GERMAN COUNCIL
of Economic Experts

UPDATED ECONOMIC OUTLOOK 2022 AND 2023

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KEY MESSAGES

↘ Russia's war of aggression against Ukraine has greatly increased uncertainty regarding economic development, dampens growth, and contributes to the rise in energy and consumer prices.

↘ For Germany, the German Council of Economic Experts (GCEE) expects gross domestic product (GDP) to increase by 1.8 % in 2022 and 3.6 % in 2023, and inflation to hit 6.1 % and 3.4 %, respectively.

↘ The high dependence on Russian energy exports induces a considerable risk of lower economic output and higher inflation. Germany should immediately make every effort to be prepared for a suspension of Russian energy supplies and to end its dependence on Russian energy sources.

SUMMARY

The **Russian war of aggression against Ukraine is clouding** the **outlook for the global economy** and creating great political uncertainty. Persistently high prices for energy and raw materials and a loss of food and fertilizer exports from Ukraine and Russia are likely consequences. Economic growth will slow considerably, **particularly in the European Union**. Heavy reliance on imports of Russian energy poses a particular risk for some Member States. Cuts to supply or an embargo on energy imports from Russia cannot be ruled out.

Before the outbreak of the war, **global economic development** was robust. While the spread of the Omicron variant of the coronavirus (SARS-CoV-2) had resulted in record levels of new infections in many countries, the economic fallout from the repeated waves of the pandemic is fading. On the other hand, Russia's war of aggression against Ukraine and the sanctions imposed in response are exacerbating disruptions in global supply chains and increasing inflationary pressure. These **supply-side difficulties** are likely to still encounter **consumer demand** that remains **healthy**. Contact-intensive services, in particular, are expected to recover further in the second half of 2022. With the continued normalisation of the consumption structure between goods and services, pandemic-related bottlenecks, at least, should play less of a role in the course of the year. Spending of some unplanned savings that have been accrued due to the pandemic and a solid labour market are likely to provide stimuli for growth.

The GCEE expects **GDP growth rates** in the **euro area** of **2.9 %** for 2022 and 2023. As the basis for this projection, the GCEE assumes that energy prices will remain high in the forecast period but that energy supply from Russia will not be halted. Germany's GDP is likely to increase by **1.8 %** in 2022 and **3.6 %** in 2023. The GCEE expects inflation rates of **6.2 %** and **2.9 %** (HICP) in the euro area in 2022 and 2023, respectively, and of **6.1 %** and **3.4 %** (CPI) in Germany. Due to the heavy reliance on Russian energy exports, there is a considerable risk of lower economic output and even a recession with much higher rates of inflation.

Germany should immediately make every effort to take precautions against a suspension of Russian energy supply and to quickly **end its dependence on Russian energy sources**. The long-term goal must be to ensure higher energy security through diversification.

I. INTERNATIONAL ECONOMY

1. Development of the global economy

1. **Russia's war of aggression** against Ukraine has **significantly clouded** the **outlook for the global economic development**. In response to the attack, several economies have introduced **sweeping sanctions** against Russia, largely cutting the country off from international financial markets and significantly limiting trade with Russia in some areas. ↘ BOX 1 In addition, a whole range of Western companies have stopped exporting to Russia or transactions within Russia. The economic pain of the sanctions imposed so far will primarily be felt in Russia itself. At the same time, they are likely to slow global growth – particularly this year – and accelerate inflation, which is already high in many countries. ↘ BOX 1 ↘ BOX 3 ↘ ITEM 58 ↘ ITEM 38 ↘ ITEM 17 ↘ ITEM 19

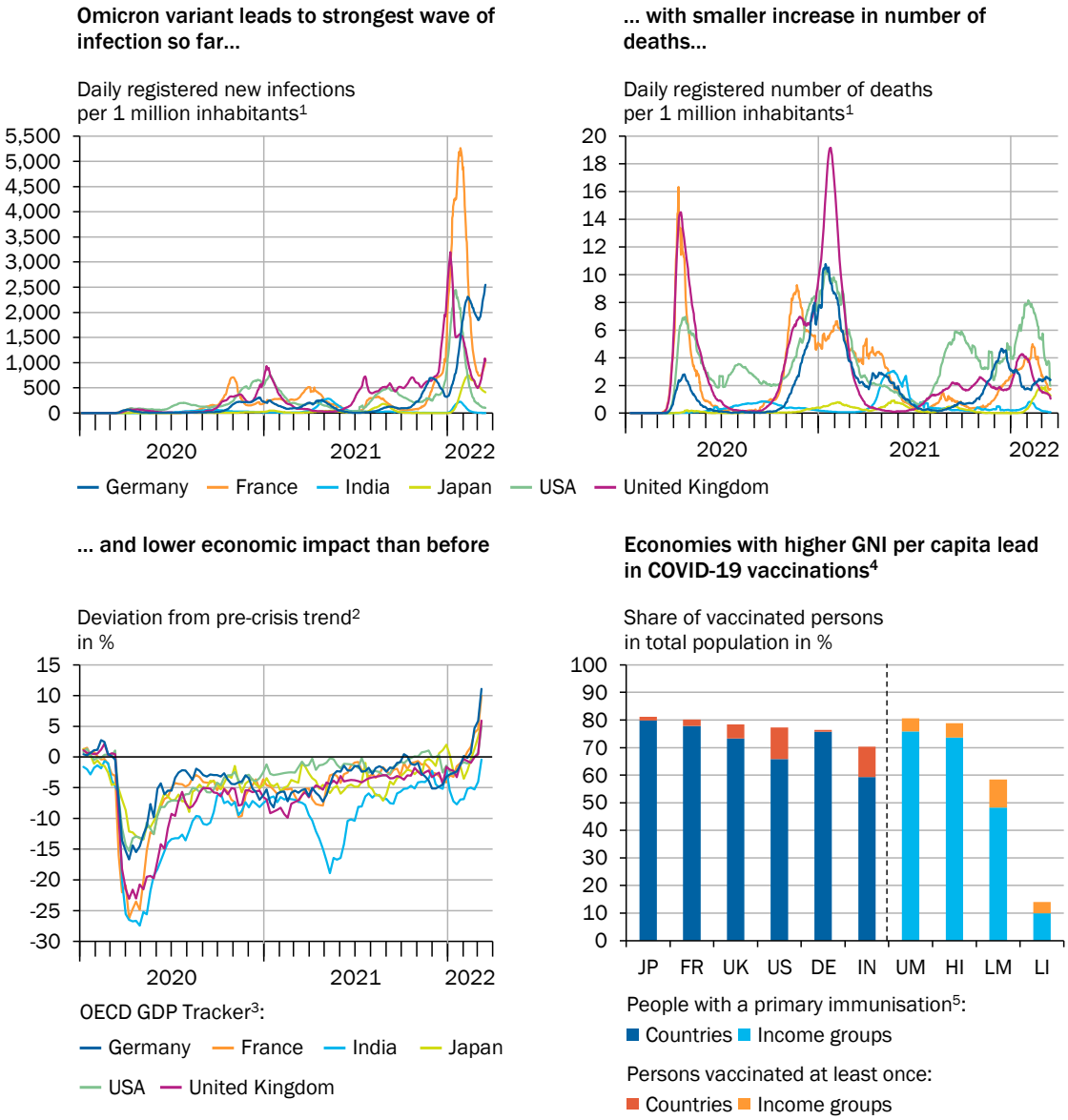
2. Right now, there is much uncertainty surrounding the economic impact of the war. It depends primarily on the duration of the war, the effectiveness of the sanctions already imposed and other potential developments, such as the possible suspension of Russian energy supply. In principle, however, **the impact of Russia's war of aggression against Ukraine on the global economy** will flow through **three main channels** ↘ BOX 1 ↘ BOX 3: First, increased uncertainty in general is likely to negatively affect consumer confidence. Empirical evidence on the effect of geopolitical events also indicates that business investments and business share prices drop when uncertainty is high (Caldara and Iacoviello, 2021). Second, an economic downturn in some countries could spill over to these countries' trade partners through global trade relations. And third, soaring energy prices are already significantly eroding households' purchasing power and increase costs for businesses. This is likely to push up inflation further in the upcoming months. ↘ ITEMS 10 F.

3. Apart from the impact of the war, global economic development continues to be marked by the COVID-19 pandemic. The **Omicron variant** discovered at the end of November 2021 brought a new wave of the coronavirus (SARS-CoV-2) and has since become the dominant strain in almost every country. It is likely to have **slowed the rate of economic growth** in several countries **at the turn of the year 2021/2022**, particularly in Europe and some emerging economies like China and India. Being more contagious than the Delta variant, Omicron resulted in a new record in global infections in the second half of January 2022, with an average of around 3.5 million new cases reported daily – around four times the numbers reported during the previous peak in early 2021. The increase in new cases was particularly pronounced in the United States and Europe. ↘ CHART 1 TOP LEFT While, in global terms, the number of new cases has been dropping sharply since mid-February, case numbers are currently on the rise again, particularly in European countries. Furthermore, in many Asian countries – including China – infections associated with the Omicron wave started to rise significantly only in mid-February, which would indicate that the wave has not yet peaked in every country.

4. The sharp **increase in reported new cases at the start of 2022** in regions where a high percentage of the population has received a primary immunisation against COVID-19 demonstrates that vaccines cannot prevent infections. That said, the increased uptake of COVID-19 vaccinations – particularly booster shots – plays an important role in protecting against severe illness (Barda et al., 2021), a fact that is clearly demonstrated by the much **lower increase in the number of deaths** in connection with a COVID-19 infection compared to the previous waves of infection. ↘ CHART 1 TOP RIGHT ↘ BACKGROUND INFO 1

↘ CHART 1

Development of the coronavirus pandemic and vaccination progress in selected economies



1 – Moving average of the past seven days. 2 – Pre-crisis trend based on OECD GDP forecasts from November 2019. 3 – The OECD Weekly Tracker of GDP growth is a real-time high-frequency indicator of economic activity using machine learning combined with Google search queries related to consumption, housing, trade, industrial activity and economic uncertainty. 4 – Data as of 18 March 2022. JP-Japan, FR-France, UK-United Kingdom, US-United States, DE-Germany, IN-India, UM-Upper-middle income, HI-High income, LM-Lower-middle income, LI-Low income. 5 – Alternative definitions of primary immunisation against COVID-19, e.g. being recovered and having received one dose of a 2-dose protocol, are excluded to allow better comparability between countries.

Sources: OECD, Our World in Data, Weltbank, WHO, World Bank, own calculations

↘ BACKGROUND INFO 1

International COVID-19 vaccination progress

Progress continues to be made in the **COVID-19 vaccination programme globally,** and particularly in advanced economies, even though vaccination gaps and differences in booster uptake still exist (IMF, 2022a, 2022b; GCEE Annual Report 2021 box 1). In autumn 2021, 64.2 % of the population in advanced economies had received primary immunisation against COVID-19; since then coverage has increased by 8.4 percentage points to 72.6 % (OWID, World Bank, data at 18 March 2022). **However, many emerging and developing countries are still not on track** to reach the goal of primary immunising 70 % of the population through vaccination in all countries by mid-2022 (WHO, 2021; IMF, 2022c, 2022d). For example, vaccination coverage in lower middle-income economies (according to the World Bank definition) is 48.3 %, and in low-income economies only 9.9 %, compared to 73.7 % in high-income economies and 75.9 % in upper middle-income economies (OWID, World Bank, data at 18 March 2022). ↘ CHART 1 BOTTOM RIGHT Of the large emerging economies, vaccine coverage is currently 59.3 % in India but 87.8 % in China. At 79.8 %, 77.5 % and 75.7 %, respectively, Japan, the euro area and Germany are ahead of the United Kingdom (73.3 %) and the United States (65.8 %). The development of the virus so far and the global spread of the Omicron variant pose the **risk that mutations of the SARS-CoV-2 virus will produce new variants in the future,** which will once again put pressure on healthcare systems and require an adjustment to current vaccines (IMF, 2022d; WHO, 2022; GCEE Economic Outlook box 3).

5. The **economic fallout** from the **Omicron wave** is likely to **be milder** than in **previous waves**. Real-time indicators for the development of the gross domestic product (GDP) suggest that the link between the number of new cases and economic output has declined significantly since the first wave. ↘ CHART 1 TOP AND BOTTOM LEFT Despite the recent record highs of new case numbers, the containment measures introduced were generally not as extensive – with the exception of some Asian countries, primarily China. ↘ ITEM 18 Furthermore, households and businesses have probably adapted more and more to the pandemic situation and voluntary restrictions are likely to be less and less pronounced. While there is still a risk of new virus variants emerging that could once again put a strain on the healthcare systems, ↘ ITEM 41 ↘ BACKGROUND INFO 1 at present the assumption is that the influence of the pandemic on economic activity will decline further in the forecast period. However, the development of the pandemic in China, in particular, does present the risk of further disruptions to global supply chains. ↘ ITEM 41

↘ BOX 1

Consequences of Russia's war of aggression against Ukraine and the sanctions imposed on Russia for trade and financial markets

In response to Russia's war of aggression against Ukraine, the United States, the United Kingdom, the European Union (EU) and other countries have imposed widespread sanctions on Russia. In particular, the access of Russia's public and private sectors to international financial markets has been severely restricted. Seven Russian banks, which hold about 30 % of total Russian banking assets, were excluded from the **SWIFT financial messaging system**. While

transactions with these banks are still permitted, transaction costs for payment settlement are likely to increase significantly. The sanctions did not target Sberbank – Russia's largest bank holding 33 % of total Russian banking assets – or Gazprombank. A large part of the payments for Russian oil and gas deliveries is settled through these banks. Furthermore, trading of newly issued Russian government bonds has been banned in the EU and the United States. In addition, transactions with the Central Bank of Russia (CBR) related to the management of reserves or assets have been prohibited by the EU, the United States, the United Kingdom and Japan, among others. This means that the CBR will probably lose access to around 60 % of its reserves, based on an extrapolation of the data published by the CBR in April 2021 on its stock of reserves as at 1 January, 2021 (Bank of Russia, 2021).

Sanctions imposed on the **Russian private sector** include a ban on the provision of financing for certain Russian companies, particularly in the energy sector. Bank deposits over €100,000 from Russian nationals or companies may no longer be accepted by European banks, with few exceptions. Likewise, exports of sanctioned goods may no longer be financed. Furthermore, the provision of public financing for trade with and investment in Russia (e.g. state export credit insurance and investment guarantees) has been prohibited (Deutsche Bundesbank, 2022a). The United States and the United Kingdom have imposed additional sanctions on Russian banks. Financial institutions in these two countries are not permitted to conduct transactions with the sanctioned banks or maintain **correspondent accounts**, thereby cutting off the sanctioned Russian banks from the US and British financial markets. Financial institutions around the world could suspend their relations with Russian banks and businesses to avoid falling under US **secondary sanctions**, which punish foreign individuals or companies that maintain relations with sanctioned entities. Possible penalties include being excluded from the US financial market or being added to the United States sanctions list (Bartlett and Ophel, 2021).

In addition to financial sanctions, **export bans** on **dual-use goods** (products that have both civilian and military use) that were imposed following Russia's annexation of the Crimean Peninsula in 2014 have been extended, and the export of high-tech products to Russia banned in many areas. Aside from government sanctions, numerous Western companies with international operations have voluntarily withdrawn from Russia (Yale School of Management, 2022). The United States has also imposed a **ban on imports** of **Russian oil**, liquefied natural gas (LNG) and coal. The United Kingdom plans to cease imports of oil from Russia by the end of 2022. While the EU Member States have not yet imposed a ban on the import of crude oil and natural gas, the European Commission plans to swiftly reduce dependence on Russian energy imports on a significant scale. ↘ BOX 3

To prevent **capital flight**, Russia has restricted the **withdrawal of foreign currency** in excess of $10,000. In an effort to stabilise the rouble, Russia has required exporters to convert 80 % of foreign currency export earnings into roubles. So far, the Russian state and Russian energy companies have met payments due on dollar bonds (FT, 2022a).

Impact on financial markets

The sanctions are likely to have a limited impact on European banks. At the end of the year 2021, estimated **total claims** vis-à-vis Russian creditors amounted to around €69 billion (BIS, 2022; De Nederlandsche Bank, 2022), with most exposure centered in Italian and French banks, at around €20 billion each, and Austria with an exposure of roughly €15 billion. In relation to capitalization, the Austrian banking sector is the most affected, with claims amounting to 15 % of its capital. ↘ CHART 2 LEFT Full write-downs of the claims would significantly reduce the capital ratio of individual banks, but are unlikely to pose a systemic risk. European banks have weathered the COVID-19 pandemic well so far and have built up risk-weighted capital buffers. (GCEE Annual Report 2021 items 111 ff.). Claims vis-à-vis Ukraine are much lower, at €6.5 billion (BIS, 2022), with Austrian banks having again the most exposure, followed by French banks. However, a significant hike in global oil prices beyond the increase seen so far could

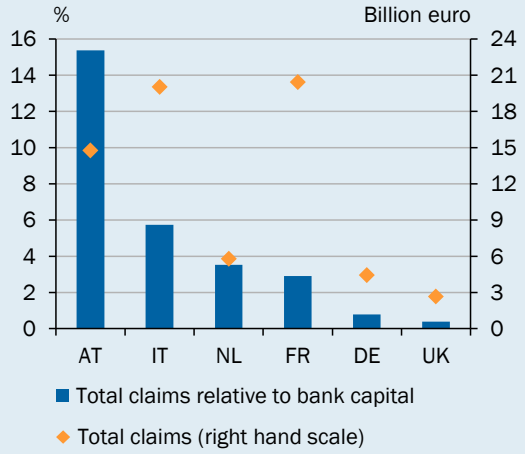
entail much larger-scale burdens for the banking system than losses on direct exposures.

Foreign investors hold around 150 billion US dollars combined in Russian stocks and bonds (FT, 2022b). The proportion of **Russian equities** in **European funds** is well below 1 % (Morningstar, 2022). General uncertainty regarding economic growth and the development of interest rates will play a much more important role for the future development of the stock market. The financial stress indicator of the European Central Bank (ECB) for the euro area has risen sharply since the beginning of February 2022. ↘ CHART 2 RIGHT This indicator, which aggregates financial market measures from the financial intermediaries sector, money markets, equity markets, bond markets and foreign exchange markets, shows the current level of stress and instability in the financial system. It is, however, still well below the level of the financial crisis in the years 2008 and 2009.

↘ CHART 2

Implications of the sanctions for the financial market

Total claims[1] of banks in selected European countries[2] vis-à-vis Russian creditors
Data as at 2021 Q3



Financial market stress in the euro area significantly increased since mid-February 2022

1 – Guarantor basis: Methodology whereby positions are allocated to a third party that has contracted to assume the debts or obligations of the primary party if that party fails to perform. Claims on a guarantor basis are allocated to the country and sector of the entity that guarantees the claims. 2 – AT-Austria, IT-Italy, NL-Netherlands, FR-France, DE-Germany, UK-United Kingdom. 3 – Composite Indicator of Systemic Stress.

