplus. More worrisome from an economic perspective are the patterns of consumption around the world, as shown in Figure 2. The growth rate of consumer spending in Germany has lagged that of many other European Community members. This lag may be explained by longstanding cultural norms in Germany, which tend to value savings and discourage debt, and perhaps too by the relative changes in purchasing power of Eurozone participants.

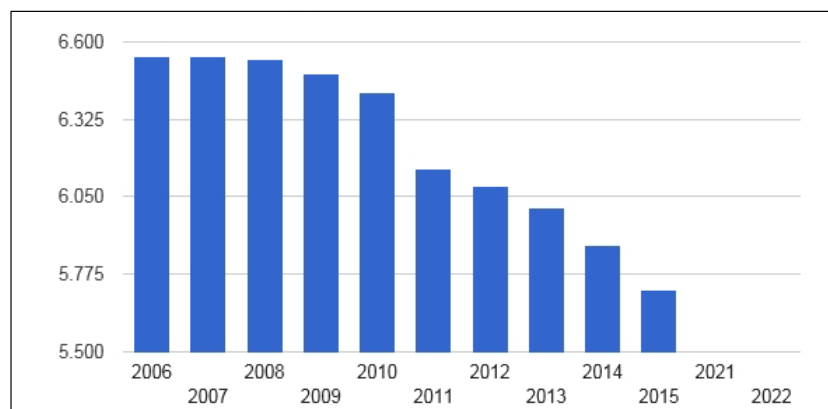
Another contributor to this phenomenon, however, is restrained wage growth in Germany during the Eurozone period. Real wages actually declined in the 2004-2008 period and grew little between the 1990s and the great recession. The Hartz reforms certainly helped enhance global competitiveness in Germany, including both for the Eurozone nations and other trading partners, but the wage earner has paid some price for this.^{iv} The total share of national income accruing to labor fell from 65 percent to around 60 percent in recent decades.^v

German capital investment, including public and private sectors, is static as a proportion of GDP and remains lower than that of China and other rising East Asian countries such as South Korea. It lags that of Japan and the United States as well as Figure 3 shows. Gross capital investment has actually declined in dollar terms since peaking just before the Great Recession. While Germany is justly famed for its transportation infrastructure, declining government investment has harmed this vital sector when accounting for depreciation of assets, and net investment has been negative in recent years for infrastructure. Figure 4 shows the decline in quality of roads, as measured by the World Economic Forum. Similar charts chronicle steady declines in the quality (and comparative world rankings) of railroads, air transport and port infrastructure. Germany still ranks in the top 20 countries in these measures, but its position is slipping, which may have consequences for the overall economy.



Source: TheGlobalEconomy.com, World Bank

Figure 3. Capital Investment as Percent of GDP.



Source: TheGlobalEconomy.com, World Bank

Figure 4. German Roads Quality.

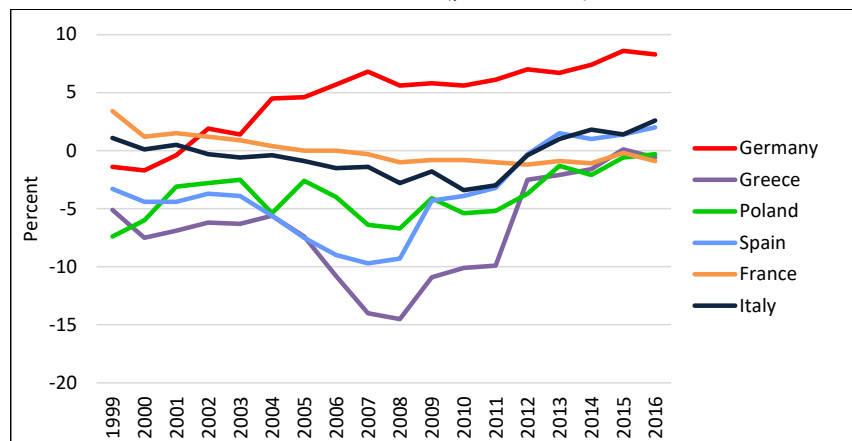
Apart from advanced manufacturing sectors such as autos and machinery in which Germany remains a world leader, the country lags in high technology industries. Only one German company, SAP, ranks in the top 10 of United Nations Conference on Trade and Development's list of the world's top technology companies. The International Institute for Management and Development's (IMD) world competitiveness rankings put Germany in the 17th position in the digital economy, lower than its overall 13th place ranking, and comments that Germans "are not the first movers.... They are not as willing to jump on the next newest thing." McKinsey Global undertook a study concluding that Germany has achieved only 10 percent of its digital potential, compared to 18 percent for the United States.^{vi} A measure of internet bandwidth available in Germany ranks it below the Eurozone average and 19th in the world. Although Germany ranks fifth in the world (behind China, the United States, Japan, and South Korea) in annual patent applications, its numbers have been falling since 2000.

