

Germany's competitiveness – from 'sick man of Europe' to superstar and back: Where does the economy stand?

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The business sentiment of German enterprises is currently hovering on levels last seen only in severe recessions, although even the most pessimistic economic forecasts for 2024 are far away from such scenarios. The image of Germany as the 'sick man of Europe' is being discussed time and time again in the public debate. Concerns over Germany's competitive position as a business location and, more broadly, the future viability of its economy have become omnipresent ever since the beginning of the energy crisis – whereby temporary economic headwinds are hard to distinguish from structural challenges. Apart from the fact that around half of the German population is female and the common metaphor therefore appears to have fallen out of time, the confusing situation calls for a systematic analysis of the relevant locational factors in order to identify strengths and weaknesses. This can serve as a basis for economic policy.

This paper explores competitiveness along the components of a traditional production function which we expand by adding the categories 'energy supply' and 'governmental framework conditions and international dependencies'. Thus, the focus is not just on the locational criteria that are external to businesses but on the general prerequisites for the future growth potential of the economy. However, subsidies from the government are not discussed here as, although they have become considerably more important worldwide, they are also heavily concentrated in individual sectors such as the semiconductor industry. In the interest of clarity, the G7 countries as major advanced economies plus China and Sweden serve as a comparison group.

Overall, the analysis provides a mixed picture with strengths, but also weaknesses. The urgency to further expand the strengths and get a grip on the weaknesses is very high. After all, even if the level of indicators for strengths is still high, their trends suggest that other economic regions are becoming more competitive. It is relevant to note that Germany was the only G7 country to catch up with the USA in terms of per capita income in the period from 2005 to 2020. After 2020, Germany fell back on a high level. Its good economic performance has long reduced the urgency to address the looming structural challenges such as demographic change, as well as the tasks of transitioning to a digital and climate-neutral economy. As a result, the current economic weakness

provides an opportunity to tackle the structural challenges from what is still a good starting position in many areas. With a view to the strengths and weaknesses, the following picture has emerged:

One of the strengths is innovative potential. Germany occupies rank 8 of 132 countries on the Global Innovation Index, partly due to high expenditure on research and development. However, there are problems in transferring technology to smaller businesses and putting 'inventions' into practice in start-ups. Here it is obvious that the role of venture capital finance is still too small. And in digitalisation, Germany only has a midfield position.

Further strengths lie in the supply of capital, where Germany scores points as a location with good access to finance even for small and medium-sized enterprises, as well as with a relatively high real capital stock and a transport infrastructure that is still rated outstanding by international standards. On the Infrastructure Score, part of the World Bank Logistic Performance Index (LPI), Germany ranked equal third with Canada among 139 countries in 2023. However, Germany always ranked first from 2010 to 2018, and it has since been overtaken by Singapore and Switzerland.

While small and medium-sized enterprises often see the availability of skilled workers as a competitive advantage, the demographic trend, which is marked by a particularly sharp decline in the employable population in Germany, is jeopardising this strength. The clearly negative trend in basic school qualifications, with Germany only finishing in midfield in the OECD according to the results of the PISA study, for example, also shows an urgent need for action with a view to the skills of future workers.

Other weaknesses include comparatively low public investment and the high tax burden on investment returns for businesses. Although Germany has increased public investment from 1.9% of gross domestic product in 2005 to 2.6% recently, this still puts it in second to last place in the comparison group. Germany is also in penultimate place in terms of corporate taxation, measured by the effective tax burden on investment income of 26.6%. In the comparison group, that rate is lowest in the UK, at 12.6%.

In the field of energy supply, Germany clearly has a competitive disadvantage in costs, especially in relation to the US and Canada. The electricity and gas price differences are so large here that they can no longer be offset by high energy efficiency in the German manufacturing sector. However, some other European countries are at a similar disadvantage or have even higher energy prices, and Germany's energy prices have already fallen substantially since the easing of the energy crisis. For the share of renewables in energy consumption, Germany ranks midfield. Overall, more clarity is needed about the energy prices that are to be expected in Germany in the long term, and renewables need to be expanded quickly.

Finally, in an environment of growing geopolitical conflicts and trade restrictions, Germany has great vulnerabilities because of its strong export orientation. In general, Germany's export and import markets are highly diversified but China remains a cluster risk in trade and with respect to returns from direct investments. Furthermore, there are significant dependencies in Germany's supply of raw materials, for which China and other authoritarian or unstable states play a major role.

All in all, the systematic analysis of locational factors reveals a mixed picture, but also a great urgency to build on strengths and get weaknesses under control to continue ensuring Germany's competitiveness as a business location into the future in an environment that is increasingly shaped by geopolitical conflicts and trade restrictions. In the past, the German economy and society have proven time and again that the location is capable of managing change and adapting to new circumstances. All actors from the political arena, business and society must now make their contribution.

The focus is back on Germany's quality as a business location

Germany's quality as a business location has moved back into the focus of the economic-policy debates ever since the outbreak of Russia's war of aggression against Ukraine, particularly with a view to industry, which is very important in this country compared with other high-income countries.¹ The causes for the current location debates are as diverse as they are comprehensible. For one thing, Germany is facing the

Herculean task of the dual transformation, that is the broad digitalisation and decarbonisation of the economy and society. At the same time, the war in Ukraine has pushed energy prices up for businesses and households and, in a very short time, required a reorganisation of the sources of important raw material supplies. These include natural gas, more than half of which Germany imported from Russia before the outbreak of the war and which is intended to act as an important bridge for the energy transition because of its lower greenhouse gas effect compared with other fossil fuels such as coal and oil. Furthermore, in addition to energy costs, businesses are having to come to terms with a general surge in prices, significantly higher interest rates and growing skills shortages which will even worsen in the coming years as a result of demographic ageing. Finally, the international race for subsidies to support green and digital technologies – such as China's broad industrial and subsidy policy² and the Inflation Reduction Act³ in the USA – is putting competitive pressure on Germany's export industry in particular.

International rankings with mixed results

Against this backdrop, growing concern is being voiced over the attractiveness of Germany as a location, often with reference to the country's drop in relevant competitiveness rankings. Examples include the IMD World Competitiveness Ranking⁴, in which Germany slipped to 22nd place among 64 countries in 2023 (2022: 15th place), and the Country Index for Family Businesses which the Centre for European Economic Research (ZEW) in Mannheim measures on behalf of the Foundation for Family Businesses, and whose ninth edition published in early 2023 ranks Germany 18th among 21 industrialised countries, as the 'great loser in the locational competition'.⁵ However, there are also international comparisons in which Germany scored well just recently or – particularly with a view to the overall reputation of the country and its government – has even been able to successfully defend its long-standing top position. In the Anholt-Ipsos Nation Brands Index⁶, which ranks 60 countries, Germany occupies the top position for the sixth straight year, just as it does in the global Gallup Poll⁷ on the quality of political leadership. In the most recent Cologne Institute for Economic Research ranking of industrial locations⁸ of 2021, Germany is in fourth place out of 45 industrial and emerging economies. Only the US scored higher among the G7 states plus Sweden and China listed in Table 1.

Table 1: Germany in various business location rankings

Rank within group G7 + CHN and SWE	USA	SWE	GER	CAN	GBR	JPN	CHN	FRA	ITA
WEF – Global Competitiveness Index 4.0 (2019)	1	4	3	6	5	2	8	7	9
World Bank – Ease of Doing Business (2019)	1	3	4	5	2	6	7	8	9
ZEW Familienunternehmen – Länderindex (2022)	1	3	7	2	4	5	6	8	9
IW Standortranking für die Industrie (2021)	1	3	2	5	6	4	8	7	9
IMD-World Competitiveness Ranking 2023	2	1	5	3	6	8	4	7	9
Average ranking	1.2	2.8	4.2	4.2	4.6	5.0	6.8	7.0	8.6

Sources: relevant rankings, KfW Research.

Perception of competitiveness also depends on the business cycle

In addition, the perception of international competitiveness is volatile and can change fundamentally in a matter of just ten years, typically in conjunction with pronounced cyclical recession or boom phases. When the New Economy bubble burst after the turn of the millennium, unemployment had risen to record highs and growth of real gross domestic product (GDP) practically came to a standstill (-0.1% on average per year from 2002 to 2004), then president of the Ifo Institute Hans-Werner Sinn in a 2003 bestseller recalled the image of 'Europe's sick man'⁹, which the magazine 'The Economist' had already pinned on Germany in mid-1999 and which has since been often cited.¹⁰ Despite what the prophets of doom have said, this was followed by a decade-long phase of above-average growth. A mere ten years later, a contribution to the renowned Journal of Economic Perspectives of the American Economic Association declared Germany an economic superstar that was virtually the only comparable country to have kept its unemployment rate low during the financial crisis and further reduced it afterwards while strongly expanding exports.¹¹ At the time, German GDP grew by an annual average of 2.3% from 2010 to 2014 in spite of the euro crisis that occurred during the same period. But Germany has fallen behind economically in recent years, in part as a result of material shortages, the energy price shock and the subsequent rapid monetary tightening. Thus, in the final quarter of 2023 German GDP hardly grew above the pre-COVID-19 level at the end of 2019 (+0.1%), while the euro area as a whole was already around 3% higher, so it is hardly surprising that the sick man of Europe – meaning Germany – made the headlines again.¹²

It is time for a sober stocktaking

In this confusing mix of weak economic performance, volatile attributions and contradictory rankings, there is a need to take a level-headed look at the data in order to systematically identify the strengths and weaknesses of Germany as a location and, building on this, to form a sound basis on which to make recommendations for economic policy actions. In doing so, we understand competitiveness from a macroeconomic perspective as the capacity of an economy to both generate sustained potential growth and be an attractive location for businesses to make investments in the real economy.

Where are we coming from?

G7 as the most important benchmark

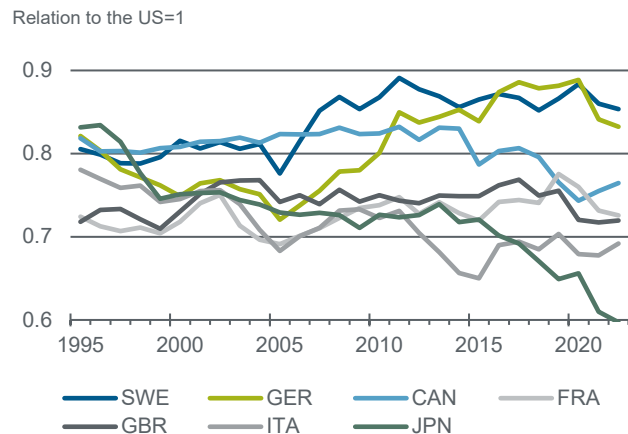
As a concept, competitiveness always has a relative dimension, which directly leads us to ask about the relevant comparison countries. The remaining countries of the G7 group are particularly suitable for this (USA: United States of America; JPN: Japan; FRA: France; UK: United Kingdom; ITA: Italy; CAN: Canada), as they are large, mature industrialised countries like Germany (GER). These countries are often neutrally referred to as advanced economies or high-income economies because of the now relatively low structural share of industry in their economies. We have added Sweden and China to this selection of countries. As a small advanced economy, Sweden is an example of the northern European countries that are successful in many social and economic dimensions. As an aspiring emerging economy, China still differs from the advanced economies in a number of structural features. Nevertheless, its pre-eminent importance for the global economy and its ambitions as a systemic rival and

competitor of the advanced economies justify its inclusion in the comparison group.