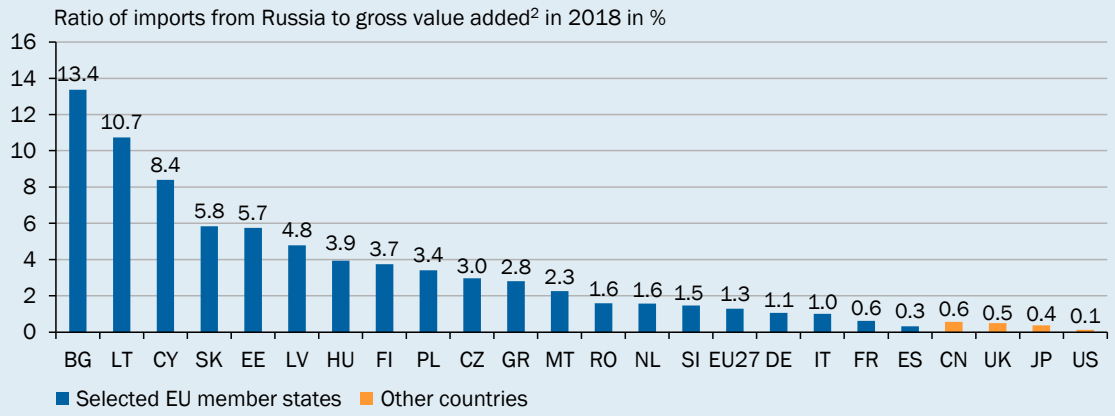
Sources: BIS, ECB, national central banks, own calculations

Impact on trade and the overall economy

The macroeconomic effects of the war are manifold and difficult to estimate so far. They hinge largely on how long the conflict will last and whether it escalates and spreads. The scope and impact of sanctions already adopted and potential additional sanctions also play a central role. In addition, the high level of geopolitical **uncertainty** is likely to weigh on the real economy and financial markets. Direct effects result from bilateral trade links with Russia, Ukraine and Belarus, which are either directly involved in the war or hit by sanctions. The financial sanctions will make the trade with Russia much more expensive and the provision of liquidity and the settlement of transactions more difficult. Due to their geographical proximity, interlinkages between Russia and the Member States of the EU and the euro area - but particularly with the eastern EU Member States - are deep by comparison. Accordingly, these countries are likely to feel the direct effects more profoundly than other states. ↘ CHART 3

↘ CHART 3

Heavy dependence of eastern European EU member states on Russian imports[1]



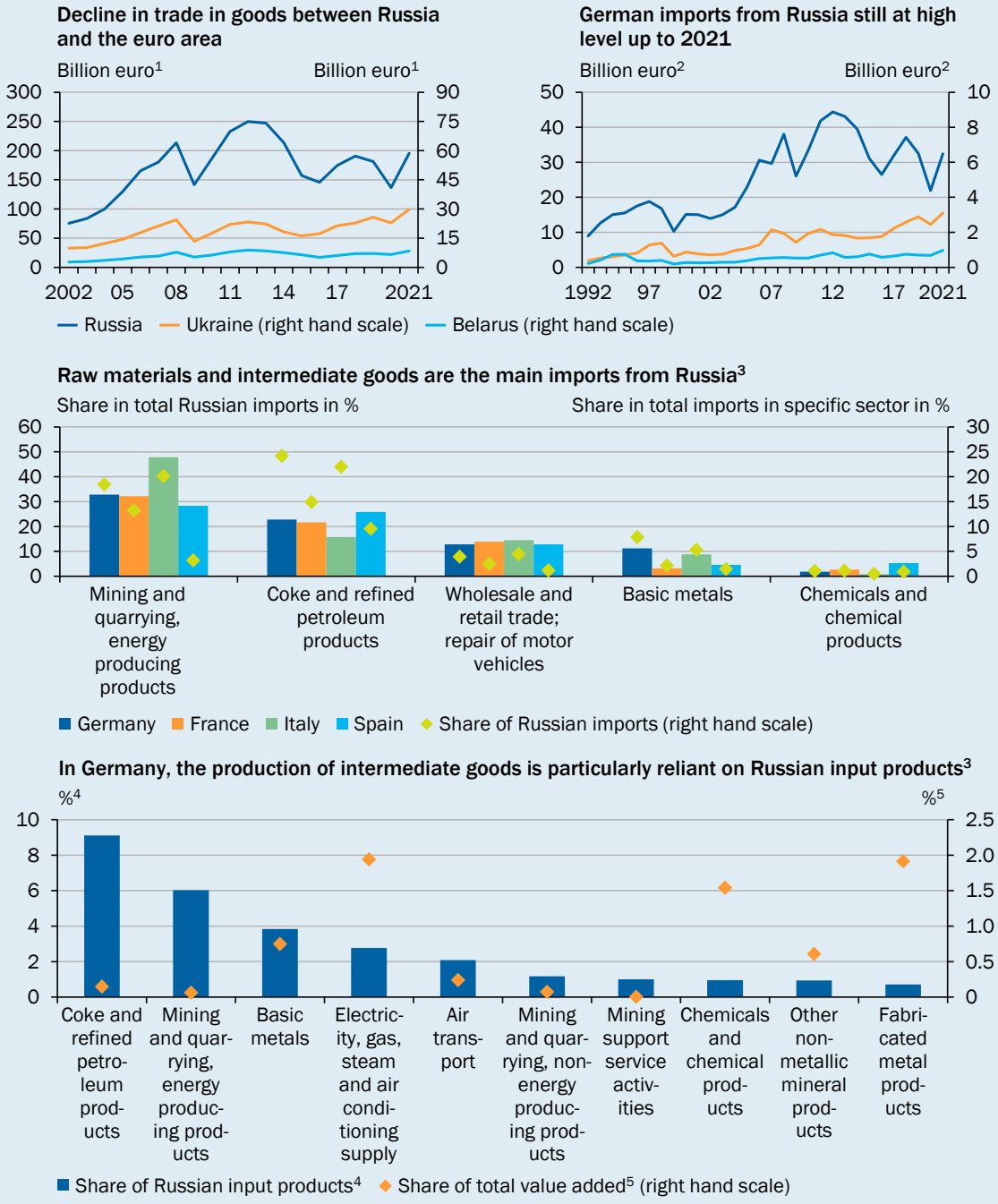
1 – BG-Bulgaria, LT-Lithuania, CY-Cyprus, SK-Slovakia, EE-Estonia, LV-Latvia, HU-Hungary, FI-Finland, PL-Poland, CZ-Czech Republic, GR-Greece, MT-Malta, RO-Romania, NL-Netherlands, SI-Slovenia, EU27-European Union (27 member states), DE-Germany, IT-Italy, FR-France, ES-Spain, CN-China, UK-United Kingdom, JP-Japan, US-USA. 2 – At basic prices.

Sources: OECD, own calculations

Above all, **heavy reliance on commodity imports from Russia** has serious implications for a number of EU Member States in eastern Europe, such as Hungary, Slovakia and Bulgaria, but also for Germany and Austria (McWilliams et al., 2022a; own calculations). ↘ BOX 3 Given Russia's importance in international commodity markets – accounting for over 12 % of the world's oil and over 16 % of the world's natural gas production (GCEE Annual Report 2021 item 530) – it can be assumed that disruptions in commodity trading will also have significant repercussions globally. This is also particularly true for global trade in agricultural products considering Russia's and Ukraine's prominent role in global wheat trade (28 % of exports and 14 % of production; USDA, 2022) and corn trade (15 % of exports and 4 % of production; USDA, 2022). Even countries with only limited direct trade relations with Russia would be significantly affected by a rise in **global commodity prices**. Furthermore, the repercussions of **geopolitical uncertainty** could also be significant. The war of aggression and the sanctions imposed have already sent commodity prices – and particularly the price of oil and natural gas – soaring on global markets. ↘ ITEM 10 At the same time, the discount on the Russian Urals crude oil brand compared to other crude oil brands has risen from 0.5 to 2 US dollars per barrel in January 2022 to over 25 US dollars per barrel mid-March 2022 (Neste Oyj, 2022). Caldara and Iacoviello (2021) develop geopolitical risk indices and find that in the past, both the threat and materialisation of adverse geopolitical events have resulted in persistent declines in investment, employment and equity prices in the United States. In addition, lower GDP growth and higher downside risks can be expected across countries. The impacts on individual sectors of the economy vary considerably, however. Although the index currently shows an increased geopolitical risk, it is at a lower level than at the start of the Iraq war in 2003 and is less than half the maximum indicated after the attacks of 11 September, 2001. By contrast, in February 2022, the country-specific geopolitical risk index rose to the highest level for Germany since the construction of the Berlin Wall in 1961.

↘ CHART 4

Trade in goods between Russia and the euro area has been declining since 2012, but commodity imports from Russia are consistently high



1 – Sum of exports and imports. 2 – Sum of imports of goods and expenditure on services. Values for Belarus from 2016 onwards are determined approximately as the difference between exports and the balance of the foreign trade. 3 – As at 2018. According to the International Standard Industrial Classification of All Economic Activities (ISIC Rev. 4). 4 – Share of Russian input products from the economic sectors of manufacture of coke and refined petroleum products, mining and quarrying of energy producing products, and manufacture of basic metals in all input products used by the respective economic sector. 5 – Share of the respective economic sector in total value added.

Sources: Deutsche Bundesbank, Eurostat, Federal Statistical Office, OECD, own calculations

Total trade in goods (imports plus exports) in the euro area with Russia, Ukraine and Belarus amounted to 1.5 %, 0.2 % and less than 0.1 % of GDP, respectively, in 2019. In terms of the total value of imports and exports, **trade in goods with Russia** has **dropped** significantly since 2012, and in 2019 it was just over 70 % of the value reported in 2012. ↘ CHART 4 TOP LEFT Imports from the product groups mineral fuels, lubricants and related materials sector fell even more sharply during the same period, but this decline is likely to be primarily attributable to the development of commodity prices on the world market. In 2021, however, the value of EU imports from Russia rose considerably due to the increase in commodity prices. Total external trade, i.e. trade in goods and services combined, between Russia and Germany accounted for just over 1.8 % of Germany's GDP in 2019, trade with Ukraine for just over 0.2 %, and with Belarus less than 0.1 %. ↘ CHART 4 TOP RIGHT The **overall impact on German exports** is likely to be rather **limited** due to the large order backlog in industry. Finished goods such as machinery and motor vehicles, as well as chemical and pharmaceutical products, are particularly important for merchandise exports from Germany and account for almost 60 % of exported goods. However, Russia is not a central market for any economic sector: in 2018, the share of exports to Russia with respect to the output value stood at roughly 0.4 %, being highest for mining support service activities and for air transportation, with shares of less than 6 % and less than 4 %, respectively. (OECD, 2021a).

Economic development is much more at risk from a possible disruption of Russian imports. In particular, Member States with an above-average dependence on Russian energy sources - such as **Germany** or **economies in eastern Europe** - are likely to be significantly affected by a **drop in imports**. ↘ BOX 3 The share of Russian imports is particularly high in the sectors mining and quarrying, energy producing products and coke and refined petroleum products. ↘ CHART 4 MIDDLE These sectors, in turn, are responsible for producing important intermediate inputs for the sectors themselves as well as for electricity, gas, steam and air conditioning supply, basic metals, chemicals and chemical products, and the air transportation sector. ↘ CHART 4 BOTTOM Accordingly, the disruption of Russian imports could lead to a drop in value added in these sectors. In addition to the risks that can be presented by the comparatively aggregated study using input-output tables, the shortage of specific intermediate products – such as wire harnesses for the automotive industry that are manufactured in Ukraine – will also temporarily result in a significant drop in production. ↘ ITEM 51 Against the background of significant supply bottlenecks for individual intermediate goods and considering the already strained supply chains, there are likely to be delays in the substitution of individual products. Therefore, a decline in imports of essential intermediate goods in just-in-time production is likely to lead to immediate disruptions.

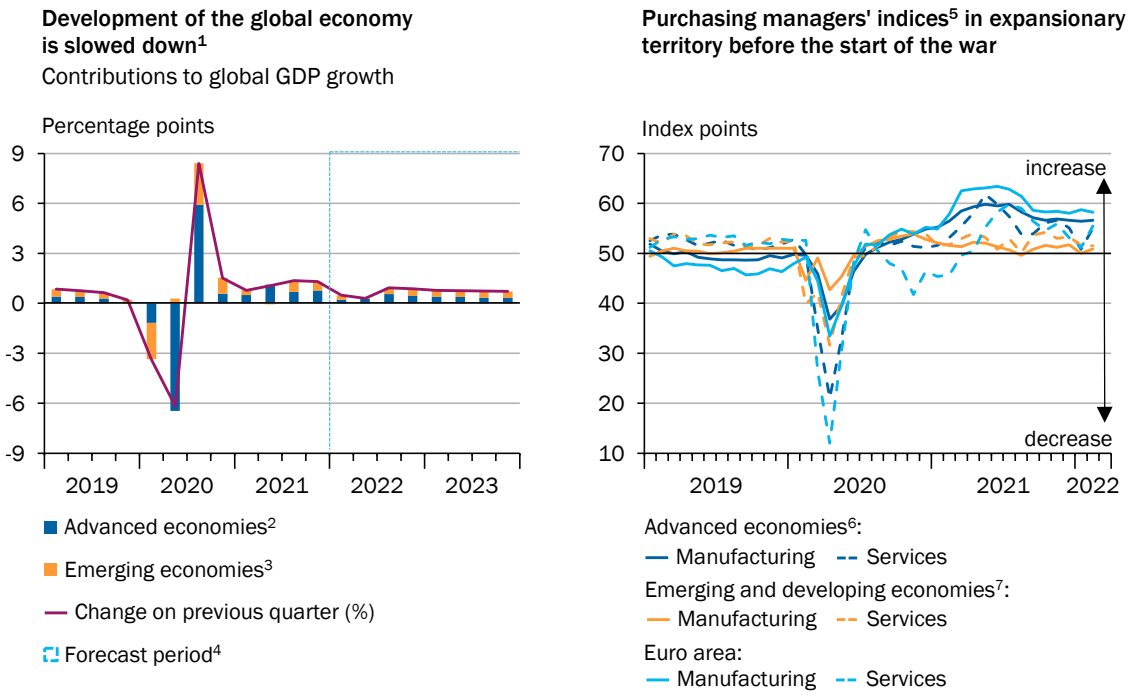
6. The **global economy** continued to **trend upward** in the second half of 2021, having **gathered some momentum** since the first half of 2021. In the third quarter of 2021, global output growth was slightly stronger than in the second quarter of 2021, increasing by roughly 1.4 %, based on market-based exchange rates. ↘ CHART 5 LEFT At 1.3 %, estimated growth in the fourth quarter of 2021 was only slightly weaker. In particular, China and the United States reported accelerated growth rates once again, while growth slowed significantly in the euro area and somewhat in emerging economies. ↘ ITEM 15 ↘ ITEM 18 ↘ ITEM 21 Overall, the GCEE estimates that the global economy experienced strong growth in 2021 of roughly 6 %.

7. The global economy's robust performance so far is also reflected in the **sentiment indicators**, which **continued on an upward trend** in **the second half of the year 2021**. ↘ CHART 5 RIGHT Nevertheless, growth was marked by

persistent supply-side bottlenecks and recurring constraints on account of the pandemic. The pandemic situation particularly weighed on businesses in contact-intensive service sectors once again during the winter of 2021/22, although containment measures were less extensive compared with past waves of infection and were often aimed at specific groups of people, such as unvaccinated and untested individuals. Thus, Purchase Manager Indices (PMIs) in the **services sector** fell sharply once again in the winter months, particularly in the advanced economies. In February 2022, however, the mood brightened again in advanced economies as the **Omicron wave** subsided for the interim. **Despite** the many **supply-side bottlenecks**, PMIs in the **manufacturing industry** are still very much in **expansion territory**, especially in advanced economies, as order books remain healthy. However, a shortage of intermediate goods, raw materials, scarce transport capacities and a shortage of labour in some areas coupled with the resulting rise in production costs slowed the momentum of the sentiment indicators, particularly in the second half of 2021. Due to Russia's war of aggression against Ukraine, **sentiment indicators** are expected to **deteriorate significantly** in **spring 2022,** however.

↘ CHART 5

Development of the global economy



1 – Averages of seasonally and price-adjusted quarterly figures. Global GDP corresponds to the sum of the countries in table 1 (total). 2 – Definition as in footnote 11 in table 1. 3 – Definition as in footnote 12 in table 1. 4 – Forecast by the GCEE. 5 – Based on a monthly survey among purchasing managers and managing directors. 6 – According to IHS Markit: Australia, Austria, France, Germany, Greece, Hong Kong, Ireland, Italy, Japan, Netherlands, Republic of Korea, Singapore, Spain, Taiwan, United Kingdom, USA. 7 – According to IHS Markit: Brazil, China, Czech Republic, Egypt, India, Indonesia, Kenia, Lebanon, Malaysia, Mexico, Nigeria, Philippines, Poland, Russia, Saudi Arabia, South Africa, Thailand, Turkey, United Arab Emirates, Vietnam.

Sources: Eurostat, IHS Markit, IMF, national statistical offices, own calculations

8. The **rapid recovery** in **global demand** that began in the second half of 2020, associated **supply-side bottlenecks**, the poor availability of some intermediate products, and recurring disruptions to global transport logistics due to the pandemic have caused **major tensions in global value chains** (GCEE Annual Report 2021 background info 2). Following the quick rebound from the sharp downturn in 2020, growth in global **industrial output** and global **trade in goods slowed** during **2021**. **In the winter months of 2021/22**, some indicators pointed to a **slight easing** in global supply and value chain pressures. ↘ CHART 6 LEFT For example, ocean freight transport costs had stabilised at a high level for a period of time, but rose again recently. Delays in the clearance of container ships in ports, as measured by the percentage of goods loaded on ships but not moving (Gern et al., 2021), showed a recent improvement. The Global Supply Chain Pressure Index developed by the New York Fed (Benigno et al., 2022) had also fallen slightly in the winter months. Apart from indicators for sea and air cargo transportation costs, this index also integrates indicators for factors that hamper production in businesses in the manufacturing industry. As pressure eased at the **end of the year,** global **industrial output** and **trade in goods also picked up again**. ↘ CHART 6 RIGHT Global services trade benefited from the substantial increases in freight rates and in the third quarter of 2021 grew by 25 % on the same quarter in the previous year - driven by strong growth in transportation services. **International travel services** also grew 54 % in the third quarter of 2021 compared to the prior year's quarter, but **still** remained roughly 52 % **below** the **level** reported in the third quarter of 2019 (WTO, 2022).