Germany does rank at the top of world lists for high technology exports, mostly in manufactured goods such as automobiles, machinery, scientific equipment, and pharmaceuticals. But it is not a leader in advanced digital technologies, the advanced process and services emerging as the Internet of Things, and smart manufacturing.

Germany's vaunted "Industrie 4.0" initiative is designed to help move its manufacturing industry to the next stage of innovation, but its \$200 million in support is at least 100 times smaller than growing Chinese investment in advanced technology industries.^{vii} We will explore this more fully and look at specific industrialized sectors in the next section. We note here only that the "Industrie 4.0" program is narrowly focused on what Germany has traditionally done best, which is produce high quality manufactured goods.^{viii} It does relatively little, and with little funding, for newer sectors and processes, including semiconductors, advanced computing, artificial intelligence, cloud computing, 5G telecommunications, and software for cyber security, all of which are being intensively developed in the United States, the Pacific Rim industrial powers, and China. It also pays scant attention to the affiliated services sector which is an increasing source of profits as the industrial sector is becoming more connected and digitized. In a Harvard study on digital readiness Germany was placed in the "stalling out" category, suggesting stagnation across four measures of readiness.^{ix}

Indeed, the entire services sector is a weak point in the German economy and has been for decades as attention was concentrated on manufacturing. Although it represents about 69 percent of the economy, it lags many countries in efficiency and quality.

In a summary article in 2012, *The Economist* boldly stated that "Germany's manufacturing juggernaut sits alongside puny services."^x Analysts often note the high level of regulation of the services sector. In 2017 the European Commission noted in its annual assessment of Germany's stability program: "High regulatory barriers remain in the business services sector and regulated professions."^{xi} One study estimates that if Germany were to have the same level of services regulation as "the most liberal countries"



Source: World Development Indicators, World Bank DataBank

Figure 5. Current Account Balances (percent GDP).

it could raise national productivity by 1 percent per year over 10 years, likely raising potential GDP growth by an equal factor. German banking tends to be very conservative and lacks cutting edge innovation.^{xii} And the venture capital industry in Germany is also weak. The Heritage Foundation's annual index of investment freedom puts Germany in 34th place, which may in part be due to the under-performing banking and venture capital businesses.^{xiii} Trade in services is not nearly as dynamic as the goods sector in Germany, and the country runs a chronic trade deficit (reaching \$25 billion last year) in this part of the economy.

Table 1. Top Ten German Exports and Imports with China (Thousands of USD)

	Exports Industry	Export Value	% Share German Exports	Import Industry	Import Value	% Share German Imports
1.	Vehicles	22,097,807	9.04%	Electrical machinery and equipment	31,041,336	23.50%
2.	Machinery, mechanical appliances, nuclear reactors, boilers	16,830,760	7.54%	Machinery, mechanical appliances, nuclear reactors, boilers	23,307,699	17.04%
3.	Electrical machinery and equipment	12,610,950	9.16%	Apparel and clothing (not knitted or crocheted)	4,790,468	27.12%
4.	Optical, photographic, cinematographic	6,835,490	10.47%	Furniture, bedding, mattresses	4,164,893	20.46%
5.	Aircraft, spacecraft	4,557,102	10.23%	Apparel and clothing (knitted or crocheted)	4,058,896	23.07%
6.	Pharmaceuticals	2,598,106	3.37%	Optical, photographic, cinematographic	3,397,488	8.89%
7.	Plastics	2,570,484	4.14%	Toys, games and sports	2,909,088	43.55%
8.	Commodities not elsewhere specified	1,757,231	8.90%	Footwear	2,762,236	24.60%
9.	Iron or steel	1,574,386	7.26%	Plastics	2,377,679	5.90%
10.	Organic chemicals	111,562	0.44%	Organic chemicals	2,318,396	7.63%

Source: International Trade Centre Trade Map, "List of Supplying Markets for a Product Imported by Germany," TradeMap.org

German foreign trade reflects many of the strengths and weaknesses in its economy. Table 1 lists Germany's top 10 exports and imports to and from China. Sitting astride the list is the powerful German automobile and machinery sectors, other heavy machinery, scientific equipment, pharmaceuticals, and chemicals. The importance of the Chinese market is apparent in the high value of goods being sent to China. These have been the strength of the German economy starting in the 19th century and constantly improving since then. The import categories show growing competition in many of these industries. Services are not a major factor, including fees from licensing in intellectual property

which are an indicator of strength in newer high technology sectors. Nor are semiconductors or telecommunications equipment represented in the top 10.