Germany has enjoyed a golden decade

Before we address the future viability of the location and leading competitiveness indicators, we will first look at how Germany has scored relative to the comparison group in terms of key performance indicators for competitiveness in the past decades. Measured by purchasing power-weighted gross domestic product per capita of the population, the key indicator for increasing material prosperity, Germany is emerging from a golden decade (see Figure 1).

Figure 1: GDP per capita of the population



Conversion at current purchasing power parities and prices.

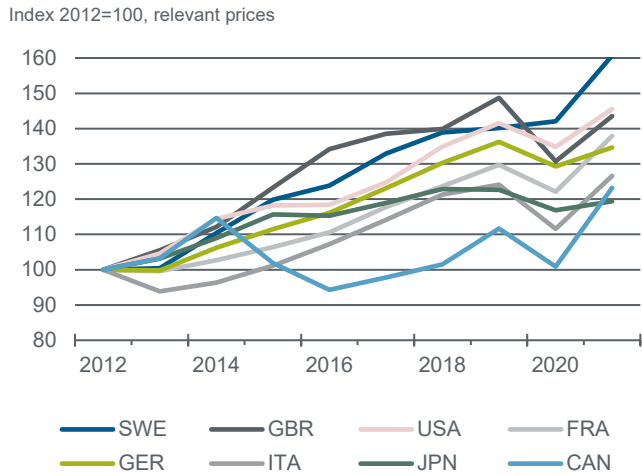
Source: World Bank, own rendition.

Since the low of the year 2005 (0.72), at the end of the period when Germany was regarded as the 'sick man of Europe', the gap to the US, the leading industrialised nation, shrank continuously, especially in the 2010s, when nations were grappling with the economic and global financial crisis. It was not until the outbreak of the COVID-19 pandemic that Germany (2020: 0.89; 2022: 0.83) slipped slightly behind Sweden again (0.88; 0.85). This comparison in Table 1 leaves out China because although the convergence on the US is considerable, it occurred on a significantly lower level, as is typical of an emerging economy (1995: 0.06; 2022: 0.28).

Business investment is keeping up internationally

A second major indicator of the quality of the location, or the result of the location competition, is domestic private sector investment. As the level of business investment also depends on factors such as sectoral structure and the division of functions between the state and private sectors, we will focus here on the development over time. In 2021, the last year with comparable data for all countries covered in Figure 2, business investment in Germany, calculated in current prices, exceeded the starting level of the year 2012 by 36% and was thus able to almost match that of France (+38%), the United Kingdom (+42%) and the US (+43%). Sweden performed much better (+61%) but so did China, which is pursuing a decidedly investment-driven growth trajectory as an aspiring emerging economy with a still relatively small real capital stock (+87% from 2012 to 2019; no recent data available).

Figure 2: Development of business investment



Data for 2022 is only partly available. The timeseries are therefore presented here only up to 2021.

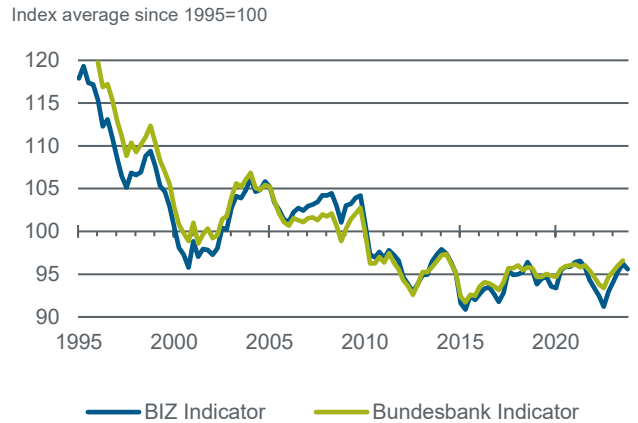
Source: OECD, own rendition.

Germany's price competitiveness is steady

The prices of products on the global market are an important aspect of the international competitiveness of an economy and its enterprises. Attractive prices in foreign markets depend on the nominal exchange rate and the relative development of the price level at home and abroad. The standard macro indicator for this is the real effective exchange rate.

The real effective exchange rate corrects the bilateral nominal exchange rates by differences in the relevant inflation rates so as to offset resulting purchasing power differences between an exporting and importing country¹³ and aggregates them into an overall indicator on the basis of the trade shares of the partner countries. As Figure 3 illustrates, Germany's real effective exchange rate has been quite steady irrespective of the exact specification since the end of the economic and financial crisis, and since 2010 has been around 5% below the long-term average since 1995. Here, a lower indicator level – that is, a real effective devaluation from a domestic point of view – signals increased price competitiveness. It must be noted, however, that price competitiveness thus defined is a macroeconomic concept that obviously leaves out the heterogeneity of sectors and businesses. At present, for example, businesses for which energy costs make up an above-average share of their total costs are likely to see their competitiveness more heavily impaired by the rise in energy prices than is expressed in a macroeconomic indicator of price competitiveness.¹⁴

Figure 3: Germany's price competitiveness



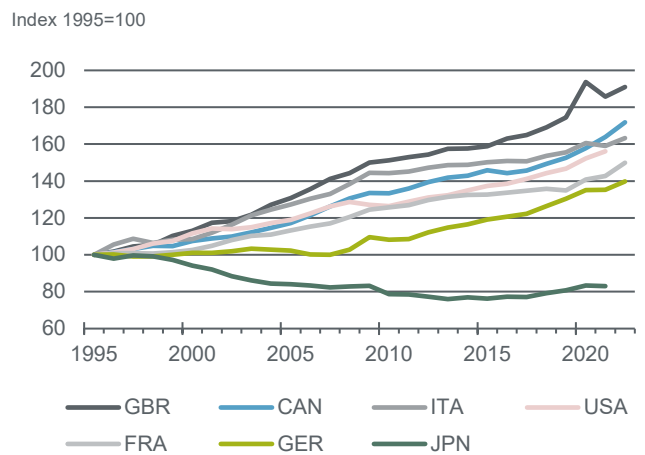
Bank for International Settlements (BIS): Real effective exchange rate against 52 trading partners based on consumer prices. Bundesbank: Indicator for German price competitiveness vis-à-vis 37 trading partners based on total sales deflator. Falling index values indicate higher price competitiveness. Last data item: Q3 2023.

Source: BIS, Deutsche Bundesbank, own rendition.

Catch-up development in unit labour costs

From a business perspective, wages as a cost factor are a major determinant of sales prices. However, price pressure on the cost side solely as a result of wage increases occurs only if wages rise more strongly than labour productivity, that is, output per worker on the payroll. The key measure of this is unit labour costs. They show how much wage increases exceed productivity growth and are typically used for unit labour cost-based comparisons of international competitiveness (Figure 4).

Figure 4: Development of unit labour costs since 1995



Source: OECD, own rendition.

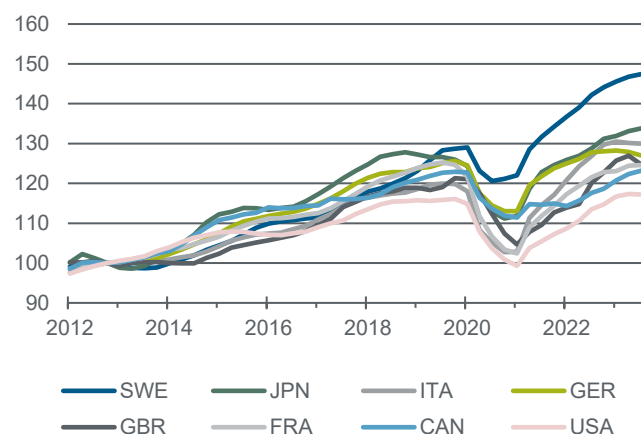
To be sure, unit labour costs in Germany rose by +21% from 2012 to 2021, the end of the current observation period, which was a steeper increase than in some of the other countries in the comparison group, especially France (+10%) and Italy (+8%). But this increase followed a phase of very strong wage restraint during which unit labour costs in Germany stagnated for more than a decade, unlike in the group of comparison countries¹⁵. If we consider the increase over the past quarter-century, the development of wages in Germany still appears extremely moderate irrespective of the catch-up development of the past ten years.

German exports began to falter only recently

In addition to sales prices in the global markets, however, the quality of products is also crucial for making them attractive for customers and, thus, for long-term commercial success. The ability of an economy to successfully market its own products internationally is illustrated by the development of exports, which is hence an important indicator of international competitiveness. The German export industry, which focuses on high-quality consumer and capital goods such as vehicles and machinery, has generally kept pace well here in the past ten years (see Figure 5). On a price-adjusted basis, German exports of goods and services grew by 27% from 2012 to 2023 – faster than those of Canada (+23%) and the US (+17%), for example. At the same time, at 47% on average across the years 2012 to 2022, the exports-to-GDP ratio is unusually high for a country with a domestic market the size of Germany. Only Sweden's export growth was notably stronger (+47%), while Japan and Italy did not pass Germany until after the pandemic (+34% and +30% since 2012). At the same time, the export performance of the other comparison countries is rather close to that of Germany in a long-term observation (United Kingdom +25%, France +25%). In the short term, however, a particularly weak trend in German exports can nonetheless be observed. In Germany the rate of change on the previous year in real exports on average for the first three quarters of 2023 was the lowest of all countries in our comparison group, while Canada exhibited the strongest year-on-year export growth rate of +4.7%.

Figure 5: Real export growth since 2012

Index 2012=100, moving quarterly averages



Source: OECD, own rendition.

Our potential-oriented approach

In the basic economic model, material prosperity is generated by the allocation and most efficient combination of the scarce production factors of labour and capital as well as technological progress. Ideally, the latter generates productivity increases over time, that is, it enables an economy to generate an expanding gross national product even under the hypothetical assumption of a constant input of labour and capital, for example thanks to product and process innovations and more favourable overall conditions. Technological progress is therefore the only sustainable source of economic growth when labour and capital are fully utilised. The supply side of an economy is typically modelled as a production function that describes the correlation between gross domestic product adjusted for cyclical fluctuations in the degree of

utilisation of production factors – that is, the production potential – and these very determinants.

In this publication we evaluate Germany's competitiveness on the basis of the prerequisites for sustained growth potential and the quality of the investment location in line with this basic macroeconomic model, thereby making transparent where Germany stands with respect to the relevant factors that must be present in order for it to successfully rise up to the challenges of the dual transformation in the years ahead. We measure competitiveness on the basis of: 1.) the extent to which the location has a sufficient number of skilled workers who provide their labour for a reasonable wage; 2.) how attractive the real economic capital stock already existing at the location is; and 3.) how favourable the conditions for innovation and productivity gains are. We have also expanded the traditional three-factor production function by a fourth category that describes the energy supply and covers not just the cost aspect but also its sustainability and energy efficiency. Finally, a fifth category comprises the regulatory framework and dependencies in international trade and the supply of resources.