   Despite these intermittent positive developments, it is **still too early** to talk of a **definitive trend reversal**. Russia's war of aggression against Ukraine is likely to have recently exacerbated supply and value chain pressures, particularly in Europe. ↘ ITEM 22 ↘ ITEM 51 **China's** recent decision to **lock down Shenzhen** – a key technology and logistics hub – due to a rise in new COVID-19 cases demonstrates how fragile the situation remains in light of the Chinese government's continued zero-Covid strategy. ↘ ITEM 18 While the port facilities, which are central to international trade, were still operating at the time of this forecast, labour shortages and logistical disruptions to land transportation due to the lockdown are likely to lead to further logistics delays and shortages of some goods. In addition, **Russia's war of aggression** against Ukraine is **intensifying bottlenecks** for some **intermediate products** and **raw materials**. ↘ BOX 1

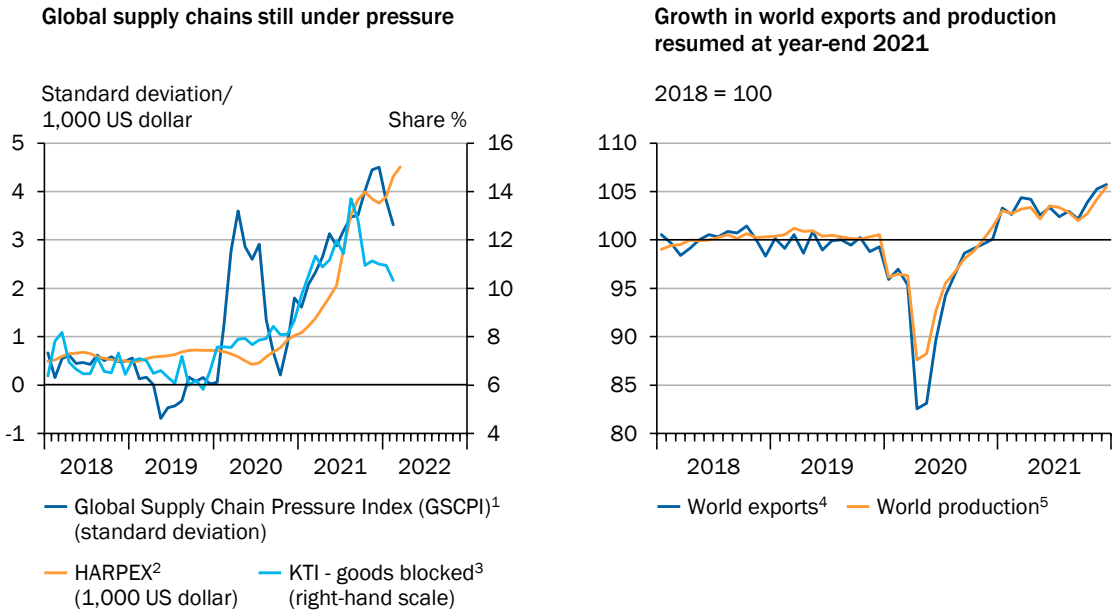
9. Bottlenecks remain at an exceptionally high level in some sectors and intensified further in some areas in the fourth quarter of 2021 compared with the forecast in the GCEE Annual Report 2021. ↘ ITEM 24 ↘ CHART 6 LEFT In its forecast, the GCEE assumes that these **pandemic-induced supply-side bottlenecks will gradually ease**. Their effects might still be felt well into 2023 in some regions and sectors, however (Celasun et al., 2022). As the pandemic-related shift in the consumer preferences of private households towards the consumption of durable goods continues to normalise, pandemic-induced material and supply bottlenecks are likely to gradually phase out (GCEE Annual Report 2021 background info 2). Furthermore, as infections trend down, we can expect some of the **pandemic-related labour shortages** to **gradually abate**, as fewer people will be absent from work due to quarantine or domestic isolation. On the other hand, labour

shortages caused by structural factors or voluntary withdrawal from the labour market are expected to decline to a lesser extent. ↘ ITEM 15 ↘ ITEM 19 However, as many companies in the manufacturing sector have a large order backlog, capacity utilisation is likely to be high in many sectors for a while as bottlenecks are cleared.

10. **Inflation rose sharply** last year in many advanced and emerging economies, not least due to rising transportation and production costs. ↘ CHART 7 RIGHT The **role** played by the individual **factors driving** inflation varies however. Rising energy prices were the main contributor to higher inflation in the euro area. In contrast, so far most of the increase in the United States and the United Kingdom has been attributable to a rise in core inflation of goods and services. In the United States, inflation is being driven by a sharp rise in the price of goods affected by supply shortages (Ilzetzki, 2022; Ricarte et al., 2022), demand for which has likely been increased by fiscal stimuli (Koester et al., 2021). ↘ ITEM 16 Furthermore, price increases in the services sectors, which were hit hard by restrictions during the pandemic, were observed earlier in the United States than in the euro area, which is probably due in part to the earlier steps taken in the United States to reopen the economy (Ricarte et al., 2022).

↘ CHART 6

Indicators of world trade



1 – The GSCPI combines various indicators of transport costs and supply shortages into one index. Index normalised to a mean of 0. Standard deviation from the mean are shown. 2 – The Harper Petersen Charter Rate Index (HARPEX) measures container freight rates in the time-charter market for periods of 3 to 48 months for seven ship classes with a defined minimum speed of 17 to 24 knots. Value for March: Average of the available values for March; data as of 17 March 2022. 3 – This Kiel Trade Indicator indicates the proportion of goods that are on waiting con-tainer ships. Calculations are made using real-time global vessel position data and include effective utilization of container ships from draught information. 4 – Coverage of exports in 81 countries and about 99 % of global exports. 5 – Coverage of industry production in 85 countries and about 97 % of global industry production.

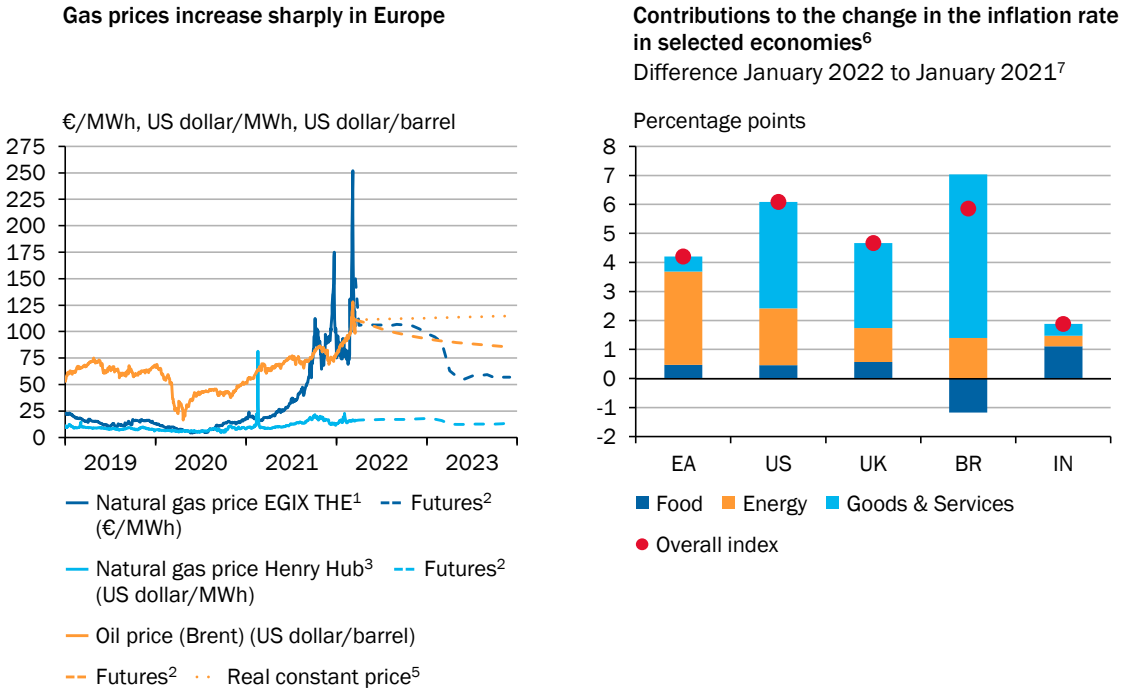
Sources: Benigno et al. (2022), CPB, Harper Petersen & Co., IfW Kiel, own calculations

In the euro area in particular, the change in the rate of inflation over the past year is largely due to the sharp **rise in energy prices,** and particularly in natural gas prices, as recently seen. ↘ CHART 7 LEFT AND RIGHT For example, in the last 12 months, spot prices for crude oil have risen by around 71 %, and those for natural gas by 461 %. While the price hikes were initially attributable to a variety of supply- and demand-side factors (GCEE Annual Report 2021 item 11), the Russian war of aggression against Ukraine has sent prices soaring in recent times. Due to the extremely **high level of uncertainty** and **volatility** at present, it is **very difficult to forecast future developments** on the energy markets. For example, in December 2021 European spot prices for natural gas rose several-fold initially but fell again shortly afterwards, while the price of natural gas in the United States hardly changed at all. In contrast to natural gas, crude oil is traded at world market prices, which means that the prices for European Brent crude oil and its US equivalent West Texas Intermediate (WTI) are closely correlated. While the price of crude oil has also risen, the price increases are on a similar scale to those observed at the start of the financial crisis in 2007. ↘ CHART 7 LEFT

11. Rising **energy and import prices** are also driving up **inflation** in many **emerging economies**. ↘ CHART 7 RIGHT These price hikes affect consumer prices, primarily indirectly through higher mobility costs. In addition, rising **food**

↘ CHART 7

Indicators of commodities and contributions to the inflation rate in selected economies



1 – The European Gas Index (EGIX) is based on exchange trades which are concluded in the respective current front month contracts (THE). 2 – Data for futures for April 2022 and following months as of 18 March 2022. 3 – Prices are based on delivery at the Henry Hub in Louisiana. Official daily closing prices at 2:30 p.m. from the trading floor of the New York Mercantile Exchange (NYMEX) for a specific delivery month. 4 – Price in US dollar/MMBtu (1 million British thermal units) converted into US dollar/MWh. 5 – Oil price extrapolated with an annual inflation rate of 2 %. 6 – EA-euro area, US-USA, UK-United Kingdom, BR-Brazil, IN-India. Categories published by national statistical offices summarized to the main categories food, energy and goods & services. 7 – Difference in inflation rate to previous year month.

Sources: EEX, EIA, ICE, national statistical offices, NYMEX, Refinitiv Datastream, own calculations

prices generally have a much larger share in the consumer price index than in advanced economies, which already resulted in sharp price increases in 2021 particularly in many emerging economies in Latin America. In contrast to many other regions, the rise in **consumer price inflation in Asia** last year was **relatively moderate** in both advanced and emerging economies. ↘ CHART 7 RIGHT

Russia's war of aggression against Ukraine is likely to **push up energy and food price inflation** even **further**. For one, Russian and Ukrainian agricultural exports and Russian and Belarusian fertilizer production play a crucial role for the world market. Furthermore, rising prices for natural gas – an important production factor for fertilizers – are driving fertilizer prices higher. Therefore, a reduction in the global supply of some food products and price increases can be expected in the forecast period. ↘ BOX 1

12. Central banks in advanced economies have begun to **normalise their expansionary monetary policies** in view of rising inflation rates and robust developments on labour markets. ↘ CHART 8 TOP LEFT Since December 2021, the Bank of England has raised the key interest rate by a total of 65 basis points to 0.75 %. In March 2022, the US Federal Reserve (Fed) also responded with a first increase in the federal funds rate, raising it by 25 basis points to the target range of 0.25 % to 0.5 %. Six additional interest rate hikes are expected to follow this year. In contrast, the ECB is not expected to raise key interest rates in the euro area before the completion of its asset purchase. ↘ ITEM 30 For 2022, market participants expect further interest rate hikes, particularly for the United States and the United Kingdom. Market-based **short- and medium-term inflation expectations** over the next three years had already been **rising** steadily since around mid-2021, ↘ CHART 8 TOP RIGHT but the increase has picked up speed since the outbreak of the war. By contrast, long-term inflation expectations have only risen moderately, indicating that such expectations **remain anchored.** ↘ CHART 8 BOTTOM LEFT However, estimates of the probability of high inflation of above 4 % and above 5 % on average over the longer term suggest that market participants have considered such high inflation rates to be much more likely since the start of the year (Hilscher et al., 2022). ↘ CHART 8 BOTTOM RIGHT

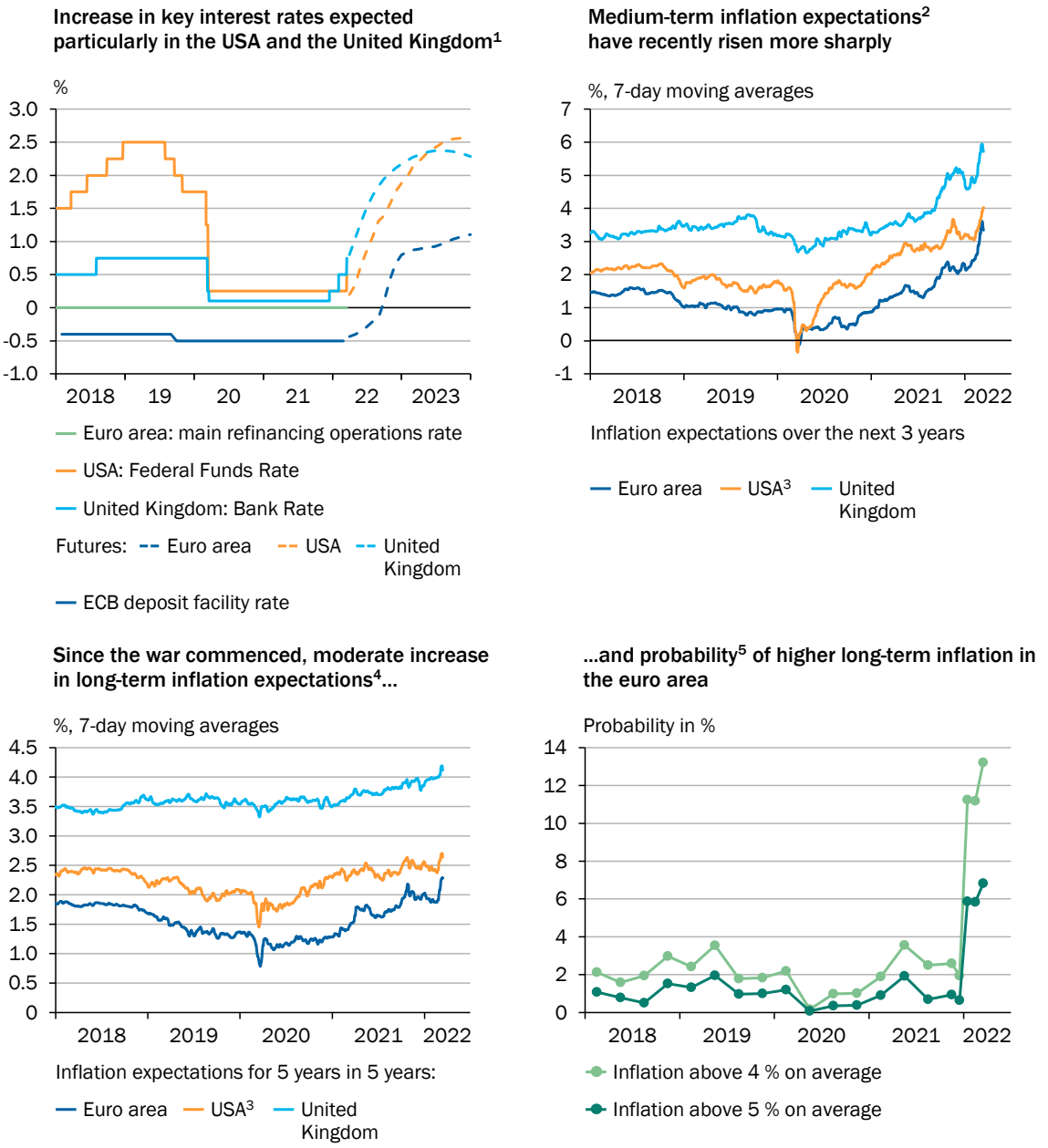
13. The **technical assumption** for the forecast on the development of **crude oil and natural gas prices** is based on the forward projection of prices using market expectations regarding future prices. ↘ CHART 7 LEFT According to this, the price of crude oil is likely to normalise more quickly than that of natural gas. An average oil price of roughly 100 US dollars per barrel is assumed for 2022, and of roughly 88 US dollars for 2023. On the other hand, a forward projection of the oil price on the basis of an assumed annual inflation rate of 2 % would result in a crude oil price of 108 US dollars and 114 US dollars in 2022 and 2023, respectively. The future curves for European natural gas imply an average price of around €106 per MWh in 2022 and roughly €67 per MWh in 2023. The exchange rates used for the forecast are based on broad nominal effective exchange rates and are projected forward on the basis of the last available value.

14. Despite the Russian war of aggression against Ukraine, the **global economy** is likely to remain **robust**. That said, both the war and the resurgence of infection in some regions are dampening growth in the short term. For the forecast,

however, the GCEE assumes that the economic fallout from the COVID-19 pandemic will continue to diminish in the future. ↘ ITEM 5 ↘ ITEM 41 For some regions and economic sectors, the war is likely to have put additional pressure on supply and value chains – which are still facing difficulties – and this is also expected to

↘ CHART 8

Development of key interest rates and inflation expectations in selected economies



1 – Market participants' expectations regarding central bank interest rates derived from the 30-day Federal Funds Futures for the USA, the 3-month EURIBOR futures for the euro area and the overnight index swap forwards for the United Kingdom. Retrieved on 18 March 2022. 2 – Inflation expectations of market participants over the next 3 years approximated by 3-year inflation swaps. 3 – For the USA, 8 data points in 2019 and 3 data points in 2020 are treated as outliers like missing observations, and only for the 3-year inflation swaps, 1 data point in 2021 and 2 data points in 2022. 4 – Inflation expectations of market participants for 5 years starting in 5 years. Calculated from the 5- and 10-year inflation swaps. 5 – Shows the development over time of the probability of an average inflation rate above 4 % and an average rate above 5 % over a period of 5 years starting in 5 years (Hilscher et al., 2022). Quarterly estimates up to Q3 2021. Monthly estimates as of November 2021.