For most of the postwar period Germany has maintained a robust trade surplus with the rest of the world, led by the industrial sector. The surplus has been around 8 percent of GDP in the last three years. Germany maintains a large surplus with the United States, as President Trump has famously noted. It also has a sizable surplus with the rest of the EU, France, the United Kingdom, and Spain. Trade is growing with the Visegrád nations as Germany increasingly relies on these nations' lower costs to remain competitive in autos and machinery production.^{xiv} Figure 5 shows the evolution of trade balances in Europe since the origins of the Eurozone, highlighting the growing German positive balance.

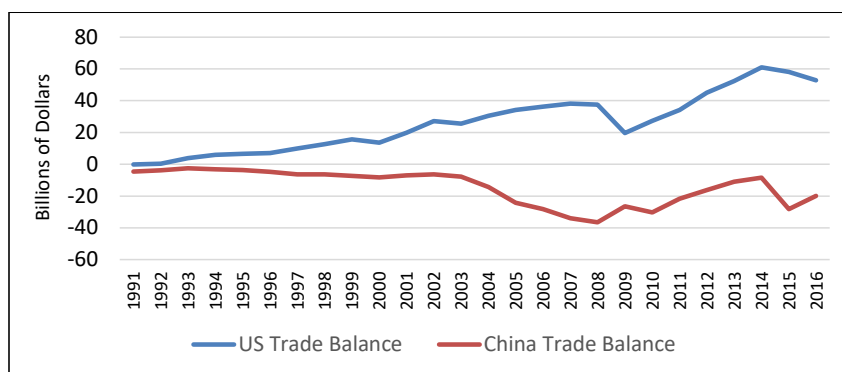
Table 2. EU Trade Balance with China for Past 10 Years

Year	EU Imports	EU Exports	EU Trade Balance
2016	344,911	169,686	-\$175,225.00
2015	350,846	170,357	-\$180,489.00
2014	302,518	164,623	-\$137,895.00
2013	280,151	148,115	-\$132,036.00
2012	292,122	144,227	-\$147,895.00
2011	295,055	136,415	-\$158,640.00
2010	283,931	113,454	-\$170,477.00
2009	215,274	82,421	-\$132,853.00
2008	249,102	78,301	-\$170,801.00
2007	233,863	71,823	-\$162,040.00

Source: EU Directorate General for Trade

Of particular importance is the growing role of China in Germany's trade. China is playing an increasingly important role in global trade, especially in manufactures. Table 2 shows the growth of trade, and the growth of the Chinese trade surplus, with the EU over the past 10 years. Chinese competition is especially important for Germany, given its reliance on manufactures trade. In 2017 China became Germany's biggest bilateral trading partner, bypassing the United States. Total Sino-German trade grew from \$97 billion in 2006 to \$190 billion in 2016 and continues to grow. Table 1 provided the 10 largest German exports to and imports from China. In 2016 China imported 9 percent of German exports of vehicles (in addition to its cars produced in China), 9 percent of electrical machinery, 10 percent of scientific equipment, and 10 percent of aerospace equipment.

Figure 6 shows Germany's growing trade deficit with China, contrasted with its surplus with the United States.



Source: TheGlobalEconomy.com, World Bank

Figure 6. German Trade Balances 2007-2016 (billions of USD).

Details on auto trade are revealing of recent trends. As the next section will explain, China increasingly insists on localizing production in its territory in order to access its markets. Global automakers have long used a strategy of local production in any case. The Chinese auto market is now by far the largest in the world at 28 million units last year. Volkswagen (VW) sold almost four million vehicles in China in 2016, most of them made in China. Mercedes Benz sold 473 thousand cars in China and BMW around 517 thousand. Audi registered 571 thousand car sales in China. The three largest German car groups sold more cars in China than in the United States, and China represents about 25 percent of total sales for these groups. Most vehicles are produced locally, but BMW and Mercedes also export to China from their U.S. subsidiaries.^{xv}

The next section will examine more closely the Chinese challenge to Germany, which can be seen as a growing issue simply because of China's growing trade surplus with Germany. But let us note that the sustained and unprecedented German trade surplus with much of the world is in itself a growing problem. This is not simply because of Donald Trump's critique but for other sound macroeconomic reasons. As French economist Thomas Piketty argues:

We must stress the fact that there is quite simply no example in economic history (at least not since the beginning of trade statistics, that is, since the beginning of the 19th century) of a country of this size which has experienced a comparable level of trade surplus on a long-term basis (not even China or Japan which in most instances have not risen above 2-3 percent in trade surplus).