In the following we will discuss these in detail for the economies selected for comparison and discuss the informative value of the indicators used. These are necessarily a compromise between theoretical aspiration and empirical availability, which must often be struck in international comparisons. Unlike in most locational studies, we will deliberately refrain from making an overall ranking of locational quality as it is hardly possible to make an appropriate weighting of indicators and the weighting of categories would have to differ greatly depending on the economic sector. In navigating the conflicting goals between identifying competitiveness as broadly as possible and providing a clear result, we will focus on a selection of four to six indicators in each of the five categories.

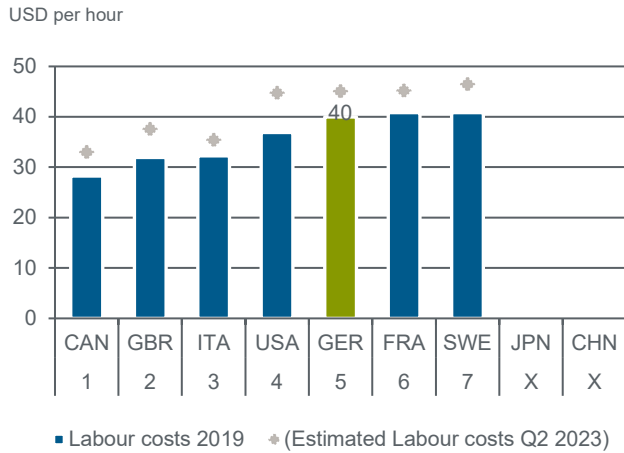
Labour supply

German unit labour costs are broadly mid-table

A basic element of any comparison of business locations is average labour costs per hour worked. In addition to wages, these also include non-wage labour costs such as, in particular, social security contributions and wage-related taxes payable by the employer. In this overall comparison of labour costs, Germany is in the middle of the comparison group on the basis of internationally harmonised data converted to US dollars. The distance to the countries that have the highest labour costs is marginal but the additional costs vis-a-vis the US are also relatively low. There are no fully comparable data from Japan and China, although it is obvious that China as an emerging economy still stands out with the lowest labour costs from a business perspective.

As the most recent standardised data is from the year 2019, the wage cost situation is likely to have changed somewhat in the meantime. Since then, the US in particular has experienced disproportionately high wage growth, which is why labour costs there are likely now on the same level as in Germany (see figure).

Figure A1: Labour costs



Standardised labour costs (wages and non-wage costs such as social security contributions) for the year 2019, converted to US dollars at market exchange rates. Continuation up to Q2 2023 with wage growth rates from the OECD (Labor Compensation per Unit of Labor Input).

Source: ILO, Bureau of Economic Analysis, OECD, own rendition.

In addition to pure labour costs, what is generally also decisive is worker productivity, which is included in unit labour costs. But since productivity thus measured is very crucially determined by other production factors such as capital allocated and is therefore more an outcome variable than a condition, we will forego an analysis of unit labour costs here. However, we demonstrated in the context of the outcome indicators above that the development of unit labour costs – that is, the productivity-weighted wage level – does not show any concerning erosion of price competitiveness in a long-term perspective.

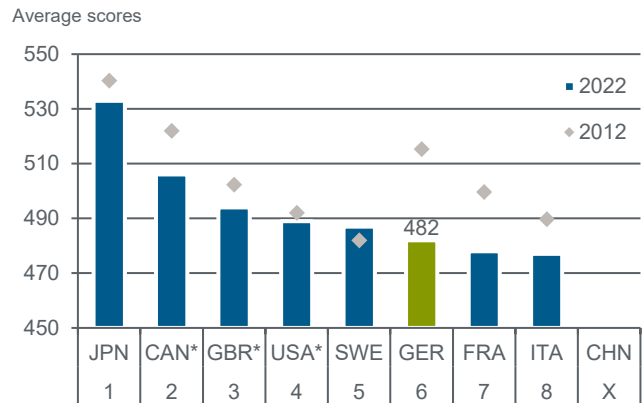
PISA results show urgent need for action

As proxy for the direct productivity of the workforce, it is worthwhile to take a look at the level of qualifications. The foundation skills acquired in school form a basis for the qualifications of the population. The best way to make these internationally comparable is to use the results of the PISA studies, for which schoolchildren aged 15 are regularly tested in the OECD countries and some partner countries. Although the current PISA results are of limited informative value for assessing the level of qualifications of the current workforce, they are nonetheless important for businesses that want to attract young people as employees and for the future growth potential of the economy as a whole.

While Germany still performed clearly above the OECD mean in PISA 2012, learning outcomes in the three competence fields are now only OECD average. Within our comparison group, Germany even came in only sixth out of the 8 countries evaluated,¹⁶ whereas ten years ago it was still in third place. Worth mentioning, however, is that the comparison with Canada, the United Kingdom and the US is currently of limited value because no representative sample was secured there. In any case, Germany clearly lags far behind the top performers, which include Singapore, Japan and South Korea. What is also critical is the downward trend in the learning outcomes measured in Germany. The results of 2022 are

generally the lowest ever measured under PISA in all three competence fields, while outcomes had still improved up until 2012. To be sure, the factors that explain the sharp decline in learning outcomes include pandemic-induced school disruptions and the high intake of refugees over the past ten years. But this hardly makes the problem any less serious. From the perspective of equal opportunities, it must also be deplored that learning outcomes in Germany depend disproportionately on students' socio-economic background.¹⁷

Figure A2: Qualifications – PISA results



Mean scores in the three competence fields reading, mathematics and science. *Care must be taken in interpreting these estimates as PISA sampling standards were not all met.

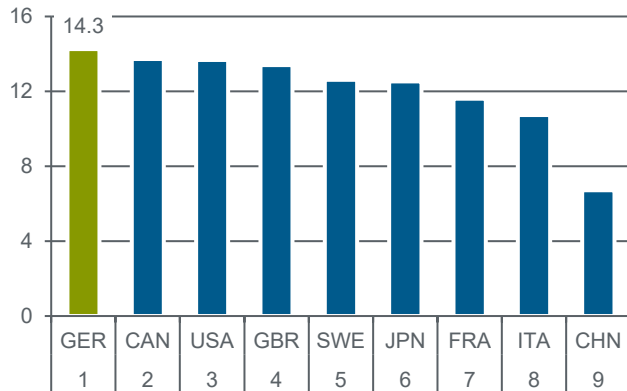
Source: OECD, own rendition.

Top score for years of education

Another common indicator of the skill level of the workforce is the average number of years of schooling and education. These are higher when more individuals have attended a university or comparable institution of higher education but are also influenced by the period of mandatory schooling. For this indicator, Germany occupies the top rank with an average of 14.3 years of schooling and education among the population aged at least 25 years, although the gap to the next-placed countries Canada, US and United Kingdom is minimal. China, however, is far behind in last place with only 6.7 years of schooling and education, which is hardly surprising for the only emerging economy in the comparison group. If we look at the currently habitual years of schooling and education instead of the average years of education in the population from 25 years of age,¹⁸ we can clearly see that the period of schooling and education has grown significantly in all countries, although China remains in last place. For the future level of skills thus measured, Germany would be in third place behind Sweden and the United Kingdom. This means that Germany is falling behind other countries with respect to children and young adults currently in school or education. Ultimately, however, the number of years of schooling and education is only a rough indicator of the general skill level.

Figure A3: Qualifications – years of schooling

Average number of years of schooling and education among the population aged at least 25 years.



Data for each last available year.

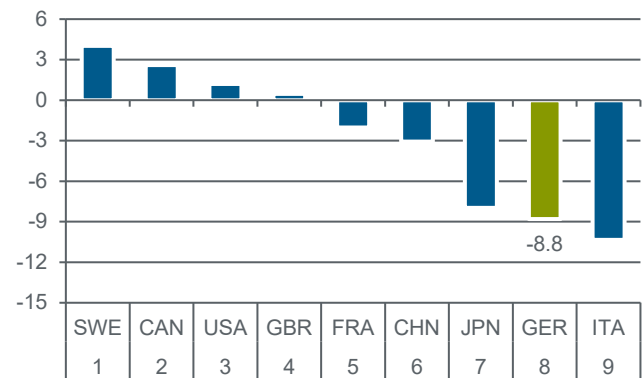
Source: UNESCO, own rendition.

Working-age population is projected to shrink sharply

Finally, besides the skills of the employable population, another factor that is decisive for the growth that can be achieved in the long term and the attractiveness as a business location is the quantitative development of the labour force potential. To estimate its development over the coming years, we consider the UN projections for the growth of the working-age population (between 15 and 64 years) for the next ten years. It shows that Germany is facing the second-largest demographic challenges with a forecast 8.8% decline in the workforce, after Italy with -10.3%. Overall, the differences within the comparison group are especially pronounced for this indicator, as there are also countries that can expect significant workforce growth: the US (+1.2%), Canada (+2.6%) and, above all, Sweden (+4.0%). While the shortage of skilled workers has so far by no means been a problem specific to Germany but has hit the US in particular with even greater intensity after the pandemic,¹⁹ the shape of the demographic pyramid heralds particularly serious problems for Germany in the next ten years. However, it must also be noted that population projections are often inaccurate.²⁰ Although the UN forecast includes not just the age pyramid, which is particularly unfavourable for Germany, but an estimate of migration inflows as well, the development of the latter is both very uncertain and subject to shaping via policy measures such as the Skilled Immigration Act, which the projections have not taken into consideration.

Figure A4: Working-age population

Population aged 15 to 64 years, projected change from 2023 to 2033 in per cent



Source: UN World Population Prospects, retrieved from World Bank (last updated: 7 May 2023), own rendition.

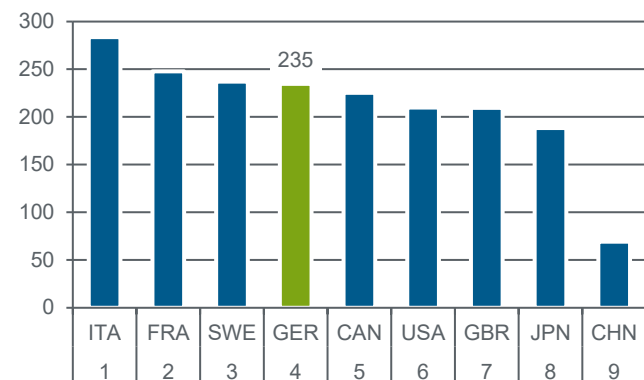
Supply of capital

Germany’s real capital stock is high

An efficient, mature economy requires extensive and diversified real capital stock in relation to the size of its population. Cluster and agglomeration advantages enable businesses already established at the location to attract further businesses to settle and invest there. Germany is well positioned at USD 235,000 per capita of the population (2017 prices, internationally comparable and converted at purchasing power parities). However, the dispersion within the countries under review here is rather low with the exception of the top performer Italy (USD 284,000), and Japan (USD 188,000) and China (USD 69,000) at the lower end of the ranking. The relatively small capital stock in the emerging economy China, however, comes into perspective given the fact that economic activity there is concentrated in some already well-developed regions while other regions of the country are lagging far behind.