Sources: BoE, CME, Deutsche Bundesbank, ECB, Fed, Hilscher et al. (2022), ICAP, ICE, Refinitiv Datastream, own calculations

weigh on global trade in goods in the short term. Overall, the GCEE expects **global GDP growth** of **3.3 %** in 2022 and of **3.1 %** in 2023. With regard to **global trade**, growth of **1.8 %** is expected in 2022, and of **3.1 %** in 2023. ↘ TABLE 1

15. In the **United States,** GDP in the fourth quarter of 2021 grew by roughly 1.7 % on the previous quarter. Real-time and monthly indicators currently available suggest that **growth** will **remain solid** in the first quarter of 2022, but will be **down** on the previous quarter. After a surprisingly strong January, retail sales were unable to maintain this high level of growth in February and fell slightly. Further **normalisation** of the **consumption structure** is **only continuing at a slow pace** at the margins. Having dropped significantly in December, private consumer spending on goods rebounded well in January. Hardly any growth was reported for spending on services, however. **Sentiment indicators** in manufacturing and in the services sector continued to **trend upward** in January and February and had even picked up momentum. Nevertheless, persistent bottlenecks in global supply and value chains together with labour shortages are likely to continue to dampen growth. With **labour market participation** still **low** compared with 2019 and demand for labour remaining high, **wage growth** in the United States has already been **significantly strengthened** (Deutsche Bundesbank, 2022b).

16. In **February** 2022, **consumer price inflation** in the United States reached the highest level recorded since 1982, hitting **7.9 %** compared to February 2021. This was driven in part by a further rise in rents, which have been on the increase in the United States since mid-2021. In February 2022, the corresponding index for rents and equivalent costs of owner-occupied housing, which makes up roughly 33 % of the consumer price index, was up 4.7 % on the previous year. Furthermore, during the COVID-19 crisis, household disposable income rose sharply due to transfer payments. This is particularly true of the first quarter of 2021, which saw increases of roughly 11.5 % on the previous quarter. Ultimately, the increased income was financed monetarily, as US Treasuries were bought by the Fed. Monetary policy is therefore accommodating the various drivers of relative price increases. Energy prices, which also rose to record highs in the first quarter of 2022, are likely to also put upward pressure on inflation in the United States for a longer period.

17. **Russia** and **Ukraine** do relatively **little trade** with the **United States**. Therefore, the direct impacts of the war are also likely to be limited. Moreover, unlike the euro area and the United Kingdom, the United States is less dependent on energy imports. For the first time since the 1950s, the United States became a net exporter of energy in 2019 and 2020, even if exports only slightly exceeded imports (EIA, 2021). Nonetheless, the **increase** in **crude oil prices** on the world market is likely to **push inflation up further** via higher fuel prices, for example. This will erode the purchasing power of affected households, which is likely to dampen private demand. On the other hand, oil and gas producers in the United States generate earnings. Real interest rates have fallen due to the rapid increase in inflation expectations and are having an expansionary effect. ↘ ITEM 12 The Federal Reserve is expected to raise interest rates in 2022 and 2023, which should increase real interest rates ↘ ITEM 12 and could slow growth. Overall, the **GCEE expects** US GDP to grow by **3.3 %** in 2022 and by **2.3 %** in 2023.

18. According to official estimates, the **Chinese economy** grew by 1.6 % in the fourth quarter of 2021 compared with the previous quarter. While this indicates an improvement in growth since the third quarter, **China's economy slowed**

↘ TABLE 1

Gross domestic product and consumer prices of selected countries

Country/country group	Weight in %[1]	Gross domestic product[2]				Consumer price index			
		Change on previous year in %							
		2021	2022[3]		2023[3]	2021	2022[3]		2023[3]
			Update	Diff. to AR 2021/22[4]			Update	Diff. to AR 2021/22[4]	
Europe	**28.4**	**5.6**	**2.2**	**(– 2.0)**	**2.3**	**3.5**	**8.7**	**(5.8)**	**4.0**
Euro area	17.3	5.3	2.9	(– 1.4)	2.9	2.6	6.2	(4.1)	2.9
United Kingdom	3.6	7.5	3.8	(– 1.2)	1.9	2.6	6.3	(3.4)	2.8
Russia[5]	2.0	4.6	– 10.0	(– 13.2)	– 3.0	6.7	20.0	(14.8)	11.0
Middle- and Eastern Europe[6]	1.8	5.5	3.1	(– 1.7)	3.3	4.4	8.7	(4.9)	4.7
Turkey	1.0	11.2	2.8	(– 0.6)	2.9	19.6	53.0	(37.5)	20.0
Other countries[7]	2.7	4.1	3.1	(– 0.4)	2.0	1.9	3.4	(2.0)	1.6
America	**34.6**	**5.7**	**3.2**	**(– 1.0)**	**2.3**	**5.5**	**7.5**	**(3.4)**	**3.6**
United States	27.8	5.7	3.3	(– 1.1)	2.3	4.7	6.9	(3.4)	2.9
Latin America[8]	2.6	7.6	3.2	(– 0.4)	2.4	13.6	14.3	(4.5)	10.3
Brazil	1.9	5.0	0.8	(– 0.7)	1.6	8.3	8.2	(2.4)	4.9
Canada	2.2	4.6	3.4	(– 0.7)	2.6	3.4	5.6	(3.0)	2.6
Asia	**37.1**	**6.5**	**4.3**	**(– 0.5)**	**4.5**	**1.3**	**2.4**	**(0.4)**	**2.3**
China	19.8	8.5	4.7	(– 0.3)	5.1	0.9	1.7	(– 0.1)	2.3
Japan	6.7	1.7	1.4	(– 1.5)	1.7	– 0.2	1.6	(1.1)	0.9
Asian advanced economies[9]	4.0	5.2	3.1	(– 0.1)	2.7	2.3	3.3	(1.4)	1.7
India	3.5	8.2	8.4	(– 0.5)	6.9	5.1	6.1	(0.8)	5.0
Southeast Asian emerging economies[10]	3.0	3.4	5.3	(0.0)	5.6	2.0	3.4	(1.0)	2.9
Total	**100**	**6.0**	**3.3**	**(– 1.1)**	**3.1**	**3.4**	**5.9**	**(2.9)**	**3.2**
Advanced economies[11]	66.1	5.1	3.0	(– 1.1)	2.4	3.2	5.8	(3.2)	2.6
Emerging economies[12]	33.9	7.6	3.9	(– 1.1)	4.4	3.7	6.2	(2.6)	4.4
memorandum:									
weighted by exports[13]	100	6.1	3.1	(– 1.1)	2.6	.	.	.	.
following IMF concept[14]	100	6.0	3.7	(– 1.0)	3.5	.	.	.	.
World trade[15]		10.3	1.8	(– 2.8)	3.1	.	.	.	.

1 – GDP (US dollar) of the named countries or country groups in 2020 as a percentage of total GDP of the named countries or country groups, corresponding to 88 % of the IMF country group weighted by US dollars and 84 % of the IMF country group weighted by purchasing power parities. 2 – Price-adjusted. 3 – Forecast by the GCEE. 4 – Difference in percentage points. 5 – Corresponds to an assessment and not a model-based forecast (see item 20). 6 – Bulgaria, Croatia, Czech Republic, Hungary, Poland, Romania. 7 – Denmark, Norway, Sweden, Switzerland. 8 – Argentina, Chile, Colombia, Mexico. 9 – Hong Kong, Republic of Korea, Singapore, Taiwan. 10 – Indonesia, Malaysia, Philippines, Thailand. 11 – Asian advanced economies, euro area, Middle- and Eastern Europe, Canada, Denmark, Japan, Norway, Sweden, Switzerland, United Kingdom, United States. 12 – Latin America, Southeast Asian emerging economies, Brazil, China, India, Russia, Turkey. 13 – Total of all named countries, weighted by the respective shares of German exports in 2020. 14 – Weights according to purchasing power parities and extrapolated to the countries covered by the IMF. 15 – As measured by the Dutch Centraal Planbureau (CPB).

Sources: CPB, IMF, national statistical offices, OECD, own calculations

appreciably in 2021, mainly due to ongoing vulnerabilities in the real estate sector, several weeks of electricity rationing, and the country's zero-Covid policy. In contrast to the global trend, at 0.9 % consumer price inflation in China in February 2022 was low compared to the same month of the previous year. To boost the economy, the **Chinese central bank** lowered reserve ratios for banks along with **important interest rates**. Furthermore, the Chinese government has eased conditions for the extension of credit to small and medium-sized enterprises and has cut taxes and fees in an effort to encourage investment. The recent lockdown imposed in technology hub Shenzhen could again slow growth in the near term. The persistent vulnerabilities in the real estate sector are also likely to continue to weigh on growth. The **GCEE** expects **GDP** in China **to grow** by **4.7 %** in 2022 and by **5.1 %** in 2023.

19. In the **United Kingdom**, **GDP** grew **by 1.0 %** in the **final quarter of 2021** compared with the third quarter of 2021, despite a sharp rise in new COVID-19 infections and a slight drop in economic output in December, which was down 0.2 % on November. GDP had therefore returned to the pre-crisis level of the fourth quarter of 2019. At the start of 2022, retail sales returned to positive growth in January compared to December, despite high rates of infection. Industrial production and output in the manufacturing sector were also clearly trending upward in January 2022 and monthly GDP showing quite strong growth of 0.8 % in January compared with the previous month. Like the United States, the United Kingdom is also facing a tight labour market, which is also reflected in increasing wage growth.

    In January 2022, **consumer price inflation in the United Kingdom** reached 5.5 % compared with the same month of the previous year. With the national energy price cap set to rise in April and a higher VAT rate in the hospitality sector – which has been lowered since July 2020 – consumer prices are expected to increase further in the course of the year. Furthermore, a sharp hike in energy prices is expected in the wake of Russia's war of aggression against Ukraine. In December 2021, the Bank of England introduced the first of a series of **key interest rate** hikes, raising the rate from 0.1 % to 0.25 %. This was followed by a second increase of 25 basis points to 0.5 % in February 2022 and by a third increase of another 25 basis points to 0.75 % in March 2022. ↘ ITEM 12 As the United Kingdom's direct trading ties with Russia and Ukraine are limited, the immediate impacts of the war are also likely to be minor. Nonetheless, indirect effects – through higher prices for energy imports – are likely to weigh on purchasing power and dampen private demand. The GCEE expects **GDP growth** of **3.8 %** in 2022 and of **1.9 %** in 2023.

20. The **Russian economy** is **facing** a **deep recession** this year as a result of the sanctions. Its de facto exclusion from international financial markets has sent the rouble tumbling. ↘ BOX 1 In order to prevent further capital outflows and therefore the further collapse of the currency, the Central Bank of Russia retaliated by raising interest rates by more than 10 percentage points to 20 %. The rouble's exchange rate had recovered to some extent recently. The massive rate hike is likely to contribute to a sharp reduction in private consumer spending and non-governmental investment. In addition, the drop in the rouble is making imports more expensive, which is likely to crimp purchasing power and therefore private

consumption further. The economic sanctions against Russian businesses and voluntary restrictions on commercial relations are likely to weigh heavily on Russian trade in goods and services.

Much uncertainty surrounds any **estimate** of the **contraction** of the Russian **economy**. The Russian financial crisis of 1998 and the sanctions imposed on Iran in 2012 could provide useful pointers for the extent of the decline in economic output. In the wake of the Russian financial crisis in 1998, GDP fell by 5.3 %. The Iranian economy contracted by roughly 7.5 % in 2012. Compared to the current situation, the two crises are more likely to serve as lower bounds for the contraction in GDP, however. For one, Russia is much more integrated into the international economic framework than Iran. Furthermore, the voluntary restrictions on business relations now are likely to be much larger. Assuming that sanctions will remain in place over the entire forecast period, the GCEE estimates that **GDP could contract by around 10 % this year and still by more than 3 % next year**.

2. Euro area

21. The economic consequences of **Russia's war of aggression against Ukraine** are likely to be more pronounced in the euro area and other EU Member States than in other regions of the world, irrespective of the **great deal of uncertainty** regarding the further course of the war. **Energy prices** – which were already high – have **continued to increase** since the outbreak of the war. The European Gas Index (EGIX) almost tripled between the day before the start of the war on 24 February and 7 March 2022, and only fell again somewhat afterwards. ↘ CHART 7 LEFT During this time, Brent and WTI crude oil brands rose by 27 % and 29 %, respectively. ↘ ITEM 11 This is likely to put additional pressure on **household purchasing power** by driving up consumer price inflation, which was already high before the war began. ↘ ITEM 28 Currently, energy deliveries from Russia are still excluded from sanctions. As things stand, physical supplies are therefore expected to be secured. ↘ BOX 1 However, considering that natural gas imports from Russia accounted for 33 % of total natural gas imports in the euro area in 2019, the extension of sanctions to sources of energy or a decision by Russia to cut supply could have more far-reaching consequences. For example, in addition to further price increases, there could be **physical shortages of natural gas**, which is likely to place considerable strain on industry in particular. Due to the segmentation of the natural gas market, substitution by other natural gas suppliers would be much more difficult in this scenario than in the case of oil and coal. ↘ BOX 3

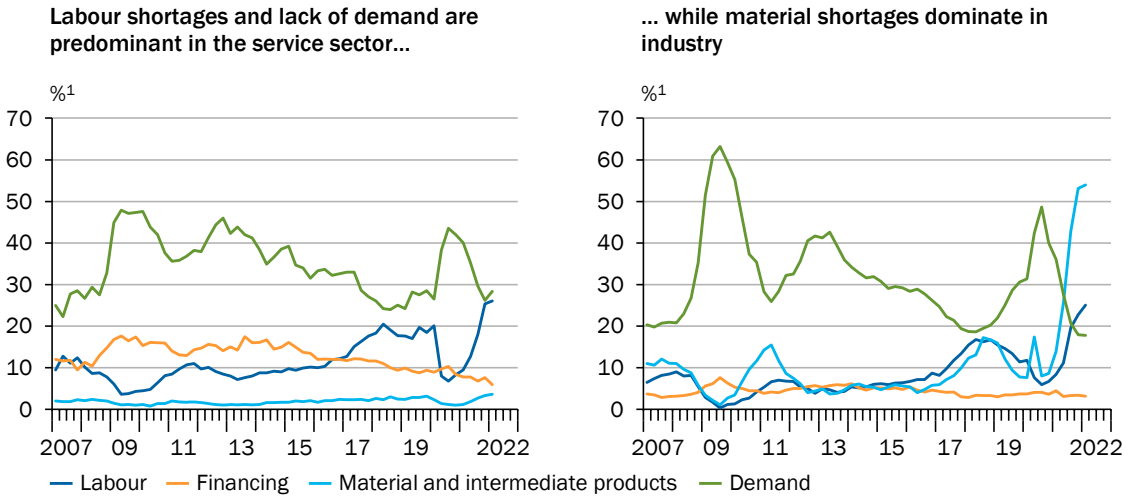
22. In 2019, total euro area imports from Russia and Ukraine amounted to €124 billion, or 1.0 % of GDP. Of these, energy imports make up the largest share, but other **raw materials, such as metals and wood, agricultural products and industrial input products** are also relevant. Input products and raw materials are used to a large extent in the automotive, chemical, aviation and metal production sectors. ↘ BOX 1 Disruptions in the supply of key input products are likely to lead to reduced production, as it could prove difficult to find substitute suppliers at short notice. ↘ ITEM 24 Exports from the euro area to Russia and

Ukraine amounted to €84 billion (0.7 % of GDP) and primarily comprise products from the manufacturing sector. While they are likely to be affected by the war and sanctions, in view of industry's healthy order backlogs it can be assumed that a partial loss of exports to Russia will only have limited macroeconomic effects. Nevertheless, the economic consequences of the war are impacting the Member States of the euro area and the EU to varying degrees. As the **eastern European states, Finland and Germany** have closer-than-average trade links and energy supply relationships with Russia and Ukraine, they are likely to feel the economic impact of the war and sanctions the most. Total exports and imports with Russia and Ukraine in relation to GDP is highest in the Baltic states, ranging between 10 % and 17 %. ↘ BOX 1 ↘ BOX 3

23. The **COVID-19 pandemic** continues to have a significant bearing on economic activity in the euro area. Between November 2021 and February 2022, the spread of the Omicron variant drove a sharp **increase in new infections** across the entire euro area. However, in contrast to the winter of 2020/2021, only a handful of Member States introduced widespread containment measures in the form of a lockdown. ↘ ITEM 5 Full-scale lockdowns were only imposed in Austria and the Netherlands, with hotels and gastronomic establishments, large parts of the retail sector, and cultural and sports facilities forced to close. In addition, these countries introduced strict social contact restrictions and even curfews in some cases. Other countries attempted to contain the pandemic through different measures, such as obligatory mask-wearing and the requirement to present proof of vaccination, testing or recovered status. At this stage, the number of new cases in most Member States has overcome the peak reached in February, but there are signs of another surge. In Germany and Austria, infections in March are already above the Omicron peak in February. Nevertheless, extensive easing of pandemic-induced restrictions has been announced or already adopted.

24. Even before the Russian war of aggression against Ukraine, **shortages of production inputs and labour** had been dampening economic growth in the euro area. For example, the percentage of companies reporting restrictions in economic activity due to these factors rose further in the last surveys conducted in February 2022 compared with autumn 2021. Most recently, the share of service companies reporting labour shortages stood at 26 %. For industrial companies, it was 25 %. ↘ CHART 9 LEFT AND RIGHT Lower labour migration due to the pandemic is probably one reason for this (Bodnár and O'Brien, 2021; OECD, 2021b). ↘ ITEM 27 In industry, the materials supply situation is far more problematic than the labour situation. The proportion of industrial companies reporting shortages of materials and equipment rose to 54 %. Both labour and material shortages have therefore reached record levels for the interim. However, there are considerable differences between the extent of shortages experienced in the various Member States. For example, the shortage of materials and input products is much more pronounced in Germany than in many other Member States of the euro area. One reason for the bottlenecks in Germany could be the heavy reliance of the German manufacturing sector on foreign input products (Timmer et al., 2014). With regard to labour shortages, Germany is also affected to an above-average extent, as are Ireland and the Benelux countries.

↘ CHART 9
Factors limiting production in the euro area



1 – Share of companies in the euro area reporting the specified production-limiting factors. Seasonally adjusted values.

Source: European Commission

25. The shortages of materials and input products are likely to be driven by pandemic-related production stoppages and disruptions in maritime transport, in addition to a **strong demand** for goods (Rees and Rungcharoenkitkul, 2021). ↘ ITEM 8 The volume of orders reported by industrial enterprises has continued to grow and is at a record high. In addition, the proportion of businesses indicating a lack of demand as a factor limiting production is at a very low level. However, this applies to a greater extent in the industrial sector than in the services sector, where poor demand is still a factor limiting production. ↘ CHART 9 LEFT Empirical studies for the euro area show that demand and supply shocks affected output in the manufacturing sector with a similar degree of intensity in 2021 (Alonso et al., 2021; Celasun et al., 2022). While supply shocks slowed production and **pushed up consumer and producer prices**, demand shocks had the effect of increasing output and prices. Much of the demand can probably be explained by increased consumption of durable goods (Federal Statistical Office, 2022a) in earlier phases of the pandemic and recently by the lifting of pandemic-related containment measures.