Piketty also notes that the persistence of the surplus is partly due to "the poor foreign investments made by [German] firms and the financial system," thus weakening growth and squandering hard-earned capital.^{xvi}

Of course standard economic theory would emphasize the internal imbalance between investment and savings in Germany as the principle cause of its chronic trade surplus. Low investment is accompanied by relatively low consumption patterns. Anemic wage

growth adds to the problem. In short, the strength of Germany's economy may tend in the long run to weaken it via under-investment not offset by domestic consumption. Apart from the U.S. President's critique (which at least has the merit of understanding that chronic deficits cannot be sustained in the long run, even though bilateral deficits are not the real problem), other members of the Eurozone are harmed by the German surplus. We noted earlier the German trade surplus with the European Community. The solution, as suggested by the European Commission, is macroeconomic in nature, supporting demand and investment, along with regulatory reform in Germany.^{xvii} Some other voices in Europe have argued as well that convergence in the Eurozone can only be accomplished through some of the same policy tools.^{xviii} Convergence is crucial to sustain political support for the Euro, as well as economic vitality throughout the Zone. After reviewing the Chinese challenge, I will suggest that some of the answers to this challenge may parallel certain measures needed to redress the trade surplus with the EU and the United States as well.

The Aggressive New Chinese Economic Plans

China has become the world's leader in exports of goods. While much of its export trade involves less sophisticated goods like textiles and steel, or products assembled from foreign components such as cell phones and computers, its new ambition is to move up the ladder to become a world leader in advanced technology products. The signature program championed by President Xi, the "Made in China 2025" initiative, marks the culmination of a succession of five-year plans.^{xix} The goal of this program is to become mostly self-sufficient and globally dominant in 10 high technology industries of the future by 2025.

While the timetables for each industry may vary, the strategy for each is generally the same. China strives to achieve a high level of dominance in its own huge internal market while soon thereafter also becoming a global leader in the designated industries. The rapidly growing size of the domestic market in China is expected to provide the economies of scale to improve productivity, innovation, and competitiveness. The methods used by the Chinese represent a wide range of tools, many of dubious legality, under the rules of the WTO to which China has agreed and for which President Xi claims to be a champion.^{xx} Perhaps we can call his remarks an introduction to "free trade with Chinese characteristics." For the new policy can only be labeled as mercantilist.^{xxi} The European Chamber of Commerce in China observes:

[T]he broad set of policy tools that are being employed to facilitate [Made in China 2025] are highly problematic. These include subsidies, protectionism, new pressures on foreign business to transfer core technology, the acquisition of companies with advanced technologies in Europe and elsewhere, often with support from state-backed investment funds, and the establishment of ever-larger state-owned enterprises (SOEs) that are being positioned as national champions while their management is often simultaneously politicized.^{xxii}

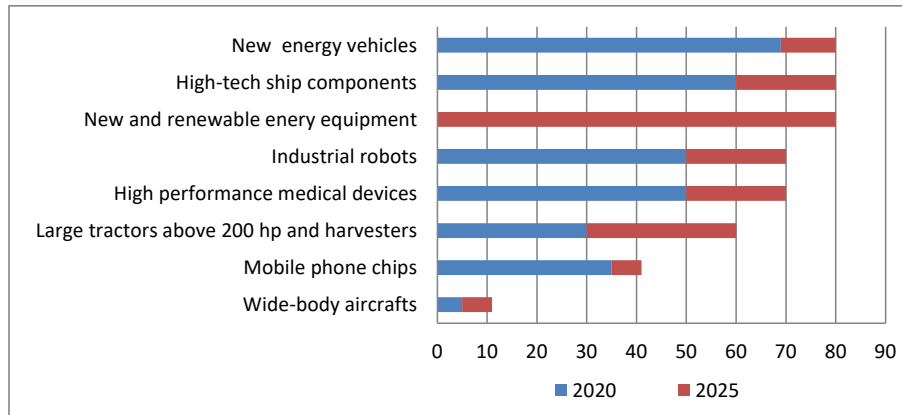
To this list one might add China's turn toward using standard setting, including unique 5G wireless technology, for telecommunications as another tool in its arsenal.^{xxiii} The Mercator Institute for China Studies (MERICS) notes that only around 50 percent of existing Chinese standards in key smart manufacturing sectors conform to global standards, and virtually none do so in cloud computing, big data, and industrial software. China is also trying to impose standards for emerging 5G technology that will be crucial to emerging wireless, big data, and Internet of Things applications.