Figure K1: Real capital stock

USD thousand per capita of the population



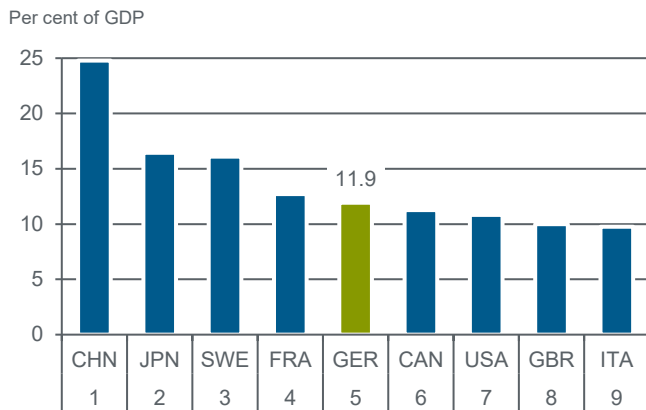
Data for the year 2019, converted to USD at current purchasing power parities and 2017 prices.

Source: Penn World Table Version 10.1, own rendition.

Business investment ratio is in midfield

The real capital stock of the economy as a whole includes both public and entrepreneurial capital and the stock of residential buildings (which make up around one third in Germany), slightly limiting its informative value with a view to the attractiveness of the location for businesses. As there is no internationally comparable breakdown of real capital stock by sectors and categories of fixed assets, we will add here an approximative indicator for the enterprise sector: business investment (gross fixed capital formation by non-financial corporations) accumulated over a period of ten years in relation to GDP. With regard to the ratio of business investment to GDP thus defined, Germany ranks fifth in central midfield with just under 12%. Interesting is what happens at the margins of the distribution. While the aspiring emerging economy China is still lagging far behind in last place in terms of the ratio of real capital stock to population, it clearly tops the list with regard to the formation of new business capital, boasting an investment-to-GDP ratio averaging almost 25% in the decade of the 2010s. The mature industrialised country Italy, on the other hand, the economy that still has the largest real capital stock per capita of the population, has fallen back to last place in the comparison group with regard to recent business capital formation.

Figure K2: Average business investment ratio



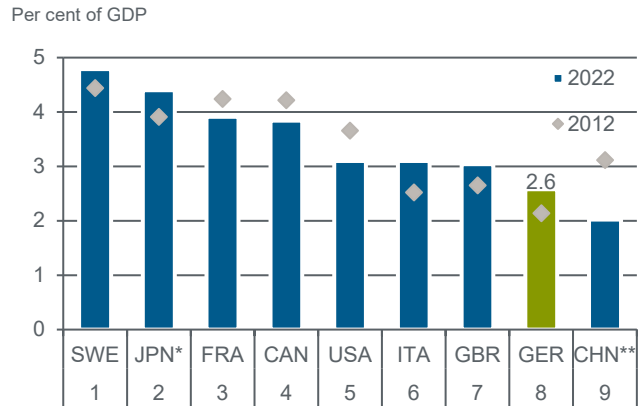
Mean value of the years 2010 to 2019.

Source: OECD, own rendition.

Public investment is rather modest

Regular investment in real capital stock is necessary to maintain its efficiency, modernise or expand it. Public investment plays a prominent role here despite its relatively low structural share, which recently accounted for around 13% of gross fixed capital formation in Germany, as it complements private investment and often makes it possible or at least profitable in the first place. A vivid example is the roads which logistics firms necessarily depend on to make their deliveries. Public-sector investment typically attracts further private investment.²¹ It is true that the German government is now investing significantly more in capital stock than during the low of the mid-2000s (2005: 1.9% of GDP). At now 2.6% of GDP, it nevertheless ranks only eighth among the nine countries under review here, with top-ranked Sweden posting an almost double public investment ratio of 4.8%.

Figure K3: Public-sector investment



Investment according to national accounts.

* The data for Japan refers to 2021; **for China 2019.

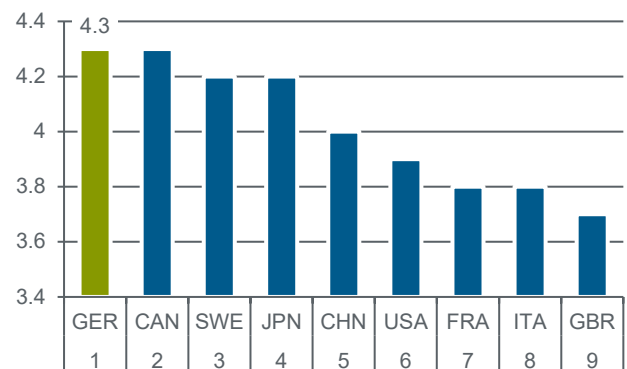
Source: OECD, own rendition.

Transport infrastructure is slipping on a high level

A core area of public-sector investment activity is domestic transport infrastructure because a highly specialised production based on a division of tasks would be inconceivable without efficient roads, railroads, waterways, tunnels, bridges, airports and seaports. The World Bank provides an own survey-based indicator with an outcomes-based description of transport infrastructure efficiency, the Infrastructure Score as part of the Logistics Performance Index (LPI).²² Of all 139 countries assessed in this index, Germany dropped in 2023 to equal third place with Canada after consistently holding first place in the previous surveys from 2010 to 2018. Ahead of Germany are now Singapore and Switzerland but none of the countries selected for comparison here. In other words, the efficiency of Germany's transport infrastructure is still rated outstanding internationally but it has recently slipped from a high level.

Figure K4: LPI Infrastructure Score

Score from 1 to 5, the higher the better



Data for the year 2023. Explanatory note from the World Bank on the indicator: The quality of trade and transport infrastructure, rated from very low (1) to very high (5) in survey question 5.

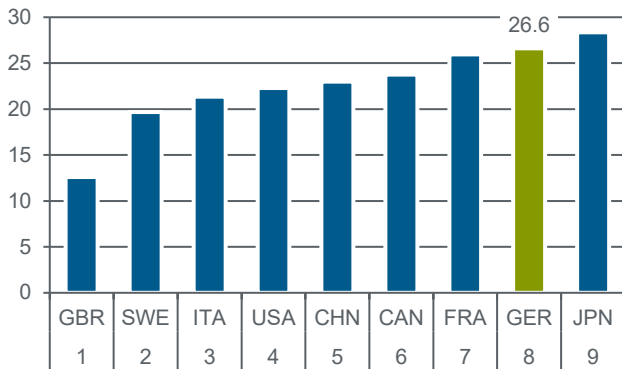
Source: World Bank, own rendition.

Tax burden on investment returns is high

An important determinant for businesses' investment decisions is the tax burden on investment returns at the location. Measured by the OECD indicator of effective average tax rates for positive investment returns, it is a high 26.6% in Germany. In the comparison countries, only in Japan is the burden higher (28.4%), while it is lowest in Sweden (19.7%) and the United Kingdom (12.6%).

Figure K5: Effective tax rate

Per cent of investment return



Data for the year 2021. OECD definition of effective tax rate: The composite Effective Average Tax Rate (EATR) is constructed as a weighted average across finance- and asset-specific EATRs. It is a synthetic tax policy indicator reflecting the average tax contribution a firm makes on an investment project earning above-zero.

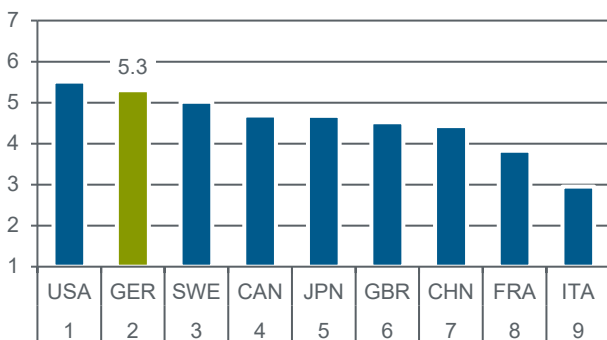
Source: OECD, own rendition.

Excellent access to finance

Finally, businesses require easily accessible finance at favourable terms to implement investment projects. While large enterprises typically have no specific barriers to overcome in financing investments, this is quite relevant for small and medium-sized enterprises (SMEs). It is therefore necessary to focus on this sub-group when comparing locations. Germany can score points here with its elaborate system of commercial and promotional banks. On the seven-point response scale of the World Economic Forum (WEF), Germany scores 5.3 points on average for access to finance for SMEs, which puts it in second place just behind the US (5.5). The lowest scores for access to finance for SMEs were given by respondents in France (3.8) and Italy (3.0).

Figure K6: Access to finance for SMEs

Survey scale from 1 (not at all) to 7 (to a great extent)



Data for the year 2019. The question posed to business leaders was: In your country, to what extent can small and medium-sized enterprises (SMEs) access finance they need for their business operations through the financial sector?

Source: World Economic Forum, own rendition.

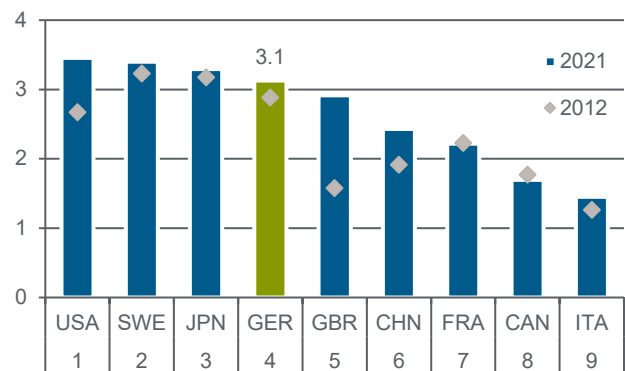
Innovative capacity

High R&D expenditure

Expenditure on research and development (R&D) is among the most obvious determinants of innovation success. With an R&D expenditure-to-GDP ratio of 3.1% (2021), Germany performs quite well and is not far behind the top-ranked US (3.5%). What is also pleasing is the positive long-term trend in R&D spending, which has grown significantly in the past decades, primarily as a result of the realignment of research policy. Thus, the R&D ratio has increased slowly but quite continuously from its low of 2.1% in the mid-1990s to the current level. However, the level of R&D expenditure in Germany is heavily favoured by the sectoral structure, which has a high share of relatively R&D-intensive sectors, while the R&D-to-GDP ratio in individual economic sectors often lies below that of the comparison countries. The concentration of R&D in a handful of industries and large enterprises is therefore a weakness of Germany's R&D activity. The share of small and medium-sized enterprises in R&D expenditure is particularly low in Germany.²³

Figure I1: R&D expenditure

Per cent of GDP



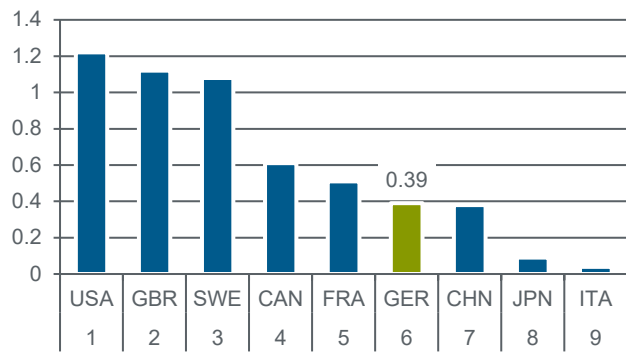
Source: OECD, own rendition.