26. In the fourth quarter of 2021, **GDP in the euro area** grew by 0.3 % on the previous quarter and by 4.6 % on the prior-year quarter after adjustments for price, seasonal and calendar effects. Quarterly growth had therefore slowed after the two strong summer quarters of 2021, where growth was up 2.2 % and 2.3 % on the previous quarter. As in the two previous quarters, development in the fourth quarter was driven by countries in southern Europe. Spain and Portugal grew by 2.0 % and 1.6 %, respectively, while growth in France and Italy was weaker at 0.7 % and 0.6 %. In Germany and Austria, by contrast, economic output fell by 0.3 % and 1.5 %, respectively. In Austria, the measures taken to contain the COVID-19 pandemic are likely to have significantly impacted economic development. Dutch GDP growth reached 0.9 % despite the lockdown, which could be explained by the fact that the lockdown was not imposed until 18 December 2021, and therefore

relatively late in the year. In addition, Dutch industrial production in the fourth quarter was up 2.3 % on the previous quarter and therefore grew at a much faster rate than industrial production of the euro area aggregate, which, at a rate of –0.2 %, actually contracted slightly. For 2021 as a whole, Eurostat reports an annual GDP growth rate of 5.3 % for the entire euro area (the GCEE had forecast 5.2 % in its Annual Report 2021 item 45). In the fourth quarter of 2021, GDP of the euro area aggregate was therefore **0.2 % above the pre-crisis level of the fourth quarter** of 2019. There were significant disparities between the Member States, however. While the Netherlands and France were already 2.8 % and 0.9 % above the pre-crisis level, respectively, Italy, Germany and Spain were still 0.3 %, 1.1 % and 4.0 % below.

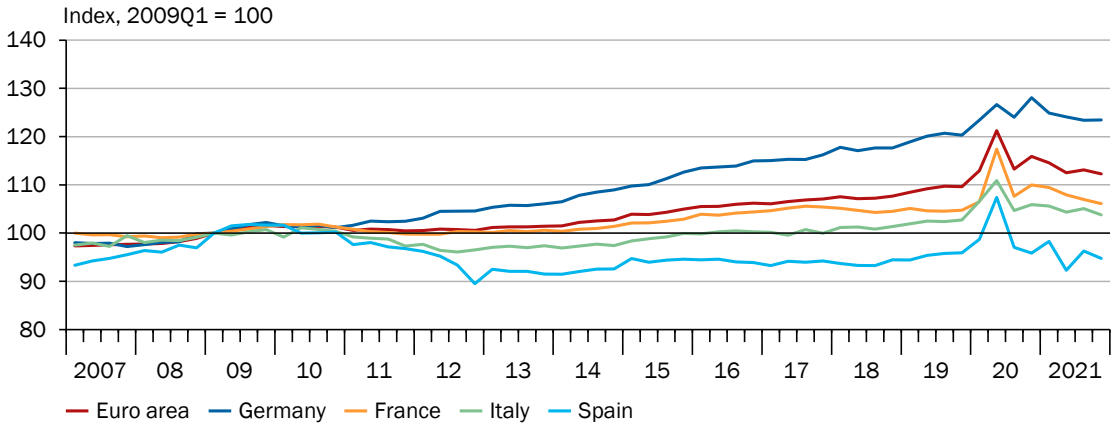
27. The **labour market in the euro area starts the year in good shape**. The seasonally adjusted unemployment rate stood at 6.8 % in January 2022, and was therefore below the pre-crisis level of 7.5 % in the fourth quarter of 2019. At around 162 million people, the number of people in employment rose by 0.5 % in the fourth quarter of 2021 and is 0.4 % above the pre-crisis level. On the other hand, the participation rate and the number of hours worked were still 0.1 percentage points and 1.8 % below pre-crisis levels, respectively.

28. **Consumer price inflation in the euro area has accelerated in recent months** and in February 2022 it reached the highest level since the creation of the monetary union. Compared with February 2021, the rate of change in the HICP hit 5.9 %, after reaching 5.1 % in January 2022, despite the absence of special effects such as the reversal of VAT reduction in Germany and lower base effects. ↘ CHART 12 TOP LEFT Almost half of the increase in the overall index could be attributed to the energy component, which rose by 3.4 % in February compared to the previous month and by 32.0 % compared to the same month of the previous year. The increase in the HICP energy component therefore accelerated again compared to January 2022. Prices for food, alcohol and tobacco rose by 4.2 % year-on-year, an uptick which was largely driven by weather-related factors, higher transportation costs and fertilizer prices (ECB, 2022a). Core inflation was also up in comparison to January 2022 and stood at 2.7 % compared with January 2021. **Inflation expectations** have also **risen in recent months**. According to the February 2022 Survey of Professional Forecasters, rates of 3.0 % and 1.8 % are expected for 2022 and 2023, respectively, which corresponds to an increase of 1.1 and 0.1 percentage points since the survey conducted in October 2021.

29. **Wages grew significantly less than consumer prices last year**. For example, the increase in negotiated wages in the euro area was just 1.5 % in 2021, after an increase of 1.8 % in 2020. Gross wages and salaries paid per hour worked rose by 0.2 % in 2021, following a rise of 6.3 % in 2020. After adjusting gross wage growth for inflation, the growth rate amounts to 6.0 % for 2020 and –2.3 % for 2021. This clearly demonstrates the loss of purchasing power in 2021, which is expected to continue in 2022 according to the ECB's gross wage and inflation forecasts (ECB, 2022b). The large increases in 2020 were primarily due to temporary reductions in working hours, such as those made possible by short-time work. The real wage level per hour in the fourth quarter of 2021 was 2.5 % above the pre-crisis level (fourth quarter of 2019). ↘ CHART 10 However, as the number of hours worked was recently still below the pre-crisis level, total real wages paid were only

↘ CHART 10

Gross real wages in the euro area fall at the current margin[1]



1 – The figure shows gross wages and salaries per hour worked. Price adjustments are made using the Harmonised Index of Consumer Prices (HICP).

Sources: Eurostat, own calculations
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0.6 % above the pre-crisis level. ↘ ITEM 27 At 4.6 %, the relatively small increase in hourly wages in Germany in 2020 compared with the euro area average can probably be explained by the lower uptake of short-time work arrangements in Germany than in other Member States (Anderton et al., 2021). According to an empirical assessment by the GCEE, it can be assumed that wage growth in the euro area should gain momentum due to higher inflation expectations and labour shortages. ↘ BOX 2 As **wages and salaries are important cost factors for companies**, their development is, in turn, relevant for inflation expectations.

↘ BOX 2

Wage developments and inflation in the euro area

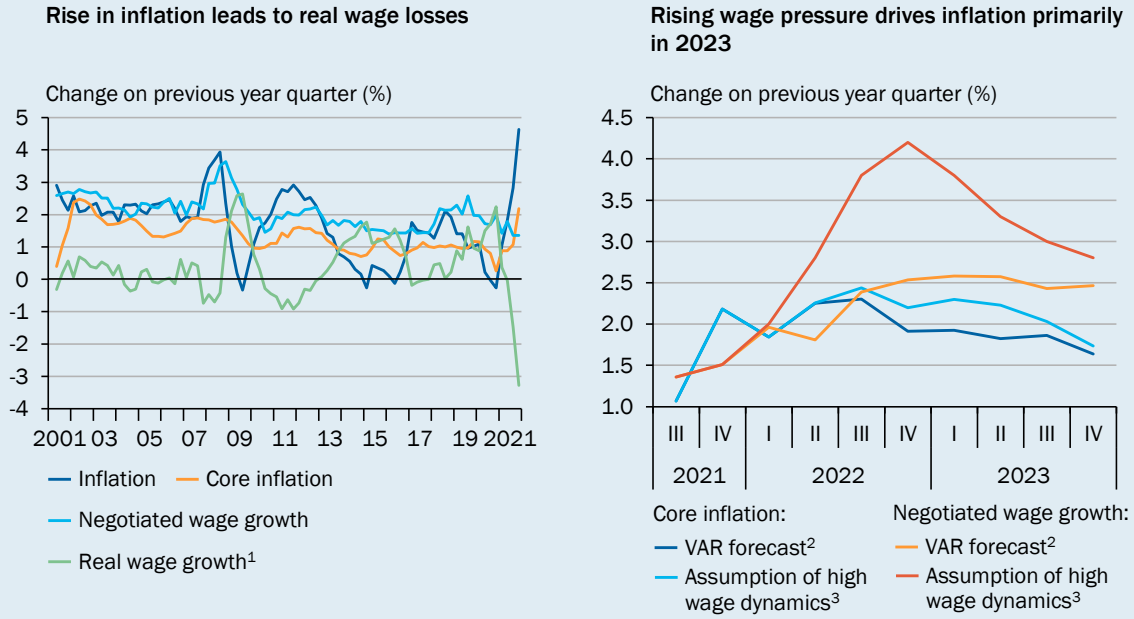
In the coming years, we are likely to see **higher wage increases than in the past ten years** for a combination of reasons: for one, in wage negotiations unions are likely to call for higher pay deals to at least partially offset the loss of purchasing power in the wake of rising inflation. In the past, wage increases have trailed inflation, with higher wage increases occurring in times of higher inflation but after a certain delay. In times of low inflation, wage growth has also been weaker, but the adjustment of wage growth to inflation has been considerably less pronounced than in times of high inflation. ↘ CHART 11 LEFT The automatic adjustment of wage development to inflation in the form of indexing is not very common in the euro area (Koester and Grapow, 2021). Secondly, the **labour market in the euro area has recovered significantly** and is experiencing shortages in a number of areas. ↘ ITEM 25 ↘ ITEM 27 This is likely to strengthen workers' negotiating positions and generally lead to higher wage agreements. Thirdly, **increases in the minimum wage** have been announced or already adopted in a number of euro area Member States. In addition to direct effects on the pay of low-wage workers, spillover effects may change the wage structure as a whole. Substantial minimum wage increases are planned in Germany (22 % increase in two swift, consecutive steps in 2022), ↘ ITEM 70 as well as in Member States in eastern Europe, some with increases of over 10 % (Vacas-Soriano and Kostolny, 2022).

A vector autoregressive model (VAR) can be used to empirically assess the **implications of the interaction between inflation and wage developments** in the euro area. In this model, the core inflation rate, as measured by the HICP, is explained by past values for core inflation itself

and the ECB's index for wages negotiated between employers and workers. In addition, labour productivity, the output gap and import prices are included in the model. Forecast scenarios can be generated for 2022 and 2023 on the basis of a model estimate for the period from 2002 to 2021 and the euro area aggregate. The estimate identifies **significant effects** of the development of negotiated wages **on core inflation**, both statistically and economically. According to the model-derived scenario, annual negotiated wage growth increases throughout 2022 and reaches around 2.6 % at the start of 2023. Annual average rates are around 2.2 % and 2.5 % in 2022 and 2023, respectively. This scenario produces core inflation rates **of 2.1 % and 1.8 %** on **average for the years 2022 and 2023.** It is important to note that this scenario does not constitute a full forecast, as the model used does not factor in all early indicators of inflation (such as supply bottlenecks for example).

↘ CHART 11

Wage and inflation development in the euro area



1 – Difference between negotiated wage growth and inflation. 2 – The vector autoregressive (VAR) forecast includes data for the euro area aggregate and the period from 2002 to 2021. The model includes core inflation, negotiated wage growth, labour productivity, the output gap and import prices. 3 – Assumption of an annual average wage growth of 3.2 % in the years 2022 and 2023.

Sources: ECB, European Commission, Eurostat, own calculations
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To take account of the pronounced real wage losses resulting from the energy price increases in 2021 and 2022, which are not included in core inflation, as well as special effects such as increased minimum wages, another scenario assumes that the **path of negotiated wages rises faster and is higher** than in the model-derived estimate. ↘ CHART 11 RIGHT In this scenario, the specified negotiated wage path adopts average growth rates of 3.2 % for 2022 and 2023, which consists of the sum of the long-term average of negotiated wage growth and the annual average real wage loss of 2021 (1.1 %). Other contributions and an ECB survey of 74 non-financial businesses in the euro area also anticipate wage growth of between 3.0 % and 3.5 % in 2022. (Colijn and Brzeski, 2022; Gareis et al., 2022). The higher negotiated wage path would mean that the **annual average core inflation rate would be 0.1 and 0.3 percentage points higher in 2022 and 2023**, respectively, than in the model-derived forecast. An equivalent analysis for Germany comes to a very similar conclusion.

30. The **ECB** conducted **net asset purchases** under the Pandemic Emergency Purchase Program (PEPP) **at a slightly lower pace** in the first quarter of 2022 compared to the fourth quarter 2021. Furthermore, at the March meeting, the Governing Council confirmed that it would discontinue net asset purchases under the PEPP at the end of March 2022 and reinvest the principal payments from maturing securities purchased under the PEPP until at least the end of 2024. In light of the updated assessment of the economic environment and given the prevailing uncertainty, the announced volume of securities purchases under the asset purchase programme (APP) has been reduced. Now, net purchases will amount to €40 billion in April 2022, €30 billion in May 2022 and €20 billion in June 2022 instead of the previously planned monthly purchases of €40 billion over the entire second quarter of 2022. Furthermore, the Governing Council announced that the **calibration of net purchases** for the third quarter of 2022 will be data-dependent and **reflect the assessment of the outlook**. If the incoming data support the Governing Council's expectation that the medium-term inflation outlook will not weaken even after the end of its net asset purchases, it will conclude net purchases under the APP. However, if the outlook changes and if financing conditions become inconsistent with further progress towards the 2 % inflation target, the ECB will revise its schedule for net asset purchases. At the March meeting, the key interest rate and the interest rate on the deposit facility remained unchanged at 0 % and –0.5 %, respectively. According to the ECB, interest rate increases are only scheduled for some time after the end of the net asset purchases (ECB, 2022c).

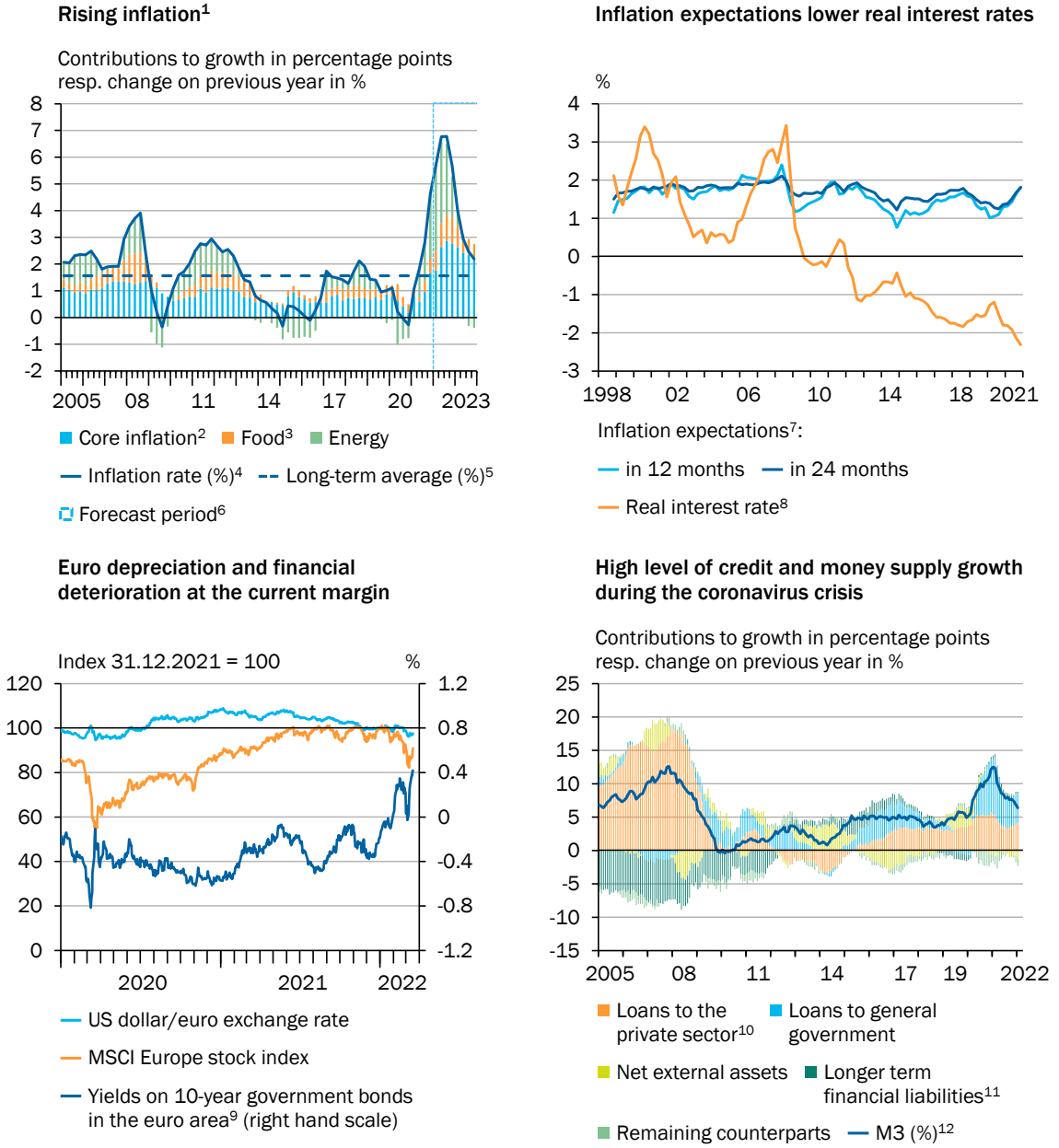
31. **Nominal financing conditions** in the euro area have deteriorated in recent months, but are **still** generally **favourable**. Yields on ten-year government bonds, for example, have risen somewhat from a very low level. Most recently, the effective interest rates for Germany, Italy and France stood at 0.3 %, 1.8 % and 0.7 %, respectively. The Country-Level Index of Financial Stress (CLIFS), which uses several indicators to measure disruptions on the financial market, and the Bank Lending Survey present a similar picture. However, the **real interest rate**, which is the difference between nominal interest rates and inflation expectations, has **fallen further** in recent months due to higher inflation expectations. ↘ CHART 12 TOP RIGHT Against the backdrop of high levels of excess savings, the lower real interest rates are likely to stimulate demand, which is expected to partially offset the consequences of the loss of purchasing power caused by high inflation rates and therefore bolster economic activity in the coming months (GCEE Annual Report 2021 item 44).