The 10 areas in which China strives to become dominant are:

1. Next generation information technology
2. High-end numerical control machinery and robotics
3. Aerospace and aviation Equipment
4. Maritime engineering equipment and high-tech maritime vessel manufacturing
5. Advanced digital equipment

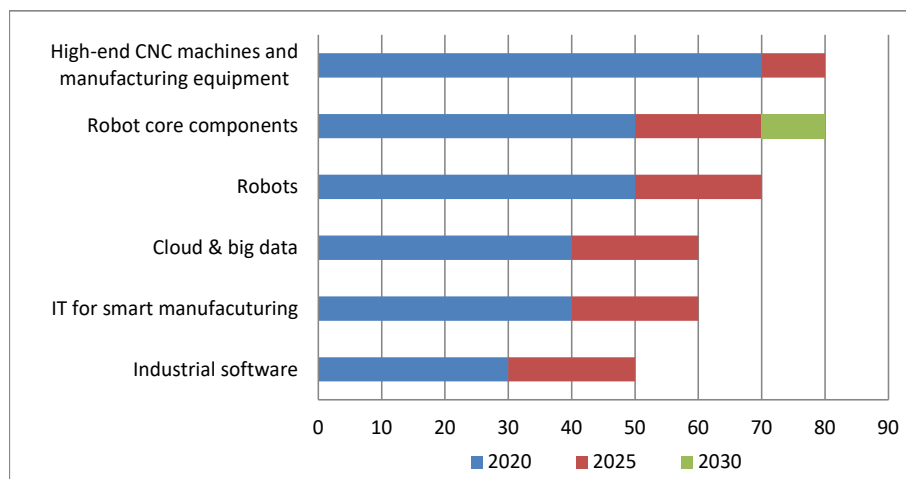
6. Energy savings and new energy vehicles
7. Electrical equipment
8. New materials
9. Bio Medicine and high performance medical devices
10. Agricultural machinery and equipment

Figures 7 and 8 show the targets for Chinese capture of its domestic market for selected industries and longer-term targets for controlling more advanced technology sectors. These industries already encompass about 40 percent of China's entire industrial manufacturing output.^{xxiv} It is worth noting at this point that at least four of these categories (autos, machinery, electrical equipment, and pharmaceuticals) are among Germany's current top exports to China. The first three are Germany's leading exports by value to China (see Table 1).



Sources: Expert Commission for the Construction of a Manufacturing Superpower and MERICS

Figure 7. Made in China 2025 Aims at Substitution. Semi-official targets for the domestic market share of Chinese products (percent).



Sources: Expert Commission for the Construction of a Manufacturing Superpower and MERICS

Figure 8. Made in China 2025: Replacing foreign smart manufacturing technology. Goals for the domestic market share of various Chinese smart manufacturing products (percent).

A focus on a few leading sectors for support show the magnitude of the resources being deployed in China.^{xxv} As of 2016, there were at least 780 “government connected” investment funds with capital, at that time, of \$326 billion, five times larger than any other start-up fund in the world. A \$30 billion fund is targeted specifically at upgrading China’s industrial state-owned enterprises (SOEs). Central government funds are only one source of subsidies, as provincial and city-based support is often larger than the Beijing-controlled funds. In the auto sector, domestic production is protected by a 25 percent tariff wall and a requirement for all foreign markets to enter into joint ventures with no more than 50 percent of capital and a requirement to share core technology with the Chinese partner.^{xxvi} China aims especially to dominate the electric vehicle (EV) market, and has put over \$12 billion in subsidies into this industry.^{xxvii} Chinese automakers are catching up to established global firms in lower end vehicles, although gaps in higher-end vehicles remain. Electric cars represent a somewhat less challenging technological gap than the current generation of high end vehicles.^{xxviii}

The semiconductor industry, which is of great interest to the United States, has received some \$160 billion in combined federal, provincial, and local subsidies. China is aggressively trying to buy European and American semiconductor and related equipment makers to acquire technology, often with “capital injections” from state-controlled funds. Many of the state funds are hidden behind walls of obscure transactions between various state-controlled financial vehicles or SOEs. Robotics and machine tools are also highly favored target industries. China recently succeeded in purchasing one of Germany’s (and the world’s) leading robotics producer, Kuka. It hopes to adapt Kuka’s leading high-end robots to broader commodity-type applications in industrial and services sectors.^{xxix} In addition to government capital subsidies and localization requirements, some indigenous companies benefit from direct operating subsidies, reaching as high as 35 percent of total revenues for some machine tool makers and 12 percent for some robotics firms. The

dynamic of urban areas and regions competing for leadership (and meeting Beijing's five-year targets) in favored industries often leads to vast levels of overcapacity, such as has evolved in the steel industry. If all the planned production facilities in China for robotics industries were built, capacity would exceed projected domestic production by about six times in a few years, leading to inevitable pressure to dump the excess on global markets.