Low level of venture capital finance

Also decisive for an economy's capacity to innovate is good access to finance for young and innovative firms, which mainly means access to private venture capital. Specifically, we measure this by the average venture capital deal volume in percent of GDP for the years 2021 and 2022. Even if the German venture capital ecosystem has continuously matured over the past years, it still needs to catch up with other countries. With a venture capital ratio of 0.4%, Germany is only in sixth place among the comparison group, and the distance to the top-ranking country US, which has three times the deal volume (in per cent of GDP) continues to be enormous.

Figure I2: Venture capital finance

Per cent of GDP; Mean value of the years 2021 and 2022.



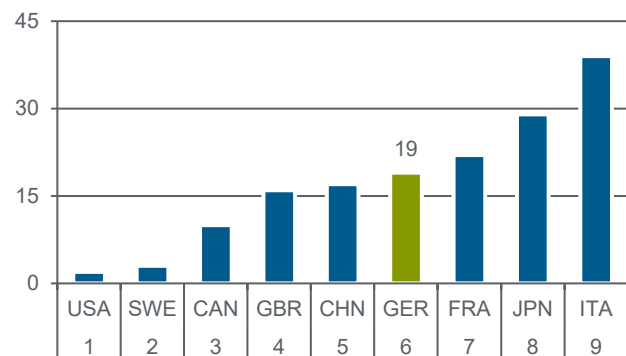
Sources: Dealroom.com, IMF, own rendition.

Digitalisation is not one of Germany’s strengths

An economy’s innovative capacity today correlates closely with the level of digitalisation. In order to capture it broadly and make it comparable internationally, the International Institute for Management Development (IMD) regularly compiles the World Digital Competitiveness Ranking on the basis of 54 individual indicators. Here Germany ranks 19th among the 64 economies analysed, which places it at the bottom of the top third. In our comparison group it is in midfield at a clear distance to the global leaders US (global rank 2) and Sweden (global rank 3). Germany also ranks only average among the EU states in the Digital Economy and Society Index 2022 of the European Commission. According to this ranking, which is limited to EU countries, the strengths lie in connectivity, for example the coverage with broadband connections. In the categories human capital, integration of digital technologies and public digital services, on the other hand, Germany performs slightly below average.²⁴ Individual studies also point out that the application and development of information technologies are not among Germany’s strengths.²⁵

Figure I3: Digitalisation ranking

Global Rank in the World Digital Competitiveness Ranking 2022



Ranking among the 63 comparison countries from the year 2022.

Source: IMD, own rendition.

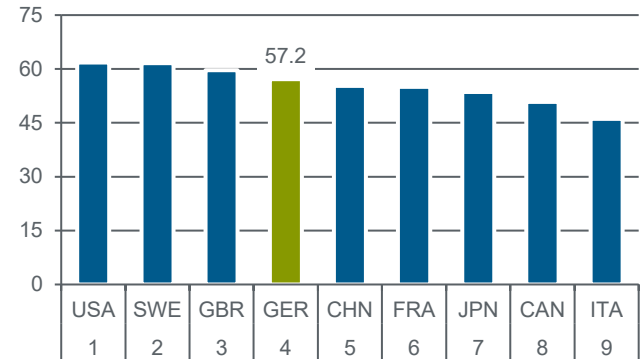
Germany’s innovation ecosystem is at the front of the field globally

The most comprehensive international ranking for the overall innovation ecosystem of economies is the ‘Global Innovation Index’ published by the World Intellectual Property Organization (WIPO). It demonstrates that Germany’s innovative capacity is generally one of its strengths. Germany holds

fourth place among our nine comparison countries. Yet it must be noted that the even better ranked US, Sweden and the United Kingdom, together with first-placed Switzerland, are also forming the global top four. Among the 132 countries of the global ranking, Germany was in eighth place in the years 2022 and 2023, which is at the front of the field globally and virtually on a par with countries such as South Korea, Singapore and Finland and well above China (rank 11), Japan (rank 13) and Israel (rank 16), whose innovation ecosystems are often said to be particularly good performers.

Figure I4: Global Innovation Index

Score from 0 to 100, the higher the better



Data for the year 2022 based on 80 criteria.

Source: WIPO, own rendition.

According to the index formed from 81 individual indicators, Germany’s strengths include ‘human capital and research’ (rank 2), ‘creative outputs’ (rank 7) and ‘knowledge and technology outputs’ (rank 9). However, Germany has weaknesses in the areas ‘market sophistication’ (rank 14), ‘business sophistication’ (19), ‘institutions’ (20) and ‘infrastructure’ (23). According to an evaluation by Zimmermann of the Global Innovation Index (2023), Germany’s strengths lie ‘in a strong academic sector and intense R&D activities in large enterprises which are complemented by high output in the form of patent applications for technically sophisticated export goods. Relative weaknesses include, among other things, ‘sub-areas of knowledge transfer, for example the transfer of new technologies, their marketing through the establishment of new businesses (rank 23) and transfer to small and medium-sized enterprises.’²⁶ Digitalisation is also rather average as measured by the relevant indicators in the Global Innovation Index.

Energy supply

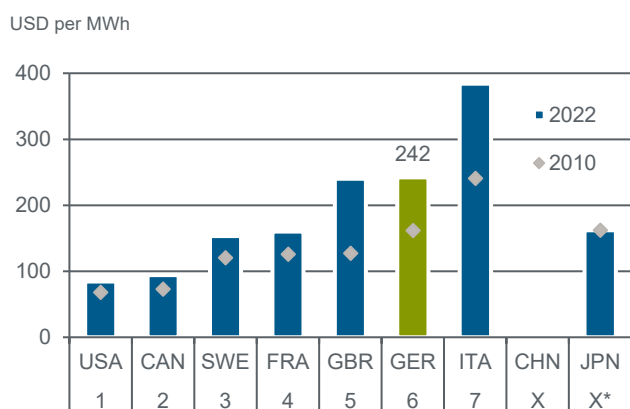
Since the outbreak of the energy crisis, energy costs have been the focus of concerns over Germany as a business location. Given that Germany and many other industrialised countries have set themselves the goal of net zero greenhouse gas emissions by mid-century, what is decisive is not just the cost but the sustainability of energy supply. The levers for this consist in raising the share of renewables in primary energy consumption while increasing the efficiency of energy use.

Energy prices are high, especially compared with North America

In terms of energy costs, we mainly focus on electricity prices because for one thing, they reflect the prices of the fossil fuels being used for energy generation and for another, they are the costs with the greatest relevance for the future with a view to the goal of fully decarbonising Germany by the year 2045. We also compare the prices of natural gas because this is the most important source of energy for German industry today²⁷ and, as the fossil fuel with the lowest carbon emissions, natural gas will continue to have a bridge function on the way to climate neutrality.²⁸

For the industrial sector, that is the large energy consumers in manufacturing, the International Energy Agency estimates the average end-user prices for electricity in Germany at USD 242 per MWh in 2022, the last available year. This means Germany has the second highest electricity prices within our comparison group, although China and Japan fall out of the group because of data gaps.²⁹ In 2022, Germany's cost disadvantage was exceptionally large compared with the US and Canada in particular but was also considerable vis-a-vis France and Sweden. Nevertheless, there are countries in Europe with electricity prices on a similar level, such as the United Kingdom, as well as countries with much higher prices, such as Italy.³⁰ Besides, a relatively high electricity price in Germany is not a new phenomenon. Electricity prices in this country were already higher than in most other countries at the beginning of the last decade. However, the price difference rose again substantially with the energy crisis, especially compared with the US: from USD 94 in 2010 to USD 158 per MWh in 2022. Unfortunately, more up-to-date international comparison data is not yet available. But the price gap has most likely shrunk again as a result of the easing energy crisis in Europe and various forms of relief in taxes and charges from the government in Germany. In any case, the price for small and medium-sized industrial customers under new agreements fell by more than 50% from 2022 until the start of 2024, according to the electricity price analysis of the German Association of Energy and Water Industries (BDEW).³¹

Figure E1: Electricity price for the industrial sector



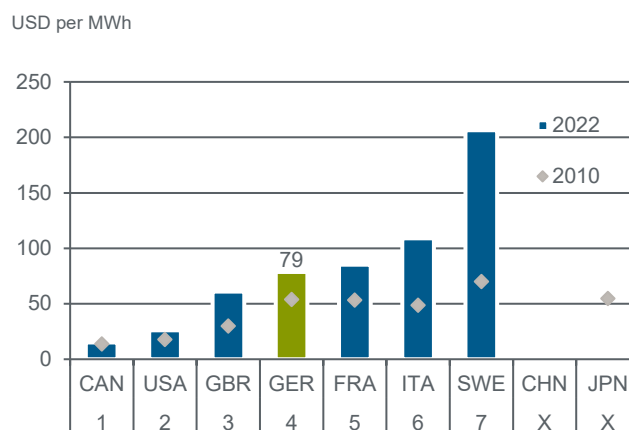
* The current data for Japan refers to the year 2021.

Source: IEA, own rendition.

A look at gas prices in the industrial sector reveals that Germany was only in midfield of the comparison group in 2022. Particularly for Sweden, the International Energy

Agency reported significantly higher prices than for Germany, but a sharp price increase was also reported for Italy. Prices were again significantly lower in Canada and the US. In the latter country, one MWh cost USD 53 more than in Germany in 2022, whereas in 2010 the price difference still stood at USD 36. However, since the wholesale price of gas in the meantime has decreased more steeply in Europe than in North America, the price gap between the two has likely reduced again.

Figure E2: Gas price for the industrial sector



Source: IEA, own rendition.

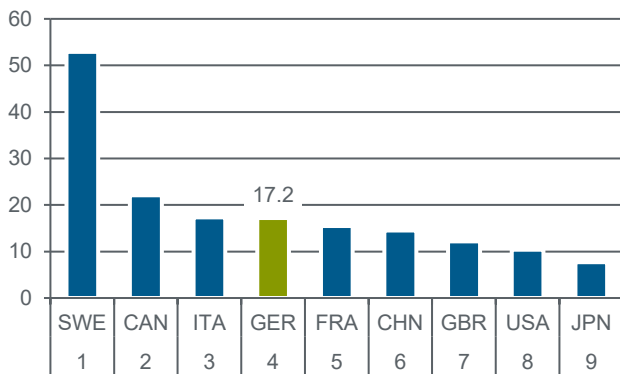
What generally makes it difficult to capture the effectively relevant and internationally comparable energy prices is that these are formed in part by taxes or network fees which vary depending on the group of customers. In Germany, for example, large consumers of electricity that compete internationally benefit from relief such as electricity price compensation. The price relations for specific industrial sectors will therefore be different than the average values collected by the IEA, although the International Energy Agency strives to capture the relevant electricity prices including the taxes actually paid in a manner that makes them comparable. Small and medium-sized enterprises, especially from the services sector, are usually charged higher electricity prices, although the energy costs here often play less of a role or the businesses do not compete internationally.³²

Share of renewables is in midfield

The share of renewable energy in final energy consumption in Germany grew from a mere 2% at the beginning of the 1990s to around 17% in the year 2019.³³ This places Germany in upper midfield, well ahead of the US and Japan but still far behind top-performing Sweden, where around half of energy consumption is based on renewables. In order to achieve the goal of climate neutrality by mid-century, the share of renewable energy generated or imported in Germany must rise to nearly 100% of energy consumed.³⁴ This requires a comprehensive electrification of the German economy.