32. Since the start of 2021, the **euro has depreciated** markedly **against most major currencies**. For example, since January 2021 it has lost around 10.5 % in value against the US dollar, 6.9 % against the pound sterling and 11.9 % against the Chinese renminbi. However, it has appreciated by around 3.8 % against the Japanese yen (data as at 18 March 2022). ↘ CHART 12 BOTTOM LEFT The depreciation of the euro follows an appreciation in the period between the start of the pandemic and early 2021. The Russian war of aggression has also triggered a move towards safer assets, i.e. partly a shift towards currencies outside of Europe and partly a move away from shares and towards government bonds. Accordingly, between the day before the outbreak of the war on 24 February 2022 and 7 March 2022, stock

market indicators such as MSCI Europe fell by 12 % and weighted 10-year government bond yields of euro area Member States dropped by 0.3 percentage points.
↘ CHART 12 BOTTOM LEFT

33. Overall, **money creation** in the euro area **continued to decline** in January 2022, and therefore continues to follow a slowdown since January 2021.

↘ CHART 12
Inflation indicators in the euro area



1 – Harmonized Index of Consumer Prices. 2 – Overall index excluding energy and food. 3 – Food including alcohol and tobacco. 4 – HICP change on the same quarter of the previous year. 5 – Average over the period 2005 to 2021. 6 – Forecast by the GCEE. 7 – SPF (Survey of Professional Forecasters), expectations for inflation in 12 resp. 24 months. 8 – Difference between the Euribor rate with a maturity of 12 months and inflation expectations in 12 months. 9 – Only government bonds with AAA rating considered. 10 – Loans to non-financial corporations and households (including non-profit institutions serving households), seasonally and calendar adjusted. 11 – With a negative sign, as an increase in itself reduces M3 growth. 12 – Change on the same month of the previous year.

Sources: ECB, Eurostat, Refinitiv Datastream, own calculations

Nonetheless, it is at an **elevated level** compared with the period before the COVID-19 crisis. ↘ CHART 12 BOTTOM RIGHT The annual growth rate of the broad measure of money supply, M3, was 6.4 % in January after a rate of 6.9 % in December. At the same time, however, credit growth in the private sector rose again to 4.3 % in January, up from 4.0 % in December. In the public sector, credit growth fell from 11.3 % in December to 10.8 % in January, but it continued to be the largest contributor to money creation, accounting for 4.4 percentage points. Loans to the private sector contributed 4.2 percentage points to money creation, while the net external position and other balance sheet items made a significant negative contribution of 2.3 percentage points overall.

34. As the US Federal Reserve **changed direction in monetary policy** and therefore initiated interest rate hikes earlier than the ECB, the euro is likely to come under further depreciation pressure. ↘ ITEM 12 Through the exchange rate channel, this is likely to have the effect of driving up the prices of imported intermediate goods, energy sources, and raw materials (Bacchetta and van Wincoop, 2003; Jašová et al., 2016). However, the effects on consumer prices are likely to be less pronounced, due in part to the fact that imported goods account for only a portion of the value added of consumer goods (Colavecchio and Rubene, 2020; Ha et al., 2020; Ortega and Osbat, 2020).

35. In terms of the outlook for the current and coming year, **supply-side bottlenecks** are expected to weigh more heavily on economic growth than previously assumed, albeit to varying degrees in the Member States as each is affected differently. **Russia's war of aggression against Ukraine** is likely to have a further significantly negative effect on growth. ↘ BOX 3 This is likely to further disrupt international supply chains, and increases in the already high prices of energy sources, such as natural gas and oil, are likely to impact **household purchasing power** and **drive up costs for companies**. In addition, increased **uncertainty** could weigh on the business climate.

36. For its forecast, the GCEE assumes that there will **be no further escalation** of the war in the forecast period up to the end of 2023. The GCEE also assumes that the **sanctions** will **remain in place** in their current form and that there will be **no disruption of the supply** of Russian natural gas and oil. While energy prices are likely to remain high for longer and are only expected to fall somewhat in 2023, the economic impact of the war is expected to diminish over the forecast horizon with the **establishment of trade relations** with other partner countries and a **restructuring** of affected supply chains. ↘ ITEM 22

37. On the basis of information currently available, a number of favourable factors should ensure that the economy in the euro area aggregate grows this year and next year despite the aforementioned obstacles to growth. In addition to a significant statistical overhang from 2021, these factors include a **healthy order backlog in industry**, a partial reduction in **unplanned savings** (GCEE Annual Report 2021 item 44), a **robust labour market** and a state consumption that is expected to increase, not least because of the implementation of the **national recovery and resilience plans** in some Member States (GCEE Annual Report 2021 items 190 ff.). Furthermore, with the lifting of measures implemented to contain the **COVID-19 pandemic**, a further normalisation of

consumption behaviour and travel patterns can be expected. If the infection situation deteriorates again to some extent in the winter of 2022/2023, this is likely to only have a limited impact on growth given that the economic fallout from the pandemic has declined since the first wave. ↘ ITEM 5

After a strong year in 2021, the GCEE is forecasting calendar-adjusted **economic growth of 2.9 % in the euro area for 2022** and is therefore revising its forecast downward by 1.4 percentage points compared to the GCEE Annual Report. Above-average growth is expected for Spain (5.2 %), France (3.4 %) and Italy (3.1 %). Growth in Germany, on the other hand, is expected to be much slower (1.9 %), which can be attributed to a smaller statistical overhang and the greater economic impact of the war than in other Member States. ↘ ITEM 22 ↘ ITEM 36 **In 2023, a GDP growth rate of 2.9 % is expected for the euro area**. ↘ TABLE 2

38. **Inflation rates in the euro area are expected to rise again sharply in 2022 compared with 2021**. The higher annual rate can be explained by dynamic developments in recent months, mainly driven by energy prices. These are

↘ TABLE 2

Gross domestic product, consumer prices and unemployment rates in the euro area

Country/ country group	Weight in %[1]	Gross domestic product[2] (calendar-adjusted)				Consumer prices (HICP)[3]				Unemployment rate[4]			
		Change on previous year in %								%			
		2021	2022[5]		2023[5]	2021	2022[5]		2023[5]	2021	2022[5]		2023[5]
			Update	Diff. to AR 2021/22[6]			Update	Diff. to AR 2021/22[6]			Update	Diff. to AR 2021/22[6]	
Euro area[7]	**100**	**5.3**	**2.9**	**(– 1.4)**	**2.9**	**2.6**	**6.2**	**(4.1)**	**2.9**	**7.7**	**6.9**	**(– 0.3)**	**6.5**
including:													
Germany	29.6	2.9	1.9	(– 2.8)	3.8	3.2	6.3	(3.9)	3.4	3.5	3.2	(0.0)	3.0
France	20.2	7.0	3.4	(– 0.1)	2.0	2.1	4.2	(2.2)	2.4	7.9	7.2	(– 0.5)	6.9
Italy	14.5	6.6	3.1	(– 0.6)	2.2	1.9	6.9	(5.1)	2.6	9.6	9.0	(0.0)	8.5
Spain	9.9	5.0	5.2	(– 1.6)	3.7	3.0	7.0	(4.8)	2.6	14.8	13.0	(– 0.9)	11.9
Netherlands	7.0	4.8	3.4	(0.0)	2.0	2.8	7.8	(5.8)	3.2	4.2	3.6	(0.6)	3.3
Belgium	4.0	6.1	2.6	(– 1.0)	2.0	3.2	9.2	(7.0)	3.0	6.3	5.7	(– 0.1)	5.3
Austria	3.3	4.6	3.0	(– 1.0)	2.4	2.8	5.7	(3.3)	2.8	6.2	5.2	(– 0.6)	4.6
Ireland	3.3	13.4	2.6	(– 1.6)	4.8	2.4	5.3	(3.2)	3.1	6.3	5.0	(– 0.9)	4.7
Finland	2.1	3.3	1.3	(– 1.5)	1.8	2.1	5.2	(3.5)	2.6	7.7	6.9	(– 0.4)	6.4
Portugal	1.8	4.9	4.9	(– 0.8)	2.5	0.9	5.3	(3.7)	2.6	6.6	6.0	(– 0.3)	5.7
Greece	1.5	7.9	3.0	(– 1.2)	2.7	0.6	6.5	(4.4)	2.4	14.8	12.8	(– 0.9)	11.8
memorandum:													
Euro area without Germany	**70.4**	**6.3**	**3.4**	**(– 0.7)**	**2.5**	**2.3**	**6.2**	**(4.2)**	**2.7**	**9.2**	**8.3**	**(– 0.3)**	**7.7**

1 – GDP in the year 2020 as a percentage of the GDP of the euro area. 2 – Price-adjusted. Values are based on seasonal and calendar-adjustedquarterly figures. 3 – Harmonised index of consumer prices. 4 – According to the measuring concept of the ILO (International Labour Organization). For the total euro area and euro area without Germany weighted by the labour force of 2020. 5 – Forecast by the GCEE. 6 – Difference in percentage points. 7 – Weighted average of the 19 euro area member states.

Sources: Eurostat, own calculations

expected to remain high in light of the Russian war of aggression against Ukraine and, like the disruptions in international supply chains, are likely to be reflected in higher consumer prices somewhat later (GCEE Annual Report 2021 item 41). ↘ ITEM 36 For 2022, the GCEE forecasts an overall rate of 6.2 % but expects inflation rates during the course of the year to decline as of the fourth quarter of 2022, largely due to a lower contribution of energy prices. At 2.9 %, the inflation rate in 2023 is expected to be well below the 2022 rate, but significantly above the ECB's 2 % target. This is likely to be due to producers **passing on higher producer prices** and **higher wages**, which will raise the core inflation rate. ↘ BOX 2 ↘ TABLE 2

3. Threats and opportunities

39. The **level of uncertainty** surrounding **global economic development** has **increased substantially** since the GCEE Annual Report 2021 was published. In principle, various developments are conceivable in which the economic outlook could be presented more favourably than in this forecast. In advanced economies, excess savings accumulated during the pandemic could be unleashed more strongly than expected, thereby increasing demand. A speedier resolution of supply-side bottlenecks could also support growth. ↘ ITEMS 41 F. Moreover, further developments in Russia's war of aggression against Ukraine could have less of an economic impact than assumed in the forecast. For example, the additional restrictions on supply chains could turn out to be less extensive than expected.

Conversely, a number of **unfavourable developments and political risks** are also conceivable. While these are not included in the point forecast, they are, in the GCEE's assessment, **considerably more likely** than the **opportunities** mentioned. First and foremost, economic uncertainty and downside risks have increased significantly since the outbreak of the Russian war of aggression against Ukraine. ↘ ITEM 40 It can also be assumed that reducing dependence on Russian energy imports will entail high economic costs. ↘ BOX 3 In addition, there is a real danger that the war in Ukraine will spread to other countries, which would have serious consequences for further global economic development. Finally, the development of the pandemic continues to pose a significant downside risk for the current forecast (GCEE Annual Report 2021 item 47). ↘ ITEM 5

40. Given the current political situation, the present forecast is faced with the **risk** of greater economic fallout, especially for EU economies, in the event of a **protracted war or escalation of tensions** between the West and Russia. For example, cuts to supply or a complete stop of Russian energy imports could lead to **supply bottlenecks**, especially with respect to **natural gas, and** a further **hike in energy prices**, irrespective of whether such a ban is imposed by the European Union or Russia. ↘ BOX 3 Even necessary precautions for the case of a possible delivery stop or to end dependence on Russia by diversifying energy imports are likely to be associated with high costs in the short term, this year in particular. Against this backdrop, **stagflation** could result, especially for economies that are particularly reliant on Russian energy imports; that is, slow or negative economic growth at the same time as high inflation. Similarly, soaring world market prices

for crude oil and coal are likely to have a significant effect on countries that do not currently import energy sources from Russia.

41. In many economies the **economic fallout** from the COVID-19 pandemic has faded in the winter half-year 2021/22. Nonetheless, there is still a risk that health systems will become overstretched in the wake of new virus variants of concern and that extensive restrictions may need to be re-imposed.

42. Should **supply-side bottlenecks persist, worsen or spread** to other areas beyond the period assumed in this forecast, this would dampen the growth of global industrial production and could, through a continued rise in producer prices, further push up inflation. ↘ ITEM 9 Further closures of important production sites and ports, for example, in China, could lead to more disruptions in already strained supply and value chains. An intensification of the pandemic could prolong and expand the bottlenecks. In this context, the central role played by **China**, combined with its **zero-tolerance strategy,** poses a **particular threat** to global supply and value chains - as the current situation in the city of Shenzhen shows. ↘ ITEM 18 A worsening of the pandemic situation could also delay normalisation of the consumption structure between goods and services. Disproportionately high customer demand would thus continue, placing further increase pressure on global transport capacities (GCEE Annual Report 2021 background info 2). However, the economic outlook could look brighter if the strain on supply chains eases more quickly than expected. In particular, this could allow for more spending of pandemic-related excess savings. A dynamic upswing in worldwide corporate investment could result, supported by strong demand.

43. The **risk** of **persistent higher inflation rates** (GCEE Annual Report 2021 item 49) is **still present and has recently increased**. In particular, a combination of further hikes in energy prices and persistent supply bottlenecks could raise inflation expectations, especially if the monetary policy response is insufficient. In extreme cases, this could lead to a de-anchoring of inflation expectations and also to strong second-round effects or even a wage price spiral through higher wage price increases. ↘ BOX 2

44. Should the sharp rise in inflation becomes entrenched or increases further, central banks would be forced to tighten monetary policy more strongly and more quickly. For **banks**, a rise in interest rates would have the **advantage** on the one hand of being likely to **increase their lending margins** (Claessens et al., 2018). **On the other hand**, they would face **asset price corrections** for fixed-income securities and in the real estate sector (GCEE Annual Report 2018 items 685 ff.). In particular, smaller and less profitable banks may have exposed themselves to higher interest rate risks in recent years through long-term assets and short-term liabilities (Memmel and Seymen, 2021). Due to rising interest rates and decreasing assets in bank balances, the currently favourable financing conditions enjoyed by companies and households could deteriorate considerably. This could in turn put a damper on growth. Due to long-term government debt, the impact of rising interest rates on state interest expenditure is likely to remain limited in the coming years (Grimm et al., 2022; GCEE Annual Report 2021 items 107 f.). A faster than expected tightening of monetary policy in the United States

could provoke a rapid outflow of international capital, which would have negative consequences in particular for emerging and developing countries.

↘ BOX 3

Effects of a possible end to energy supplies from Russia on energy security and economic output

The Russian war of aggression against Ukraine since 24 February 2022 has intensified the discussion of Europe's reliance on energy imports from Russia. A **ban on Russian imports of oil, natural gas and coal** has already been imposed by the **United States**, while the United Kingdom plans to cease oil imports from Russia by the end of 2022. The Western community of states has been struggling in particular with the idea of a gas embargo against Russia. The Federal Government is currently opposed to an energy embargo against Russia (BMWK, 2022a). However, the Federal Ministry for Economic Affairs and Climate Action (BMWK) is working on a strategy to reduce gas consumption (BMWK, 2022b). At the same time, Russia may decide to stop its energy exports to countries that are imposing sanctions.

Reliance of Germany and the European Union on energy imports from Russia

Russia plays **an important role as an energy supplier** not only to Germany but to the European Union as a whole. According to Eurostat, 27 % of crude oil, 44 % of hard coal and 38 % of natural gas imported into the 27 EU Member States in 2019 came from Russia. EU Member States are required to hold reserves of oil for emergency situations and these must, at a minimum, correspond to 90 days of net imports or 61 days of consumption – depending on which quantity is larger (European Commission, 2022a). It is unclear just how large the European Union's reserves of hard coal are. Some 2.6 million tonnes (MT) – roughly equivalent to three weeks of imports from Russia – are currently stocked in ports but additional reserves should be available at power plants (McWilliams et al., 2022b). A sufficient quantity of lignite is mined within Europe itself (McWilliams et al., 2022b). The markets for crude oil and coal are globally integrated. This means that oil and coal imports from Russia could be replaced by global market procurement if supply is suspended. The associated challenges of procurement and logistics are not discussed below. In contrast, the natural gas market is regionally segmented, which goes a long way towards explaining the significant regional differences in natural gas prices (Barbe and Riker, 2015). ↘ CHART 13 TOP LEFT Due to insufficient global transport capacities, Russian natural gas imports cannot be fully replaced in the short term, i.e., over the course of a year (McWilliams et al., 2022c).

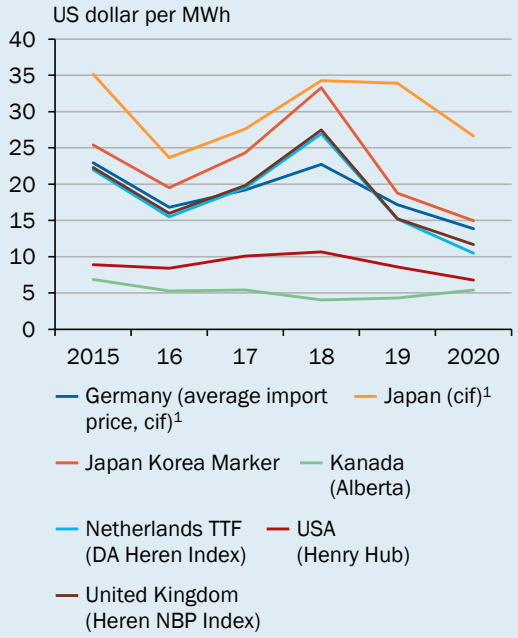
According to Eurostat, over 400 billion cubic metres of **natural gas** were consumed in the 27 EU Member States in 2019. A large portion of this – over 160 billion cubic metres (**40 %**), – was **imported from Russia**, ↘ CHART 13 TOP RIGHT with more than 46 billion cubic metres of this share being imported by Germany. According to Eurostat, this represented 48 % of natural gas consumption in Germany. However, Germany's reliance on natural gas from Russia is significantly lower according to the gas statistics published by the Federal Office of Economics and Export Control (BAFA) and the statistics on foreign trade published by the Federal Statistical Office. Between 2016 and 2020, gas imports from Russia accounted, on average, for 39 % of all gas imports into Germany according to BAFA (BAFA, 2022; BMWK, 2022c). One possible reason for the divergence in these figures is the different handling of re-exports and loop flows, i.e., volumes of gas that flow out of Germany and then re-enter the German grid elsewhere.

In recent years, the **supply of gas piped from Russia has declined** considerably. ↘ CHART 13 BOTTOM LEFT At the end of 2021 in particular, flows were falling compared to earlier years and had dropped to a very low level by the start of 2022. While Russia was continuing to meet its long-term contractual obligations, 2021 in particular saw a significant short-term drop in the volume of natural gas that was made available for purchase on the spot markets (Elliott, 2021).