Recent investment patterns also underscore the tactics being deployed for the China 2025 effort. Internally, investments are increasingly targeted at SOEs, and the market share of current investments for these firms is slightly higher than for privately held firms. SOE reform is not advancing. In short, President Xi is tightening control over the economy and enhancing the State's ability to direct advanced technology sectors.^{xxx} Around 50 percent of "pillar industries," which include most of the targeted advanced technology sectors, are controlled by SOEs. Given the well documented inefficiency of these enterprises, this is not an especially good sign for the success of the China 2025 effort. This may be one reason Chinese outbound investment is growing, including to Europe, especially the United Kingdom, and Germany. Advanced manufacturing firms account for one-third of Chinese investment in Europe, including German machine tool manufacturing.^{xxxi} China is also stepping up its venture capital (VC) investing. According to a recent McKinsey study, China has seen a better than 500 percent increase in VC investment, mostly in big data, artificial intelligence, and financial technology. Half of this VC activity in 2014-2016 was outside China.^{xxxii} VC experts often employ the term "unicorns" to designate new startup companies valued at \$1 billion or more. Since 2013 there have been 59 unicorns in China, 12 in the United Kingdom, and only 8 in Germany. The United States is the world leader at 127 unicorns in this period, but China is rapidly closing the gap.^{xxxiii}

In contrast to almost every other industrialized country, manufacturing's share of total employment is rising in China. China scholar Nick Lardy estimates the share at 20 percent, double that of the United States and up from 15 percent in 2002.^{xxxiv} Germany has about the same proportion as China, albeit with a much better trained workforce.

The MERICS study on China 2025 lists Germany, along with its partners in the Visegrád area and South Korea, as the countries most exposed to the challenge of Made in China 2025. It also concludes that China is highly unlikely to meet its interim goals of controlling 70 percent of most of the internal markets for the 10 target industries in China by 2025, let alone be a real force in outside markets in all of them. Quality of the workforce, including scientists and engineers, and gaps in existing technological capabilities are the main impediments to China's goals. Nonetheless, the MERICS study cautions that Germany and other industrialized countries should not be complacent about the challenge and underestimate the determination and financial resources China is devoting to its quest. MERICS does conclude that China is already closing the technology gap in 3D printing, robotics, and industry software. China is also a world leader in electronic payment systems and is closing the gap in telecommunications hardware and software. The U.S. Economic and Security Review Commission also concludes that China is already competitive in artificial intelligence and quantum computing.^{xxxv}

Enhancing this program is the “One Belt, One Road” (OBOR) initiative whose goal is to extend the network of Chinese-dominated commerce and influence further and further to its West. China has already purchased the Port of Piraeus and has major investments in Eastern Europe. It is building transportation networks steadily further West through South and Central Asia and into Eastern Europe. *Washington Post* foreign policy columnist David Ignatius notes that in real dollar terms OBOR is 10 times the scope of the Marshall Plan. OBOR can be viewed as a “force multiplier” for the Made in China 2025 initiative, providing the infrastructure means, the incentives for adopting Chinese standards, and political incentives to extend Chinese economic influence. As Ignatius puts it: “China has a master plan to oust the U.S. as a global superpower—and this time it might work.”^{xxxvi}

America’s recently growing industrial sector, a target of intense concern for the Trump Administration, is equally threatened by China. Not only is the traditional manufacturing sector seeing new competition from China but its advanced technology, advanced services, and strong banking sectors are as challenged as the German industrial sector. Efforts to combat the challenge are well under way in the United States in 2017.

Actions to Address the Chinese Challenge

Constructive actions to counter the growing Chinese threat to German industry—and also China’s challenge to the traditional operation of the WTO—can be divided into two general categories: those that largely involve trade policy, and those that require alteration of domestic economic policy.

Trade policy for Germany is under the purview of the European Commission, but Germany certainly is a leader in formulating policy that involves the industrial sector. Some commentators have asserted that China considers Berlin the principal interlocutor on all European relation matters: “If you want something done in Brussels,’ a Chinese official told us in a recent visit, ‘you go to Berlin.’”^{xxxvii} I would argue, too, that actions within the WTO framework would likely have a much better chance of success if taken in a cooperative, multilateral approach. In a report on a possible new China policy, the European Commission noted that: “A global approach to addressing the underlying causes of over capacity will be essential.”^{xxxviii} There is reason to believe the United States is increasingly willing to work with Europe on matters related to the Chinese economic challenge.^{xxxix} The United States recently announced a new national security strategy which puts a priority on countering China’s attempt “to erode American security and prosperity” through a combination of actions including working “with like-minded partners to preserve and modernize the rules of a fair and reciprocal economic order.”^{xl} Japan has also indicated a growing desire to work with the United States and the EU on addressing concerns with Chinese policy.^{xli} Many official, business, and think tank reports on the multitude of trade issues with China exhibit a surprising degree of convergence.^{xlii} It is also likely that other industrial economies, especially Canada, Australia, and possibly South Korea, would work with the United States and Europe, as well.