Figure E3: Renewable energy

Percentage share in primary energy consumption



Data for the year 2019. 'Modern renewables' according to IEA definition, that is, without the traditional use of biomass such as firewood.

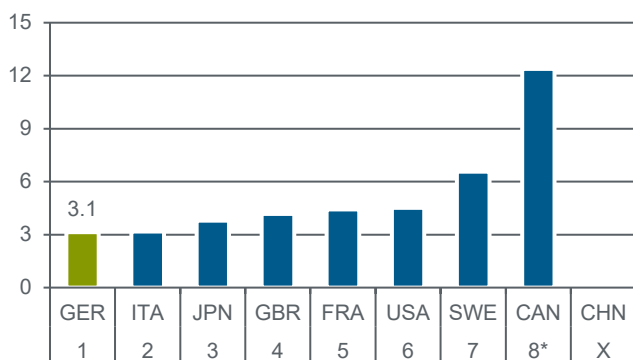
Source: IEA, own rendition.

High energy efficiency in industry

The efficiency of energy use is measured on the basis of energy intensity of value added, specifically in the form of energy used per US dollar of value generated. Low energy intensity is important for the reduction of CO2 emissions on the one hand and a competitive advantage that can compensate for higher energy costs on the other. From a macroeconomic perspective, however, energy intensity depends on the country's economic structure, and here industry-heavy economies are at a disadvantage. Under the assumption that Germany's high share of industry is to be maintained, we therefore focus only on the energy intensity of value added in manufacturing. Within our comparison group, German industry stands out with the lowest energy intensity and performs far better than the US and, in particular, Sweden and Canada.³⁵ As expected, a negative correlation between electricity prices and energy intensity is clearly identifiable in our comparison group.

Figure E4: Energy intensity of industrial value added

Megajoule/USD



Data for the year 2021 (*exception: Canada 2020); USD in purchasing power parity of 2015.

Source: IEA, own rendition.

Regulatory framework and dependencies

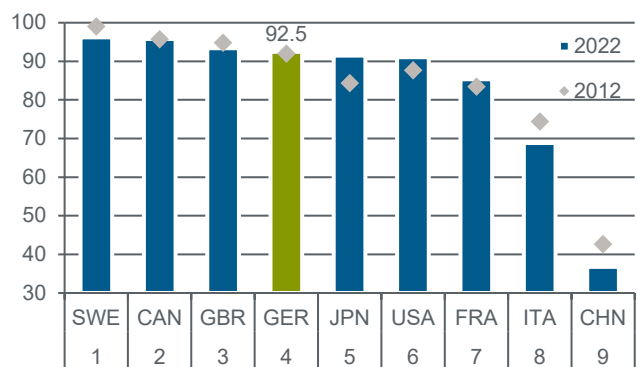
Various elements of the regulatory framework such as governance quality, red tape and access to international markets are also decisive to enable the efficient use of production factors. Given the supply chain disruptions during the pandemic, Russia's war against Ukraine and geopolitical tensions with China, it is also worth taking a look at the dependencies in international trade and the supply of raw materials.

Good governance quality

One indicator of the quality of government regulation (*Regulatory Quality Index*) is regularly calculated by the World Bank with its *Worldwide Governance Indicators*. The indicator is defined as the perceived ability of governments to formulate and implement good regulations and policies that encourage the development of the private sector. The index is calculated from the aggregate of multiple expert- and business surveys on various aspects of governance quality.³⁶ Germany scored a very high percentile rank of 92.5 in a global comparison but is only average in our comparison group. If we consider the measures of uncertainty available in this dataset, the differences between the G7 states are mostly insignificant. Within the G7, only Italy's governance quality is rated significantly worse. China finished a distant last place in our comparison group. Over time, the assessment of regulatory quality in Germany has hardly changed in the past ten years.

Figure S1: Regulatory quality

Ranking from 0 (weakest) to 100 (strongest)



Percentile rank among 214 countries/territories ranked.

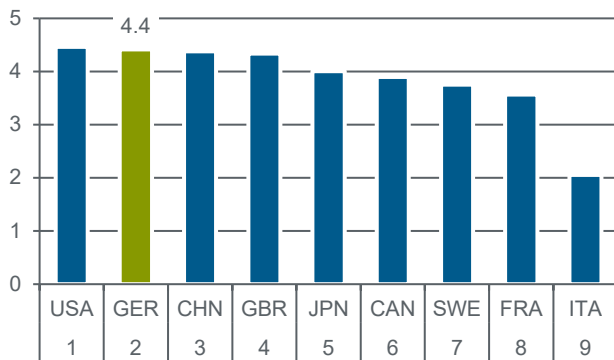
Source: World Bank, own rendition.

Red tape was low in 2019

Regulatory quality is a major determining factor for the administrative burden on businesses. In addition, the Executive Opinion Survey in the Global Competitiveness Report provides a direct measure of the administrative burden on businesses. Specifically, it asks business leaders how burdensome it is for businesses in the relevant country to comply with the demands of public administration such as approvals, directives and reporting obligations.³⁷

Figure S2: Administrative burden

Survey scale from 1 to 7, the higher the number, the lower the burden



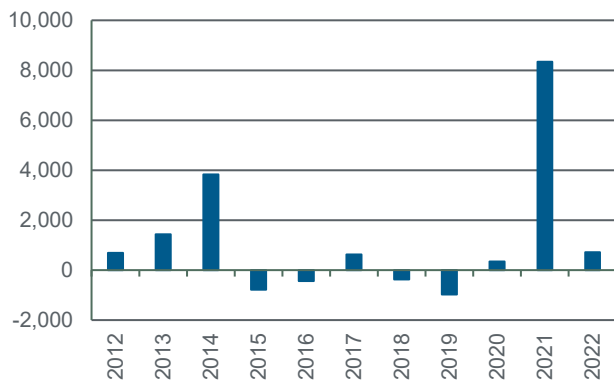
Data for the year 2019. Answer to the question asked of business leaders: 'In your country, how burdensome is it for companies to comply with public administration's requirements?' [1=extremely burdensome; 7=not burdensome at all].

Source: WEF, own rendition.

The significance of the differences between countries is uncertain given the small survey sample. But finishing second within our comparison group does provide an indication that the bureaucratic burden perceived by business leaders in Germany was relatively low at the time of the latest survey (2018–2019). With respect to the bureaucratic burden thus measured, China scored significantly better than for regulatory quality, while Italy ranked lower again.

Figure S3: Compliance costs of German businesses

Difference in annual compliance costs for legal requirements, in EUR millions



Source: Federal Statistical Office, own rendition

As the last internationally comparative business survey is already several years old, it is also worth taking a glance at how the bureaucratic burden developed in Germany over time. The Federal Statistical Office, in a collaborative work with the federal ministries responsible for legislation, regularly estimates the administrative costs that emerge or are cancelled for businesses as a result of new regulations. The most comprehensive measure of administrative cost is the compliance cost which businesses incur in meeting legal requirements – for example, documentation obligations, labelling requirements, duty to cooperate in inspections or compliance with minimum standards, for example in occupational safety. While the compliance costs for businesses decreased in Germany in 2019 and rose only moderately in 2020, a sharp increase is notable in the year 2021. Starting from a good position, the bureaucratic burden may therefore have increased in recent

years. However, the data on the administrative burden in Germany does not provide a clear picture. For instance, the increase in compliance cost in the year 2021 was solely due to the Act on the Further Development of the Greenhouse Gas Reduction Quota – a regulation that directly impacts only companies in the petroleum industry. In addition, the administrative costs index, which is more narrowly defined but reported with greater frequency and describes all information obligations in the meaning of classic 'red tape' as a subset of compliance cost, has recently eased significantly. In fact, the administrative costs index has rather been trending downwards since the middle of the last decade.

Figure S4: Administrative costs index

January 2012=100



Source: Federal Statistical Office, own rendition

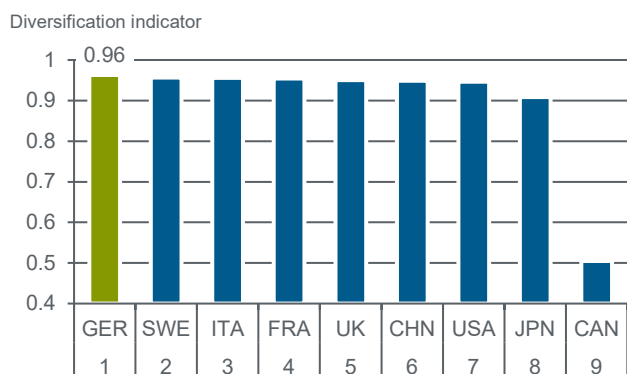
Ultimately, estimating administrative costs in advance is likely to be difficult.³⁸ Furthermore, the administrative costs caused by EU regulations are not captured by the Federal Statistical Office. The extent of the administrative burden is therefore unclear. Germany appears to have fared well in international comparison just a few years ago and there is no clear evidence of an increase in the bureaucratic burden since then. Under a supplementary survey to the KfW SME Panel in March 2023, respondents nonetheless mentioned the bureaucratic burden as the greatest risk to future international competitiveness at their German location.³⁹

Broad trade diversification thanks to good market access...

Finally, market access is also crucial for the attractiveness of an investment location. The size of the relevant economy itself plays a role here, with Germany ranking fourth with a gross domestic product of USD 4.1 trillion in the year 2022, just behind Japan (USD 4.2 trillion) and well behind the US (USD 25.5 trillion) and China (USD 18.1 trillion). However, what also matters is economic integration with trading partners, which is very pronounced in the EU thanks to the common internal market, where common GDP is as large as USD 16.6 trillion. We apply a measure for the diversification of export markets as an indicator for access to international sales markets – and, with limitations, also for resilience against trade barriers and geopolitical shocks.⁴⁰ Germany ranks highest for this indicator and also has the highest diversification on the imports side, according to calculations by the International Monetary Fund.⁴¹ It must be noted, however, that the differences to most other economies in our comparison group are only minor with the exception of Japan and, in particular, Canada, both of which are very heavily focused on their large neighbouring countries. What is

decisive for an economy's susceptibility to disruptions in international trade is not just its diversification but its degree of openness, with Germany being particularly exposed due to the very high weight of exports in the economy. Germany's export share is 47% of GDP, which is significantly higher than in Italy, the second most open economy in our comparison group (33%), while exports in the US are a mere 11% of GDP.

Figure S4: Trade diversification



Data for the year 2021. The diversification indicator is calculated based on the Herfindahl-Hirschman market concentration index (=1-Index). The indicator measures how exports are distributed across an exporter partners. A country whose trade is concentrated primarily in a few markets has an index value close to 0.