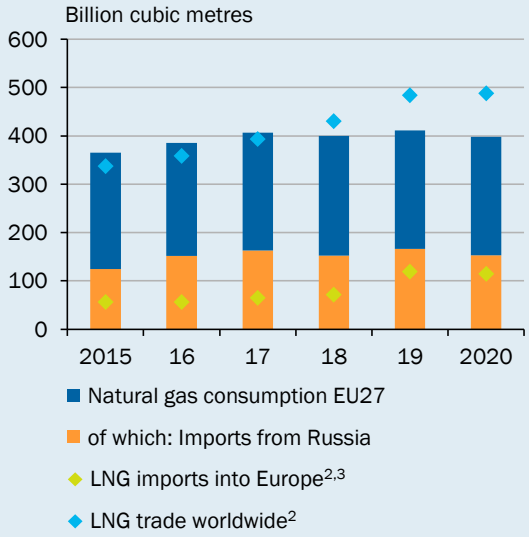
↘ CHART 13

Indicators of the natural gas market in Europe

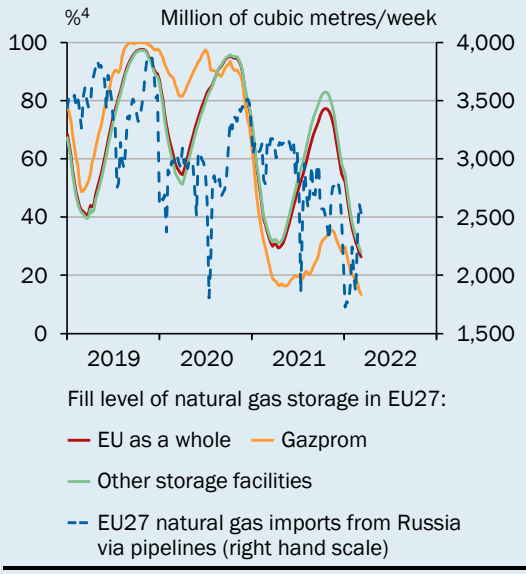
Natural gas prices vary between world regions



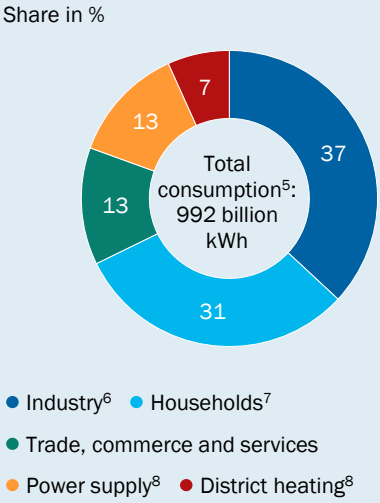
Consumption and import of natural gas in Europe



EU natural gas imports from Russia via pipelines and fill level of natural gas storage



Natural gas in Germany most consumed by households and industry in 2021



1 – Cost + insurance + freight (average prices). 2 – Liquefied Natural Gas. 3 – This includes all European countries, not just the EU27. 4 – In % of the relevant storage capacity. 5 – Provisional, differences in the totals due to rounding. Natural gas sales do not include the gas industry's own consumption. 6 – Including industrial power plants. 7 – Including housing companies. 8 – Including combined heat and power plants.

Sources: BAFA, BDEW, BP (2021), EDMC Energy, Energy Intelligence Group, entsog, Eurostat, Gas Infrastructure Europe (GIE), ICIS Heren Energy Ltd., OECD/IEA, S&P Global Platts, own calculations

Natural gas imports from Russia have risen again since the start of the war in Ukraine. European **gas in storage** is currently at a low level of around 25 % as at 16 March 2022 (GIE, 2022), while the levels of gas stored in Russian-owned Gazprom facilities are significantly lower on average at 13 % as at 16 March 2022 (Zachmann et al., 2022). ↘ CHART 13 BOTTOM LEFT

Price effects

Since the start of 2022, the **price of natural gas on the European market** has climbed **by more than 35 %** (as at 17 March 2022), at one point sky-rocketing by over 200 % – a much greater rise than has been seen in the US market. ↘ CHART 7 LEFT On the supply side, the sharp price hike in Europe is primarily due to reduced natural gas exports from Russia. ↘ CHART 13 BOTTOM LEFT A further reduction or complete cessation of Russian supplies with a (partial) replacement with supplies from other sources (such as the import of liquefied natural gas, LNG) would drive the gas price higher again. Around 70 % of global trade in LNG is in connection with **long-term supply contracts** lasting 10 years or more (The Economist, 2022). The remainder is traded on spot markets and as part of short-term supply agreements. In total, 145 billion cubic metres of gas is traded for immediate delivery – a figure slightly less than the quantity supplied by Russia to the European Union in 2019. The prices of LNG could continue their upward trend due to scarcity accompanied by increased demand from Europe – although a portion of the price rise due to expectations of scarcity may already been included in current prices. Despite fragmentation of the markets, the increased demand in Europe is having an impact on prices in Asia. ↘ CHART 13 TOP LEFT This could reduce the demand for LNG from other regions of the world. In addition, the mandatory gas storage levels that are currently planned for Germany (Deutscher Bundestag, 2022) may temporarily drive prices up even further. Extracting larger quantities of gas in Europe should be possible only at those gas fields which have spare capacity (McWilliams et al., 2022c). Spare capacities can be found in Norway, the United Kingdom and the Netherlands (McWilliams et al., 2022c; Patterson and Zhang, 2022). Higher prices could induce higher extraction quantities.

The extent to which energy companies can pass on higher costs of procurement to their customers depends on the type of contracts in place and on the price elasticity of the demand. Burke and Yang (2016) estimate that increasing the consumer price of natural gas by 1 % would cause consumption to drop by 0.13 % for households and by 0.37 % for industry within one year. Given the **low price elasticity of the demand**, a sufficient short-term adjustment in the demand for natural gas in line with reduced supply is therefore unlikely. In addition, rises in wholesale prices are passed on to consumers after a delay rather than immediately.

In accordance with the principle of marginal pricing, the rising prices of natural gas contribute to an **increase in energy wholesale prices**. It is estimated that gas power plants determined the price in European energy markets during 30 % of hours in 2020 (Blume-Werry et al., 2021). However, energy prices vary significantly for the various economic players due to the diverse structure of supply contracts, as well as rates and levies. At the start of 2022, for example, the average energy price for German households rose by 12.5 % compared to the annual average for 2021, while the corresponding figure for small and medium-sized companies (SMEs) was 27 %, with this difference being explained by the lower charges and levies and thus the larger share of the wholesale price in the retail price (BDEW, 2022a). As the procurement costs for energy suppliers have continued to rise recently, further price increases are possible in the coming months (BDEW, 2022a).

The **price of mineral oil** has also **risen sharply** in the face of the crisis, i.e., by 36 % (as at 17 March 2022) compared to the start of the year. ↘ CHART 7 ↘ ITEM 10 As a result, the oil price is currently at a level similar to that in the period 2011 to 2014. Mineral oil is the most important primary energy source in Germany (German Environment Agency, 2022a). Most of the oil is used as a fuel in the transport sector, for heating or as a raw material in industry (German Environment Agency, 2022b). Therefore, the price rise may lead to increased costs in certain

industries and for households. If imports of Russian oil grind to a halt, it may be possible to find an alternative source based on globally integrated oil markets. However, price pressure may become even more intense. And even with mineral oil there are challenges to overcome in terms of transport within Europe and due to differences in oil quality depending on its origin. Moreover, an internationally coordinated approach is needed to reduce the demand for petroleum as soon as possible (McWilliams et al., 2022b). The potential to reduce demand is particularly high in the transport sector (IEA and OECD, 2018). If there is an import embargo on Russian oil, Russia could potentially divert its supply to China, although this would involve significantly longer freight routes. As recently as February 2022, Russia and China extended contracts for oil to be supplied via the Kazakhstan-China pipeline (Bloomberg, 2022). Several factors will determine whether China will purchase the Russian oil that is not imported by the West – including the price and how much oil from other suppliers can be displaced (Downs, 2022). In addition, some independent refineries in China are currently reluctant to purchase from Russia due to uncertainty over sanctions (Downs, 2022). The price differences of around 25 US dollars that are already evident would also imply a significant loss of income for Russia in this case. China, on the other hand, would be in a position to benefit from the low prices. Price rises on the global market and the scale of a possible subsequent increase in supply will depend on the extent of such a re-routing of oil supplies.

Alternative natural gas suppliers

With a potential cut-off of natural gas supplies from Russia, the question arises as to which alternative sources could be accessed by Europe. European gas extraction can only be expanded to a limited extent. For example, the Netherlands has cut back on gas extraction in recent years due to the risk of earthquakes. Imports from Norway and North Africa could be increased slightly (McWilliams et al., 2022c). Key considerations are the extent to which **LNG imports** (e.g., from the United States and Qatar) could at least partly replace Russian gas and how long it would take. Imports of LNG into Europe have already **increased** considerably in recent years. ↘ CHART 13 TOP RIGHT The European Union could intensify efforts to increase these imports, and these efforts could also be supported by procurement via other countries, such as Japan, South Korea and the United States. The degree to which LNG imports can be further increased depends both on the potential to expand **production capacities** (e.g., from the United States) in the short term, on the **transport capacities of the shipping fleets**, and on the European infrastructure, i.e., the **capacities of LNG terminals, liquefaction plants, and gas pipelines** for distributing the gas within Europe. Germany currently has no LNG terminals of its own. While two terminals are currently at the planning stage, it is likely to take several years for them to be commissioned. Another bottleneck is presented by the fact that Europe's system of pipelines is not currently designed to transport large quantities from the west to the east or from the south (e.g., Spain) to the north (McWilliams et al., 2022c). This means that the impact will be felt particularly strongly, not only in Germany but also in countries in eastern Europe that currently import a large share of their gas from Russia and only have limited capacity for LNG imports (McWilliams et al., 2022a).

Potential for saving and replacing natural gas

Due to the limited options for increasing supplies of natural gas from other countries, several economic experts (Hirth et al., 2022; Leopoldina, 2022; McWilliams et al., 2022a) have suggested that an end to imports of Russian gas will necessitate a **reduction in gas consumption in the European Union**. For one thing, price increases are likely to reduce demand to a certain extent. For another, additional measures to replace natural gas with other sources of energy will contribute to a reduction in demand. In the area of electricity supply, an **accelerated expansion of renewable energy** and storage options will only succeed in providing relief in the medium to long term – in other words, in a few years from now. In the short term, i.e., in the current year,

partial replacement by **coal-based power generation** presents an option (Leopoldina, 2022). Delaying the closure of nuclear power plants has also been proposed as a means of replacing Russian gas (IEA, 2022). In addition, measures to **increase efficiency** could be intensified, e.g., by means of heating settings in buildings, rapid replacement of old boilers and digital control of facilities, also in industry. Substantial savings could also be achieved through **information campaigns to reduce consumption** (Grimm and Kuhlmann, 2022; IEA, 2022; Leopoldina, 2022; McWilliams et al., 2022c).

The quantity of gas that can be saved by the various measures depends on what share of overall gas consumption is attributable to the various consumer groups. In Germany, industry consumes the **largest share** (36 %) **of natural gas, followed by private households** (31 %). ↘ CHART 13 BOTTOM RIGHT In industry, a large volume of natural gas is used as an energy source and a raw material in the chemical sector, for example. In addition, 14 % of gas consumption is used to generate electricity, which is particularly important during times of peak demand ("peaking power plants"). However, only a portion of this can be replaced due to the concurrent production of electricity and useful thermal energy in combined heat and power plants for example. Agora Energiewende (2022) predicts that, if Russian supplies of natural gas cease and if extensive energy-saving measures are implemented and additional supplies of gas are obtained from other countries, there will be a shortfall of 30 TWh for Germany in the short-term (meaning, in this case, up to winter 2023/24). A recent analysis conducted by the German Association of Energy and Water Industries (BDEW, 2022b) concludes that one-fifth of German gas consumption can be replaced in the short term. This corresponds to half the volume of gas imported from Russia, assuming that 40 % of gas consumed in Germany comes from Russian imports. An analysis by IEK-3 at the Jülich research centre (Forschungszentrum Jülich, 2022) concludes that approximately one-third of the Russian natural gas that is imported into Germany can be saved in the short term by private households, businesses, trade, services, industry and electricity generation.

In the **event of a physical shortage** of available gas, **emergency plans** (BMWi, 2019) are in place that prioritise gas supply for heat generation for private households as well as for the supply of critical infrastructure. In this scenario, there may be a decline in industrial production next winter (BDEW, 2022b; Leopoldina, 2022). Reducing gas consumption at an early stage, for example, by partially replacing gas-based power generation with coal-based power generation, may help alleviate bottlenecks next winter (Hirth et al., 2022; Leopoldina, 2022). Various analyses indicate that these precautionary measures need to be implemented with care to prevent Russia from viewing energy supply as a vulnerability in strategic negotiations (Hirth et al., 2022; Leopoldina, 2022).

According to recent **estimates by the International Energy Agency** (IEA, 2022), the European Union **can reduce its procurement of gas from Russia by up to one-third within a year** using measures that are compatible with the European Green Deal. These measures include, in particular, greater use of alternative natural gas suppliers, an accelerated switch to alternative energy sources and improved efficiency in energy usage by homes and businesses. According to the IEA, this approach could potentially reduce imports of natural gas from Russia by more than 50 billion cubic metres, despite the need to increase gas storage levels in 2022. A **reduction of 80 billion cubic metres in total (or around 50 %)** would be **possible** if additional measures were implemented that are not compatible with the European Green Deal, in particular increased coal-based power generation or use of crude oil.

If gas-based power generation is replaced by coal-based power generation, the EU Emissions Trading System (EU-ETS) in its current form could ensure that CO2 emissions do not rise as a result of this measure, because an upper limit for emissions in the power and industry sector is defined in this system. In this scenario, however, fewer emission allowances may be cancelled from the Market Stability Reserve. The additional demand for allowances would in principle increase their price, thereby burdening the companies in the ETS and their customers.

This could create pressure to increase the number of allowances in the short term as a result of the crisis.

According to an **analysis by Bruegel** (McWilliams et al., 2022a), **gas consumption in the European Union will need to drop by 400 TWh (10–15 % of annual consumption)** if supplies from Russia are cut off. The analysts assume that LNG imports can be increased to the maximum capacity of the gas terminals – which is unlikely to be possible due to the inadequate piping capacities (e.g., from Spain to northern Europe). They also assume that the currently high level of imports from North Africa, Norway and Azerbaijan can be maintained. The analysts also indicate that incentives must be put in place to fill gas stores over the summer, which is likely to require regulatory intervention. The Leopoldina (German National Academy of Sciences) highlights the point that commercial gas store operators could be exposed to a significant economic risk if they fill their stores at high prices and Russian suppliers subsequently flood the market with cheap gas in the heating period (Leopoldina, 2022).

For the medium term, the EU Commission's "**REPowerEU**: Joint European Action for more affordable, secure and sustainable energy" (European Commission, 2022b) sets out a plan for how the European Union's reliance on energy sources from Russia is to be significantly reduced before 2030. In particular, this plain aims to reduce the high degree of reliance on Russian natural gas **by two-thirds (100 billion cubic metres) within one year**. This objective is to be achieved by (i) increasing gas imports from other countries by 60 billion cubic metres (LNG imports by 50 billion cubic metres and pipeline imports by 10 billion cubic metres), (ii) increasing the sustainable production of biomethane (to replace 3.5 billion cubic metres of gas), (iii) increasing the use of solar roofs and heat pumps (to replace 4 billion cubic metres of gas) and (iv) speeding up the construction of wind and solar power plants (to replace 20 billion cubic metres of gas). In addition, energy efficiency measures, such as reduced heating in buildings, will be used to save 14 billion cubic metres of gas.

Assessing the effects of an escalation of conflict on economic output

Overall, the impact of Russian's war of aggression against Ukraine on the German and European economy – especially in case sanctions will be tightened – is highly uncertain. To assess the effects of an intensification of the conflict on economic output, different institutions prepared **risk scenarios for economic development in Germany and Europe** as part of their economic forecasts (Deutsche Bank Research, 2022; ECB, 2022b; Goldman Sachs, 2022; Köppl-Turyna et al., 2022; Liadze et al., 2022; Oxford Economics, 2022). ↘ TABLE 3 These scenarios examine, for example, the possible economic effects of increased uncertainty leading to a decline in consumer confidence and household spending, a deterioration of financing conditions, further restrictions on trade relations with Russia and rising costs of raw materials. ↘ BOX 1 Due to Russia's important role as an energy supplier for Europe and the limited possibilities to substitute Russian energy imports in the short to medium run, one of the major transmission channels in these scenario analyses works through a supply shortage of crude oil and natural gas, especially in Europe. ↘ BOX 1 Most of these scenarios assume a temporary stop of imports of crude oil and natural gas from Russia resulting in higher prices – at least temporarily – for crude oil and natural gas in Europe. The scenario analysis by Oxford Economics (2022), in particular, assumes that the price for natural gas remains significantly higher in the longer term. In this scenario, the price increases immediately to 190 Euro per MWh due to a stop of imports from Russia in 2022 and, subsequently, slowly decreases to roughly 70 Euro per MWh in 2025. This represents more than a quadrupling compared to the average price in 2019 and slightly less than a tripling compared to the average price in the period 2019 to 2021. ↘ ITEM 10 Depending on the scale and the duration of the assumed rise in energy prices and a potential amplification through the financial market, these studies predict **deduction of 1.2 % to 2.2 %** to the **euro area GDP in 2022** compared with the forecast based on the latest situation of the war and the sanctions when the studies were conducted. The **addition to the inflation rate in**

2022 is in the **range of 0.8 percentage points and 2.6 percentage points** depending on the respective scenario.