The most straightforward way to counter China’s trade policies is enforcement of its existing obligations under its terms of accession to the WTO. Europe and the United States are already working together on China’s demand to be treated as a market economy for purposes of antidumping cases. The United States has been more aggressive in taking such cases to the WTO for steel and aluminum. In the future, as the China 2025 initiative evolves, it may be necessary to move cases involving higher tech industries such as robotics and 3D printing. Better enforcement of rules protecting intellectual property is also urgently needed. Neither Europe nor the United States has been effective in countering the persistent and growing use of subsidies in China. A good place to start would simply be compelling China to report domestic subsidies as required under the terms of its WTO accession. China has *never* reported those coming from state and local governments. The WTO’s localization and technology transfer rules should also be more widely invoked to address abuses in the mercantilist China 2025 implementation.

Second, there is an urgent need to rethink how WTO rules affect the behavior of state-owned enterprises. Larger and more hidden government capital injections, procurement preferences, localization requirements, technology theft, or acquisition of technology firms by state-controlled enterprises are all problems that may require new rules under the WTO. China has never joined the government procurement code despite repeated

assurances that it would do so. Chinese SOEs also are prevented from sharing their own audit work so that foreign investors or competitors “are exposed to potentially exploitative and fraudulent activity by Chinese firms listed in the United States.”^{xlili} The same applies to European listings.

Third, China’s use of standards as a protectionist tool requires renewed attention. This has been a problem in the telecommunications sector for decades but will be a growing problem in advanced technology industries of the future. China now employs cyber security concerns as an intrusive tool for internal social control. There is a danger that such activities also will translate into extensive protection of domestic information technology, data transfer, and cloud computing industries. This would of course spill over into problems for foreign-owned digital commerce firms and potentially impede their ability to maintain or transfer (outside of China) proprietary databases.^{xliv} The European Commission also notes that:

European information and communications technology companies face market access problems all along the value chain, including technologically based standards, complex and discriminatory licensing and certification requirements, disproportionate restrictions arising from security-related legislation, lack of access to standardization bodies, and closed public procurement.^{xliv}

It will undoubtedly require tough negotiations with China, best undertaken in a WTO forum, on standards setting, privacy, data protection policies, and cyber security to address these issues. Private sector firms also need to be more engaged in standard setting, which will become even more important as China pursues the OBOR initiative.

Fourth, Germany and the European Community need to rethink foreign investment screening rules.^{xlvi} Chinese investment in Europe increased tenfold between 2009 and 2015 and another 77 percent in 2016. Chinese investment in Germany alone was up tenfold in 2016 compared to 2015.^{xlvi} As noted earlier, Chinese outward investment has relied more on SOEs and state-directed firms, with a clear intent to acquire advanced and sensitive technologies for the China 2025 plan and for Beijing’s own national defense needs. European screening is not coordinated at the community level, nor is it as extensive as in the United States. The United States is preparing to strengthen its own Committee on Foreign Investment in the United States (CFIUS) in the face of expanded Chinese ambitions and the opaque nature of Chinese investments, some of which mask the role of Chinese military and security institutions.^{xlvi} Germany and Europe will have to work out the scope for screening between respective national versus EU responsibilities. There is good reason at least to coordinate thinking with the United States, Japan, and other interested parties. Minimum requirements to address Chinese practices should include the following features proposed by MERICS:^{xlvi}

- Work constructively to join the government procurement code;
- Increase transparency by tightening disclosure requirements;
- Extend scope of national security screening;
- Use competition policy more broadly for reviewing SOE investors;

- Establish reciprocity measures (and negotiate with China over inward investment barriers); and
- Screen state-led investments for systematic acquisitions of essential high technology.

Former Danish Prime Minister Anders Fogh Rasmussen has underscored the need for Europe to take a lead in this initiative:ⁱ

[G]iven the scale and nature of Chinese investment, what looks like good business could in fact bring an open market system to breaking point. Europe is centre stage in this drama: both as holder of the global trading system (given the current US protectionist retrenchment on trade) and as a growing target of Beijing's investment might.

Germany might also consider pursuing a few other more general, trade-related initiatives that might aid in strengthening its economy and the global trading regime in view of the Chinese challenge. These include:

- Redoubling efforts to protect patents and trademarks around the world;
- Working to preserve and strengthen the private-sector led standards-making system;
- Working with NATO and other allies on addressing cyber security, related questions affecting digital commerce, and the development of next-generation, 5G telecommunications systems; and
- Working to complete a global agreement on services trade.