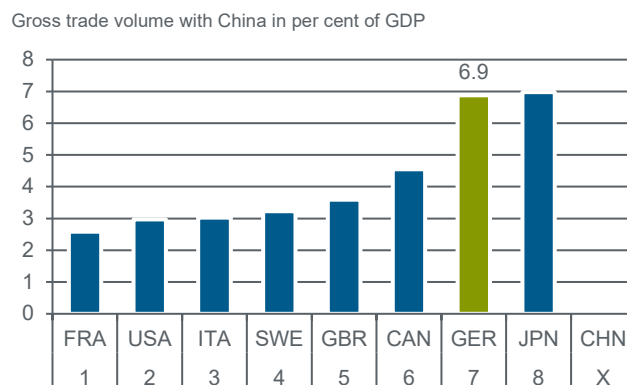
Source: UNCTAD, own rendition

... but also strong exposure in trade with China

Furthermore, Germany has very close trade ties with China, which is in a growing geopolitical conflict with the West. With a share of 9% in Germany's trade turnover, China is its most important single trading partner and Germany's trade exposure to China is also high compared with other major economies. Germany's gross trade volume with China amounts to 6.9% of German GDP, which in our comparison group is surpassed only by China's direct neighbour Japan.⁴² Both Germany's exports to China (2.9% of German GDP) and its imports from China (4.0% of German GDP) are above-average. China's importance as a sales market is particularly high. The share of German value added that relies on final demand from China recently stood at around 3%.⁴³ According to calculations by the Bundesbank, 22% of Germany's global

turnover and 15% of its global investment income has been generated from investments in China in recent years.⁴⁴ Finally, imports from China also play an important role for Germany in some intermediate and high-tech products that are difficult to substitute.⁴⁵

Figure S5: Trade integration with China



Data for the year 2021. Gross trade volume=exports+imports.

Source: UNCTAD.

Heavy dependencies in the supply of raw materials

Considerable dependencies also exist in the supply of raw materials, as Germany and Europe are heavily dependent on the imports of metals and certain industrial minerals to manage the green and digital transformation.⁴⁶ The European Commission calculated that the greater part of the raw materials required for the production of many key technologies in the EU comes from China. For example, 65% of the raw materials needed for electric motors is sourced from China.⁴⁷ To be sure, the determination of critical import dependencies is extremely complex, as it depends on various factors, such as the substitutability of imports by alternative countries of origin, the availability of alternative products or domestic production. However, the high concentration of global raw material extraction on few countries, many of which are geopolitically critical or unstable, is without a doubt an almost universal problem faced by the G7 countries. China, on the other hand, as the largest producer of numerous critical metals and minerals, has a considerable competitive advantage as a supplier of raw materials.⁴⁸

Table 2: Scoreboard with numerical and coloured rankings within the selected sample (G7+China and Sweden)

		USA	SWE	GER	CAN	FRA	GBR	ITA	JPN	CHN	Ranking
Labour	Labour costs (USD per hour; 2019)	4	6	5	1	6	2	3			1=lowest costs
	Qualification (Pisa results; 2022)	4	5	6	2	7	3	8	1		1=highest score
	Qualification (mean years of schooling)	3	5	7	2	7	4	8	6	8	1=most years of schooling
	Labor supply (change of working-age population, 2023 to 2033)	3	1	8	2	5	4	9	7	6	1=highest growth
Capital	Stock of capital (USD per person; 2019)	6	3	4	5	2	7	1	8	9	1=highest capital stock
	Business investment (percent of GDP; mean 2010–2019)	6	3	5	7	4	8	6	2	1	1=highest investment ratio
	Public investment (percent of GDP; 2021)	5	1	8	4	3	7	6	2	9	1=highest investment ratio
	Logistics Performance Index for infrastructure (Index, 2023)	6	3	1	2	7	5	8	4	5	1=highest index value
Innovative potential	Effective tax rate of investment projects (2021)	4	2	8	6	7	1	3	9	5	1=lowest tax burden
	Access to finance for SMEs (survey scale; 2019)	1	3	2	4	8	6	9	5	7	1= best access
	R&D expenditure (percent of GDP; 2021)	1	2	4	6	7	5	3	8	3	1=highest expenditure ratio
	Venture capital financing (percent of GDP; average 2021 and 2022)	1	3	6	4	5	2	9	8	7	1=highest financing ratio
Energy supply	Digitisation Index (2022)	1	2	6	3	7	4	9	8	5	1=best ranking
	Global Innovation Index (2022)	1	2	4	8	6	3	9	7	5	1=highest index value
	Electricity prices in the industrial sector (USD per MWh; 2022)	1	3	6	2	4	5	7			1=lowest price level
	Gas prices in the industrial sector (USD per MWh, 2022)	2	7	4	1	5	3	6			1=lowest price level
Government framework and international dependencies	Share of renewables in primary energy consumption (in percent, 2019)	8	1	4	2	5	7	3	9	6	1=highest share
	Energy intensity of manufacturing value added (MJ/USD; 2021)	6	7	1	8	5	4	2	3		1=lowest intensity
	Quality of regulation (survey ranking; 2022)	6	1	4	2	7	3	8	5	9	1=highest quality
	Bureaucratic burden (survey scale; 2019)	1	7	2	6	8	4	9	5	3	1=lowest burden
GDP	Trade diversification (Index, 2021)	7	2	1	9	4	5	3	8	6	1=highest diversification
	Gross trade volume with China (percent of GDP, 2021)	2	4	7	6	1	5	3	8	9	1=lowest trade volume
	GDP per capita in PPP weighted USD (2022)	1	2	3	4	5	6	7	8	9	1=highest GDP

Source: see graphics.

Conclusion: Strengths, weaknesses and need for action

The **outcome indicators** described at the outset show that Germany is able to tackle the challenges of preserving its sources of prosperity from a sound starting position. Measured by gross domestic product per capita, Germany is emerging from a golden decade. It has continuously narrowed the gap to the leading industrial nation US in the 2010s, while the growth in business investment in Germany has been able to keep up internationally, although without standing out. Measured by the real effective exchange rate since the end of the economic and financial crisis, Germany's price competitiveness has remained quite steady, and its unit labour costs still appear to be moderate in spite of the catch-up development of the past ten years, which has likely contributed to the generally sound export performance in the past decade.

Taking into consideration all locational factors, Germany occupies a mid-table position in our comparison group. There are strengths, weaknesses and a need for action in each of the five categories. With respect to the **supply of labour**, greatest challenges lie in the demographic trend because the age structure in Germany heralds a particularly sharp decline in the working-age population and growing skills shortages for the coming years that can only be addressed through a combination of multiple measures.⁴⁹ As a result of the particularly unfavourable demographic development, rising non-wage costs could also increase labour costs in the future, which are currently in the middle of the comparison group. In terms of basic school qualifications, a way out of mediocrity must also be found again, which requires, among other things, greater equality of opportunity in educational attainment. Ultimately, however, survey studies such as the KfW Internationalisation Report demonstrate that businesses still regard the availability of highly trained skilled workers as a locational advantage.⁵⁰ Maintaining this advantage, however, will become more challenging in the future.

The indicators for the **supply of capital** give Germany as a business location an average scorecard overall, which also is also reflected in an average business investment ratio. Germany scores with good access to finance even for small and medium-sized enterprises, as well as with a relatively high real capital stock and a transport infrastructure that is still rated outstanding by international standards, the efficiency of which, however, has recently begun to decline. At the same time, its attractiveness as a location needs to be enhanced in the area of public-sector investment, which remains relatively low despite recent improvements, and with respect to the tax burden on investment returns.

In general terms, **innovative capacity** is one of Germany's strengths. Relatively high expenditure on research and development generates a corresponding output. While the transfer of knowledge between science and industry generally works well, there is a lack of technology transfer to smaller companies and the implementation of "inventions" in start-ups. This also shows that venture capital financing still plays too small a role. Another problem is the particularly high

concentration of R&D expenditure on large companies from just a few sectors of the economy. Finally, Germany is only midfield in the area of digitalisation.

Quantifying the costs of **energy supply** is made difficult by the lack of up-to-date, internationally comparable data. Particularly in relation to the USA and Canada, however, electricity and gas prices are probably still so high that they can no longer be compensated for by the high energy efficiency of German industry. Yet some other European countries are at a similar disadvantage or have even higher energy prices, and the trend in Germany's electricity and gas prices is pointing in the right direction since 2023. In order to reduce energy prices to a competitive level while continuing to advance on the path to greenhouse gas neutrality, there needs to be more clarity about the possible range of future electricity prices and a rapid continued expansion of renewables. This requires substantial public and private investment in generation capacity and associated technologies such as electricity grids and storage systems.⁵¹

Perhaps the most surprising findings come from the international comparison of the **administrative burden**. Contrary to the current frequent complaints about a high bureaucratic burden, Germany performs well in the common, internationally available indicators. It must be noted, however, that the picture is ambiguous. In our SME survey, respondents recently described the administrative burden as by far the greatest risk to future international competitiveness at their German location, even before taxes and charges.⁵²

Finally, in an environment of growing geopolitical conflicts and trade restrictions, Germany is particularly vulnerable because of its strong export orientation. Even if Germany's export and import markets are generally highly diversified, China remains a cluster risk in trade and with respect to returns from direct investments. Furthermore, there are significant **dependencies** in Germany's supply of raw materials, for which China and other authoritarian or unstable states play a major role.

A look at the international dependencies ultimately highlights the fact that the challenges Germany currently faces go well beyond the scores it achieves with respect to traditional location conditions. Just as decisive are the vulnerabilities of Germany's economic structure. Germany's strong export orientation, in particular, is linked to the exceptionally important role of the manufacturing sector. Challenges such as decarbonisation are thus more difficult to master than in service-oriented economies – particularly as the automotive industry, which is very important for Germany, is facing a profound technological change and decarbonisation in the USA is being driven primarily by subsidies instead of CO₂ prices. Finally, subsidies and other industrial and trade policy measures have considerably gained in importance outside climate policy as well, especially since the US administration under President Biden moved to decidedly promote the manufacturing sector.

¹ Manufacturing currently generates around one fifth of Germany's gross value added (2022), which is significantly more than in other advanced economies such as France (11%), the United Kingdom (9%) or the US (11%).

² Garver, R. (2022), Report: China Spends Billions of Dollars to Subsidize Favored Companies, Voice of America (May 24th, 2022); accessed via: [Report: China Spends Billions of Dollars to Subsidize Favored Companies \(voanews.com\)](https://www.voanews.com/news/China-Spends-Billions-of-Dollars-to-Subsidize-Favored-Companies-20220524).

- ³ McKinsey (2022), The Inflation Reduction Act: Here's what's in it, Article (October 24th, 2022); accessed via: [What's in the Inflation Reduction Act \(IRA\) of 2022 | McKinsey](#). ifo Institute (2023), Die Betroffenheit der deutschen Wirtschaft durch den US-Inflation Reduction Act (*The impact of the US Inflation Reduction Act on the German economy* – our title translation, in German), ifo Kurzexpertise (March 2023); accessed via: [Die Betroffenheit der deutschen Wirtschaft durch den US-Inflation Reduction Act \(IRA\) \(bundesfinanzministerium.de\)](#).
- ⁴ IMD World Competitiveness Center (2023), World Competitiveness Ranking 2023 Results (June 20th, 2023); accessed via: [World Competitiveness – IMD business school for management and leadership courses](#).
- ⁵ ZEW (2023), Deutschland ist der große Verlierer im Standortwettbewerb, (*Germany is the great loser of the locational competition* – our title translation, in German), Länderindex Familienunternehmen: Aktuelle Krise sollte als Chance zur Umkehr genutzt werden (*Current crisis should be used as an opportunity for a reversal* – our title translation, in German) (16 January 2022); accessed via: [Aktuellmeldung: Deutschland ist der große Verlierer im Standortwettbewerb | ZEW](#).
- ⁶ McGrath, J. and M. Bobev (2022), Nation Brands Index 2022: Germany finishes first again with Japan and Canada rounding out the top three nations, Ipsos (November 2nd, 2022); accessed via: [Nation Brands Index 2022: Germany finishes first again with Japan and Canada rounding out the top three nations | Ipsos](#).
- ⁷ Vigers, B. (2023), Germany Remains Atop Global Leadership Ratings Under Scholz, Gallup (June 7th, 2023); accessed via: [Germany Remains Atop Global Leadership Ratings Under Scholz \(gallup.com\)](#).
- ⁸ Bähr, C. and Barth, H. (2021), Standort Deutschland nach der Großen Koalition: Eine Bewertung mit dem IW-Standortindex (*Germany as a location after the Grand Coalition: an assessment with the IW Locational Index* – our title translation, in German), IW-Trends 3/2021 accessed via: [Standort Deutschland nach der Großen Koalition: Eine Bewertung mit dem IW-Standortindex - Institut der deutschen Wirtschaft \(IW\) \(iwkoeln.de\)](#).
- ⁹ Sinn, H. W. (2003), Ist Deutschland noch zu retten? (*Can Germany still be saved?* – our title translation, in German) Econ Verlag. From the jacket blurb (our translation): 'Germany has become the sick man of Europe. The educational system is abysmal, competitiveness is disastrous. The demographic development is bringing us to our knees, the social security systems are ramshackle and producing even more unemployment. Politicians, business and trade unions are passing the buck back and forth. How could we let this happen? Hans-Werner Sinn provides unsettling answers and maps a way forward with a "Ten-point Programme for the Renewal of the Economy", showing what needs to be done immediately to save Germany.'
- ¹⁰ The Economist (1999), The sick man of the euro (June 3rd, 1999), accessed via: [The sick man of the euro \(economist.com\)](#).
- ¹¹ Dustmann, C., Fitzenberger, B., Schönberg, U. and Spitz-Oener, A. (2014), From Sick Man of Europe to Economic Superstar: Germany's Resurgent Recovery, American Economic Association, Journal of Economic Perspectives, Vol. 28, No. 1 (Winter 2014), pp. 167–188; accessed via: [From Sick Man of Europe to Economic Superstar: Germany's Resurgent Economy - American Economic Association \(aeweb.org\)](#).
- ¹² Münchau, W. (2023), Britain is not the sick man of Europe – that accolade goes to Germany, The New Statesman (June 7th, 2023), accessed via: [Britain is not the sick man of Europe – that accolade goes to Germany - New Statesman](#).
- ¹³ The adjustment for inflation is based on the assumption that, from the perspective of the importing country, the price attractiveness of imported goods remains the same when their prices rise at the same rate as their own inflation. If the inflation rate of the exporting country is lower, the exporting country can raise the prices of the exported goods less steeply at the rate of the inflation difference when the nominal exchange rate is steady and thereby make them more attractive for the importing country without foregoing export earnings in real terms. In other words, the exporting country's price competitiveness rises. Opposite considerations apply when the inflation rate in the exporting country is higher.
- ¹⁴ Deutsche Bundesbank (2022), Rise in energy prices, the exchange rate of the euro and Germany's price competitiveness, Monthly Report December 2022, Pages 45-54, accessed via: [Deutsche Bundesbank \(2022\), Rise in energy prices, the exchange rate of the euro and Germany's price competitiveness \(bundesbank.de\)](#).
- ¹⁵ China and Sweden were not included in this comparison of unit labour costs for lack of comparable data. Japan is special because the general deflationary trends there led to an internationally atypical, sharp decline in unit labour costs there since the mid-1990s which only ended in 2015.
- ¹⁶ China did not participate in the 2022 PISA study. In 2018, the last year China took part, it still achieved a very high 579 points, although this was not the national average but the result of tests in only four regions that were particularly highly developed and therefore not necessarily representative of the country as a whole.
- ¹⁷ Cf. OECD (2018): [Country Note PISA 2018 – Germany](#); OECD (2022): [Country Note PISA 2022 – Germany](#).
- ¹⁸ Expected years of schooling that a child who is of enrolment age will prospectively need to be at school, in training or a degree course.
- ¹⁹ Cf. Causa et al. (2022), The post-COVID-19 rise in labour shortages, OECD Economics Department Working Papers No. 1721.
- ²⁰ Cf. [Bevölkerungsprognosen und ihre Interpretation \(Population projections and their interpretation – our title translation, in German\) - Wirtschaftsdienst](#).
- ²¹ Matjeves, O. and O. Tkacev (2023), Invest One – Get Two Extra: Public Investment Crowds In Private Investment, SUERF Policy Brief No 499 (January 2023), accessed via: [f_e3d6cc3234536c545e69eb18115b6ebf_59417_suerf.pdf](#).
- ²² Cf. World Bank (2023), Connecting to Compete 2023, The Logistics Performance Index and Its Indicators, accessed via: [LPI_2023_report.pdf \(worldbank.org\)](#).
- ²³ Cf. Zimmermann, V. (2022): Die Entwicklung der FuE-Ausgaben in Deutschland im internationalen Vergleich (The development of R&D expenditure in Germany in international comparison – in German), Focus on Economics No. 404, KfW Research; Rammer, C. and Trunschke, M. (2022): Studie zur Entwicklung der Forschungs- und Entwicklungsausgaben in Deutschland im internationalen Vergleich (*Study on the development of research and development expenditure in Germany in an international comparison* – our title translation, in German), Study commissioned by KfW Group.
- ²⁴ Cf. [The Digital Economy and Society Index \(DESI\) | Shaping Europe's digital future](#)
- ²⁵ Cf. Zimmermann, V. (2021): Information technologies are not one of Germany's strengths but of vital importance as technologies of the future, Focus on Economics No. 332, KfW Research.
- ²⁶ Cf. Zimmermann, V. (2023): Wo steht Deutschland bei Innovation und Digitalisierung im internationalen Vergleich? (Where does Germany stand in innovation and digitalisation in an international comparison? – in German only), Focus on Economics No. 412; KfW Research.
- ²⁷ In 2021 the share of natural gas in industrial energy use was 30%, followed by electricity with 21%. Cf. [Bedeutung der energieintensiven Industriezweige in Deutschland - Statistisches Bundesamt \(destatis.de\) \(Importance of energy-intensive industrial sectors in Germany – our title translation, in German\) Federal Statistical Office](#)
- ²⁸ Brüggemann, A. (2023): Natural gas as a bridge to climate neutrality in Germany – a reassessment. Focus on Economics No. 442, KfW Research.
- ²⁹ No comparable data is available for China, while the most recent data for Japan is from the year 2021. At the time, Japan had a slightly lower electricity price than Germany (USD 162 per MWh vs USD 173 per MWh).
- ³⁰ In the Netherlands and Denmark, electricity prices for industrial customers were almost on the same level as in Germany in 2022.
- ³¹ Cf. [BDEW-Strompreisanalyse Februar 2024 \(BDEW Electricity price analysis February 2024 – our title translation, in German\), \(Slide 24\)](#)
- ³² Based on the electricity prices for households, which are also available from the IEA and which are likely to be the same as those of many SME services enterprises, in an international comparison Germany ranks on a similar level as industrial consumers.
- ³³ After a global surge in the pandemic year 2020, the global renewables share fell again in 2021, according to the IEA. In the course of the global increase in energy prices of 2022, considerable additional capacity was then brought online. However, internationally comparable data is available only up to the pandemic year 2020, so we use data from 2019. Cf. <https://www.iea.org/reports/sdg7-data-and-projections/modern-renewables>.
- ³⁴ Including in the form of hydrogen or similar sources but without nuclear power and under the assumption that only a small portion can be compensated through the removal of carbon dioxide from the atmosphere.
- ³⁵ The overall energy intensity of the manufacturing sector is also influenced by its composition. In terms of the competitive situation of the particularly energy-intensive industries, energy intensity must be analysed at sector level: Cf. Scheuermeyer, P. (2023): Wettbewerbsfähigkeit nach dem Gaspreisschock: Auf Energiepreise und Effizienz kommt es an (Competitiveness after the gas price shock: energy prices and efficiency are what matters – in German), Focus on Economics No. 434, KfW Research.
- ³⁶ Cf. <http://info.worldbank.org/governance/wgi/Home/Documents>
- ³⁷ Cf. Possible answers ranged from 1 for 'extremely burdensome' to 7 for 'not burdensome at all'.
- ³⁸ Subsequent estimates are made only after around two years and therefore cannot reflect the most recent regulatory initiatives.
- ³⁹ Cf. Abel-Koch, J. (2023), [KfW Internationalisation Report 2023](#), KfW Research.
- ⁴⁰ The diversification indicator is calculated on the basis of the Herfindahl-Hirschman market concentration index (=1-Index). The indicator is a measure of the distribution of traded value across an exporter's partners. A country whose traded value is concentrated primarily in a few markets has an index value close to 0. It is therefore an indicator of an exporter's degree of dependency on its trading partners and of the danger that looms when its partners raised their trade barriers.

⁴¹ Cf. IMF (2023): IMF Country Report No. 23/258, p. 27 (Figure 17).

⁴² The gross trade volume of some smaller OECD economies with China is even significantly higher than that of Germany, with important commodity exporters such as Chile and Australia playing a major role on the exports side. On the imports side, China is particularly dominant for industry-heavy countries such as the Czech Republic and Slovenia.

⁴³ Cf. OECD (2022): Trade in Value Added (TiVA) Principal Indicators. Latest data update from the year 2020.

⁴⁴ Cf. Deutsche Bundesbank (2023): Germany as a business location: selected aspects of current dependencies and medium-term challenges, Monthly Report September 2023.

⁴⁵ Cf. *ibid.*; IMF (2023): IMF Country Report No. 23/258, p. 27 (Figure 17); Baur A. and Flach L. (2022): German-Chinese Trade Relations: How Dependent Is Germany on the Middle Kingdom? *ifo Schnelldienst* 4/2022, 13 April 2022.

⁴⁶ Cf. Brüggemann, A. and Levinger, H. (2022). Securing critical raw materials for the net zero and digital transformation. *Focus on Economics* No. 399, KfW Research.

⁴⁷ Cf. European Commission (2020), 'Critical Raw Materials for Strategic Technologies and Sectors in the EU – A Foresight Study', available from: <https://ec.europa.eu/docsroom/documents/42881>.

⁴⁸ IMF (2023): Fragmentation and Commodity Markets: Vulnerabilities and Risks. *World Economic Outlook* October 2023.

⁴⁹ Cf. Müller, M. (2023): Skills shortage marks a turning point: The times of guaranteed growth are over. *Focus on Economics* No. 414, KfW Research.

⁵⁰ Cf. Abel-Koch, J. (2023): *KfW Internationalisation Report 2023*, KfW Research.

⁵¹ Cf. Brand et al. (2021): Investing EUR 5 trillion to save the climate – a surmountable challenge. *KfW Research*, *Focus on Economics* No. 350, 7 October 2021.

⁵² Cf. Abel-Koch, J. (2023): *KfW Internationalisation Report 2023*, KfW Research.