This latter point can be an introduction to some domestic fiscal and macroeconomic policies that might help, in the long run, to strengthen the German economy and address what were alluded to earlier as unsustainable imbalances in that economy. They would also help move Germany to become more competitive with China. The services sector in Germany is, especially compared to the dynamic manufacturing sector, relatively weak and inefficient. Part of this weakness is due to what the European Commission calls “high regulatory barriers.” Some deregulation, as the Commission suggests, would be facilitated by a broad, preferably WTO-based, services agreement to add incentives and provide competition which can promote efficiency.^{li} The services sector is increasingly important in generating national wealth, especially when tied to the digital manufacturing economy. The internet of things, driverless cars, deployment of artificial intelligence, and digital commerce all fit this category and will be important in meeting the Chinese challenge in smart industries of the future. Banking, education, and software are other service areas that need modernization and upgrading. While Germany has just recently started to include services in the “Industrie 4.0” effort, much remains to be done to catch up to the United States and China.^{lii} Rebalancing the structure of the German economy with a stronger services sector should also strengthen growth prospects in the medium to longer term. It would also help make Germany less reliant on the manufacturing sector which is challenged by China (and others like South Korea as well).

The European Commission has suggested a number of other macroeconomic changes to strengthen the German economy and reduce the persistent trade surplus, which exceeds EU guidelines. The EU places its members under surveillance when trade surpluses exceed 3 percent of GDP. The Commission has for the past few years suggested that Germany should employ policy to increase domestic demand: measures such as reducing Federal savings (i.e., the budget surplus), reducing taxes and other measures to increase wages, deregulating of the services sector, and, especially, increasing capital investment and investment in research and education. In a recent blog post, former Federal Reserve Chair Ben Bernanke reinforces these points. After noting that German excellence in manufacturing is boosted by a currency weaker than it would be if Germany were not a member of the Eurozone, Bernanke observes: ^{liii}

What is a problem is that Germany has effectively chosen to rely on foreign rather than domestic demand to ensure full employment at home, as shown in its large and persistent trade surplus..... Within a fixed-exchange rate system like the Euro currency area, such persistent imbalances are unhealthy, reducing demand and growth in trading partners and generating potentially destabilizing financial flows. Importantly, Germany's large trade surplus puts all the burden of adjustment on countries with trade deficits, who must undergo painful deflation of wages and other costs to become more competitive.

The thrust of the Commission and Bernanke arguments, which our earlier discussion of imbalances in the German economy previewed, is to fix the problem by increasing wages and overall domestic demand, competition in the services sector, and investment. Increasing domestic demand might address certain political issues surfacing in recent German elections. It might also help reduce the irritant (to the United States and others) of the trade surplus and the threat to convergence in the Eurozone which might in the long run weaken the Euro project. And it would certainly help strengthen growth in the entire European Community, which would contribute to sustainable long-term growth in Germany.

The emphasis on increasing investment is especially relevant in the context of this study. Germany does need to address the slow deterioration of its basic infrastructure. This would both bolster demand and contribute to longer term efficiency and economic competitiveness. But Germany also needs to find ways to invest in education, research, and technology to meet the Chinese threat head-on. Corporate savings have been high, perhaps, as noted earlier, because returns on investment, including those funneled through the somewhat inefficient banking system, have underperformed. The venture capital industry is weak in Germany as well. Tax reform suggested by the European Commission might be one way to improve incentives for risk taking. More resources devoted to basic research in universities and the business-government Fraunhofer would also be productive in the environment of high technology global competition. There are undoubtedly many creative ways to stimulate domestic demand, but they ought, in conclusion, to take into account the need to address the Chinese challenge.

Conclusions

Germany remains one of the strongest industrial economies in the world. But other sectors of its economy are less efficient and robust. Its economy is unbalanced internally due to the dominance of manufacturing and externally due to a persistently high trade surplus. China is an increasingly sophisticated producer of manufactured products and has the ambition, expressed through its Made in China 2025 program, to displace the products of Germany and those of other advanced industrial economies in its domestic market in 10 advanced technology industries. Eventually, China has the ambition to become the world leader in the smart advanced technology industries of the 21st century. This ambition is a direct challenge to Germany, as at least four of the top German manufacturing sectors, including autos and machinery, are among the sectors targeted by the Chinese.

China employs a variety of tools to promote its industrial sector goals. Many of its tools are of questionable legality, under the rules and accepted norms of the post-war global trading system. These include subsidies, localization requirements, coercive technology transfer, support of and preferences for state-owned industries, restrictions on market access, acquisition of leading technologies by state-controlled or directed entities (or by outright theft), discrimination in government procurement, and investment restrictions.

Many of these Chinese practices can be countered by enforcement of existing WTO rules and by elaboration of new rules in areas not already covered well by the WTO, such as support for SOEs, distortions in the digital economy, or investment restrictions. Cooperation with traditional allies on trade issues would enhance the probability of success. Certain domestic policies might also strengthen and rebalance the structure of Germany's economy to better counter the Chinese challenge. These include strengthening domestic consumption and increasing investment. These policies could also contribute to the sustainability of the Eurozone and have other political benefits internally and externally.

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