↘ TABLE 3

Selected scenario calculations relating to the effects of an intensified conflict on economic output

Institution	Scenario	Assumptions	GDP deduction[1]	Inflation increase[1]	Region
Effects relative to a baseline scenario, taking into account the current conflict and sanctions situation					
Deutsche Bank Research[2]	Negative scenario with temporary ban on imports of natural gas and oil from Russia	Highly elevated energy prices (oil US$140/barrel; natural gas €150/MWh)	1.5	1–1.5	Germany
ECB[2]	Adverse scenario	Sharp temporary increase in natural gas prices and increase in oil prices	1.2	0.8	Euro area
ECB[2]	Severe scenario	Sharper and longer increase in natural gas and oil prices; strong second-round effects	1.4	2.0	Euro area
Oxford Economics[2]	Ban on Russian natural gas imports for 6 months	Oil price between US$100 and US$115/barrel, natural gas price at €190/MWh	1.5	2.6	Euro area
Goldman Sachs[2]	Ban on Russian natural gas imports		2.2	–	Euro area
Effects relative to a baseline scenario without taking into account the current conflict and sanction situation					
EcoAustria[2] (Köppl-Turyna et al.)	Increase in natural gas prices and ban on exports to Russia	Natural gas price of €172/MWh and no exports to Russia and to Ukraine	1.3	–	Austria
NIESR[2] (Liadze et al.)		Oil price at US$140/barrel; higher public expenditure	0.8	2.5	Euro area
Estimates by Bachmann et al. (2022)					
Bachmann et al.[3]	Ban on Russian natural gas imports	Introduction of trade barriers with the model used by Baqaee and Farhi (2021), which cut off all Russian imports to the EU	0.2–0.3	–	Germany
Bachmann et al.[4]	Ban on Russian natural gas imports	Drop of 30 % in natural gas imports; elasticity of substitution of 0.1 between natural gas and other inputs	2.2	–	Germany
Bachmann et al.[5]	Ban on Russian natural gas imports	Energy imports down by 30 %; 5 percentage points change in the share of energy import costs in GNE to 7.5 %	1.4	–	Germany

1 – In percentage points relative to the baseline scenario. 2 – Deduction or increase for the year 2022. 3 – The estimate using Baqaee and Farhi's (2021) trade model compares two different long-term equilibrium with various trade barriers. Does not take into account any of the common macroeconomic multipliers. 4 – Based on a production function approach with conservatively estimated elasticities of substitution, but excluding common macroeconomic multipliers. 5 – Based on an approximation of the GNE loss on the basis of sufficient statistics. Lemma 1 in Bachmann et al. (2022) derives the approximation using the model of Baqaee and Farhi (2021). Does not take into account any of the common macroeconomic multipliers.

Sources: Bachmann et al. (2022), Deutsche Bank Research (2022), ECB (2022b), Goldman Sachs (2022), Köppl-Turyna et al. (2022), Liadze et al. (2022), Oxford Economics (2022)

In addition to these scenarios, which focus in particular on estimating the consequences of higher energy prices within the standard forecasting models, there exist additional approaches to estimate GDP deductions, for example as a result of a complete stop of Russian energy imports. **Bachmann et al. (2022)** use various approaches to estimate the potential effect of a complete stop of Russian energy imports. On the one hand they calculate two different equilibria within the neoclassical multi-sector trade model of Baqaee and Farhi (2021). One with imports to the EU from Russia and one without. With this approach one can estimate the long-run effects of a potential stop of imports. The stop of imports is simulated by an increase of trade barriers which induce a complete cessation of trade between Russia and the EU. Due to possible adjustments in trade flows that are likely to occur in the long run, the resulting deduction to GDP of 0.2 % to 0.3 % is very small. ↘ TABLE 3 On the other hand the authors use a production function approach with very conservative substitution elasticities. To this end, the authors derive a theoretical relationship that allows to estimate the change in gross national expenditure (GNE) and in GDP using changes in the quantity of energy imports and the elasticity of substitution between energy inputs and other inputs. Additionally, they derive an approximation of the decline in GDP using a sufficient statistic. This allows to estimate the change in GDP by using an assumption about the change of the average price of energy imports, rather than by using an assumption about the elasticity of substitution in order to arrive at an. They present a pessimistic scenario in which a stop of Russian gas imports leads to a **30 % decline in German natural gas imports** and the **elasticity of substitution between gas and other energy inputs is very low (0.1)**. In this scenario, which the authors interpret as a very pessimistic scenario for the short run, **German GDP would contract by 2.2 %.** ↘ TABLE 3 In another scenario, the authors assume a complete cessation of all Russian energy imports and that the expenditure share of energy imports in the GNE increases by 5 percentage points to 7.5 %. In this scenario, German GDP would contract by 1.4 %. ↘ TABLE 3 However, this approach omits common macroeconomic amplification mechanisms such as those triggered by investment adjustment costs, price rigidities or financial market frictions. Thus, the estimated effects could potentially come on top of the aforementioned scenarios that do not take account of a full cessation of Russian energy imports.

Using the sufficient statistic derived by Bachmann et al. (2022), the GCEE has compiled its **own estimates in additional scenarios relating to the decline in natural gas imports and the increase in natural gas prices.** These scenarios complement the present economic forecast, which is based on the sanctions adopted at the time of date cut-off (March 18, 2022) and the corresponding energy price trend. However, they should not be interpreted as full-fledged risk scenarios. ↘ ITEM 39 In particular, like Bachmann et al. (2022), these estimates **do not take into account common macroeconomic amplification mechanisms.** In the extreme case that only a quarter of the shortfall in Russian natural gas imports could be compensated for and thus **German gas imports would drop by 30 %** (this assumes that Russia accounts for 40 % of Germany's natural gas imports, in line with BAFA's figure for the average Russian share from 2016 to 2020) and that the **average import price** for the remaining **natural gas imports increases to 350 Euro per MWh** (a sevenfold increase compared with December 2021), **German GNE would decrease by 2.0 %.** ↘ TABLE 4 Using this method, **additional estimates** of the effect of a stoppage of Russian energy imports on the GNE in **other EU member states** can be made. Under the same assumptions as for Germany (cessation of Russian natural gas imports, only 25 % of the shortfall can be compensated; natural gas prices increase to 350 Euro per MWh) the decline would amount to 2.2 % in Italy and to 0.6 % in Poland. With a decline of 0.14 % and 0.03 % respectively, France and Spain would be far less severely affected due to their lower volume of natural gas imports overall and the low share of natural gas imports stemming from Russia, respectively. ↘ TABLE 4

↘ TABLE 4

GCEE estimates of the deductions to economic output and additions to inflation resulting from a restriction of imports of Russian energy carriers

Assumptions	GNE deduction[1]	Additional inflation[1]	Region
Own estimates based on the method of Bachmann et al. (2022)[2]			
Decline in natural gas imports amounting to 75 %	2.0	–	Germany
of the natural gas imports from Russia; Increase	2.2	–	Italy
in the average price of natural gas imports to	0.6	–	Poland
350 €/MWh	0.14	–	France
	0.03	–	Spain
Estimates of the deduction to economic output and additional inflation due to an adverse oil supply shock			
40 % increase in the oil price	0.4–0.8	1.6	Germany

1 – In percentage points relative to the baseline. 2 – Approximation of the GNE loss based on a sufficient statistic. Lemma 1 in Bachmann et al. (2022) derives the approximation in the general model of Baqaee and Farhi (2021). The approach does not incorporate common macroeconomic amplification mechanism.

Source: own calculations

In addition to the restrictions of the natural gas imports from Russia, a restriction of crude oil supplies from Russia, which would represent an **adverse oil supply shock**, could spark **further negative GDP effects**. In general, the price of crude oil follows the development of the global economy. However, exogenous events, such as the wars in Iraq or the sanctions against Iran, can lead to increases in the price for crude oil that are not caused by economic developments. By historical standards, the price of oil (unlike the price of gas in Europe, for example) is still below the interim highs reached between 2011 and 2014, based on a monthly average. ↘ CHART 14 Furthermore, for the most part, there are only minor differences between the prices of crude oil in Europe (Brent) and the United States (WTI). ↘ CHART 14 LEFT

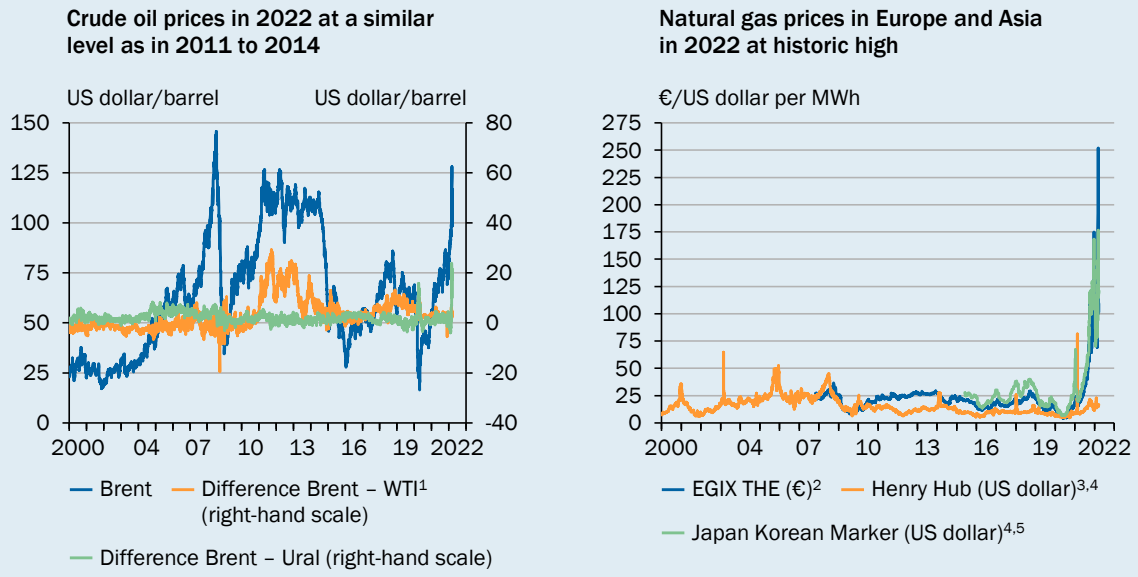
Previous macroeconomic studies on **oil supply shocks** find **moderate and delayed effects on real economic activity and inflation** (Kilian, 2008, 2009; Carstensen et al., 2013; Baumeister and Hamilton, 2019). According to a 2013 study on Germany, adverse oil supply shocks that lead to a 10 % increase in crude oil prices lower industrial production by 0.5 % after 1 year and by 1 % after 2 years (Carstensen et al., 2013). German producer prices increase by 0.5 % one year after a corresponding shock. GCEE estimates based on the method of Känzig (2021) yield similar magnitudes for the effect on industrial production. Further, the consumer prices would rise by 0.4 % at the peak.

The reasons for the estimated moderate effects of an increase in the price of oil are manifold. It is argued that the share of crude oil in value added is lower today than in 1970s and 1980s (Blanchard and Galí, 2007; Herrera and Pesavento, 2009). Moreover, strong **fluctuations in crude oil prices** can largely be **explained by** aggregated, oil-specific, and expectation driven **demand factors**. Consequently, crude oil price increases in the past have often not been accompanied by negative economic growth (Kilian, 2008, 2009; Baumeister and Hamilton, 2019). During the oil crises of the 1970s and 1980s, it was precisely the expectation-driven and oil-specific demand component (demand grew as oil was stockpiled in anticipation of the impending drop in supply and price increase) and other non-supply-side oil shocks that were major factors in the sharp increases in the price of oil. The adverse oil supply shocks were only partly to blame (Kilian, 2009; Baumeister and Hamilton, 2019; Känzig, 2021). Finally, the global market for crude oil is highly integrated. Consequently, restrictions on the production of crude oil in one country have been at least partially offset by an expansion of production in

other country (Kilian, 2009). This was also observed during the Gulf War and as a result of US sanctions on Iran (Kilian and Murphy, 2014; Caldara et al., 2019). As a direct consequence, oil supply shocks have led only to transitory and moderate increases in the price for crude oil. This is also likely to apply to the current situation if Russia's 16 % share of global oil production would be sanctioned by Western industrialised countries. Rerouting Russian oil production at a significant price discount to China, for example, would presumably at least partially cushion the supply shock through the global market.

↘ CHART 14

Development of oil and natural gas prices in the longer term



1 – West Texas Intermediate. 2 – The European Gas Index (EGIX) is based on exchange trades which are concluded in the respective current front month contracts (THE). 3 – Prices are based on delivery at the Henry Hub in Louisiana. Official daily closing prices at 2:30 p.m. from the trading floor of the New York Mercantile Exchange (NYMEX) for a specific delivery month. 4 – Prices in US dollar per MMBtu (1 million British thermal units) converted to US dollar per MWh. 5 – Japan Korean Marker (JKM) is the Liquefied Natural Gas (LNG) benchmark price assessment for spot physical cargoes. JKM reflects the spot market value of cargoes delivered ex-ship (DES) into China, Japan, Republic of Korea and Taiwan. Deliveries into these locations equate to the majority of global LNG demand.

Sources: EEX, EIA, NYMEX, Refinitiv Datastream, own calculations

Given the aforementioned evidence, the most recent observed **increase in oil prices of more than 40 %** implies a decline of 2 % to 4 % in industrial production in Germany over the course of 2 years. With German industry accounting for roughly 20 % of gross value added, the **resulting deduction to GDP** could be **less than 1 %.** ↘ TABLE 4 However, stronger price increases due to a stoppage of imports to Western economies and additional multiplier effects could result in larger effects. In particular, the effect on GDP depends on the reaction of the central bank to the oil price-induced increase in inflation and inflation expectations. Empirical evidence on the oil price shocks of the 1970s and 1980s suggests a strong effect on GDP (Bernanke et al., 1997). Thus, oil supply shocks result in a difficult trade-off for the central bank.

Overall, the different estimates show that a disruption of Russian energy imports is likely to have a considerably negative effect on GDP growth. The estimates can be interpreted as **possible deductions** to the baseline scenario of **the GCEE's economic forecast**. The different deductions could come on top of each other because the scenarios calculations within the established forecasting models have a hard time to estimate the consequences of a complete stoppage of

Russian energy imports and any resulting short-term physical shortages, for example. However, the estimates for such a complete stop do not take into account potential spillover effects via financial markets.

In the short run in particular, **possibilities to substitute Russian energy supplies** in the case of a complete disruption of Russian energy imports could be **more constrained** than presumed in these estimates, and thus trigger a stronger decline in GDP growth. Consequently, a number of parties argue that short-run shortages in both natural gas and coal supplies could cause far-reaching **disruptions to production at energy-intensive companies** (Bardt et al., 2022; Fuest, 2022), and that these disruptions would in turn give rise to unemployment or short-time work and thus restrict demand (Dullien and Krebs, 2022; Schaefer and Küper, 2022). These interruptions of production could further exacerbate supply shortages in various sectors. Additionally, inflation, further fuelled by rising energy prices, is likely to dampen demand and thus place additional pressure on the economic outlook. Aside from the effects outlined by the authors, a sharp increase in energy prices and a decline in GDP could lead to **credit losses** and thus to disruptions on financial markets. Energy suppliers, for example, could struggle to cope with sharply rising energy prices if they are unable to pass these increases on to their customers because of longer-term contracts.

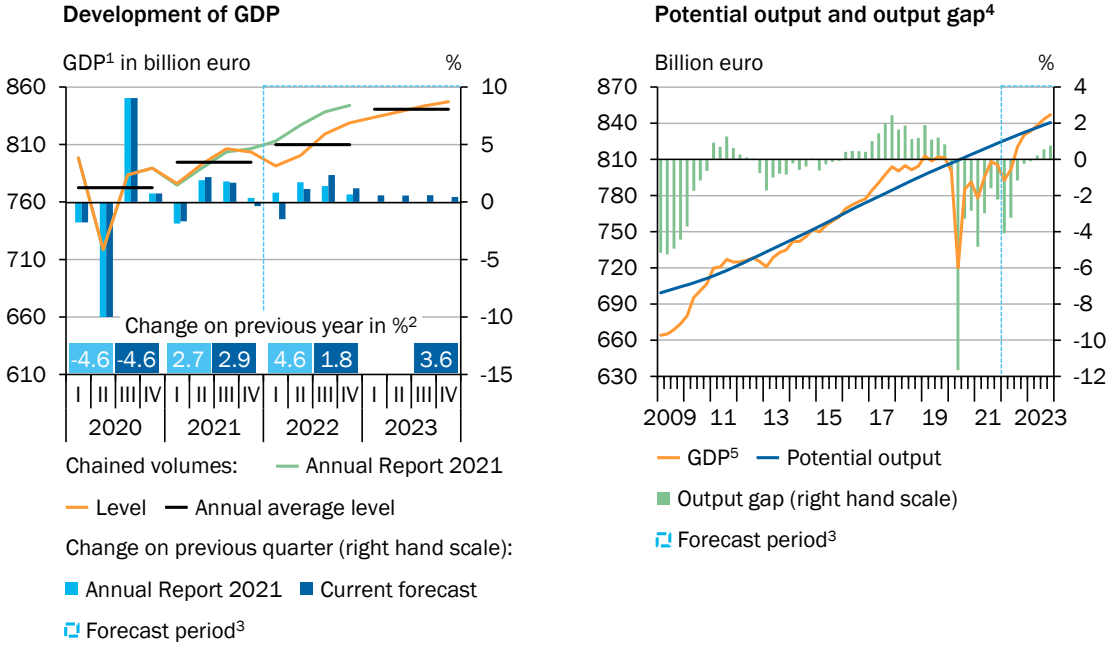
II. THE GERMAN ECONOMY

45. Compared to the GCEE Annual Report 2021, the **outlook** for the German economy **worsened considerably**. First, resurging coronavirus infection rates in the winter half-year 2021/22 suppressed consumer spending among households, especially for contact-intensive services. Second, steep increases in the prices of raw materials, energy and intermediate products have increasingly been passed on to consumer prices, thus placing an additional burden on the real purchasing power of households. In addition, the **Russian war of aggression against Ukraine** is slowing economic development because of increased uncertainty, the continued rise in energy prices and the loss of some intermediate products. ↘ BOX 1 While industrial production was trending upward at the end of 2021, renewed disruptions to the value chains and shortages of key intermediate products are now likely to have a severe impact on individual sectors of the economy, at least in the short term. Furthermore, additional cost increases for industry and consumers are to be expected. These are likely to exceed previous energy price hikes, which were already high.

46. The GCEE has therefore significantly reduced its **GDP forecast** for Germany for **2022** and now expects growth of only 1.8 % (1.9 % adjusted for calendar effects). ↘ CHART 15 LEFT In **2023**, economic output is expected to increase by **3.6 %** (3.8 % adjusted for calendar effects). ↘ ITEM 36 **Consumer prices** will probably increase by **6.1 %** and **3.4 % this year and next year** respectively, due to the continued very high spot prices for energy and the increased pass-through of cost increases to end customers. However, these point forecasts are associated with a **very high level of uncertainty**. It is difficult to predict, for example, what the full consequences of the Russian war against Ukraine are likely to be. ↘ ITEM 39 In particular, a ban on the import of Russian energy sources could result in a recession of the

↘ CHART 15

Expected economic development in Germany



1 – Reference year 2015, seasonally and calendar-adjusted. 2 – Not adjusted. 3 – Forecast by the GCEE. 4 – Estimate by the GCEE. 5 – Real seasonally adjusted values; the calendar effect is taken into account, however.

Sources: Federal Statistical Office, own calculations

German economy, irrespective of whether such a ban is imposed by the European Union or Russia. ↘ BOX 3 ↘ ITEM 40 There is also a risk that a resurgence of infection owing to new viral mutations will have greater economic consequences, thus slowing the recovery in the consumption of contact-intensive services.

1. Renewed decline in economic output in winter half-year 2021/22

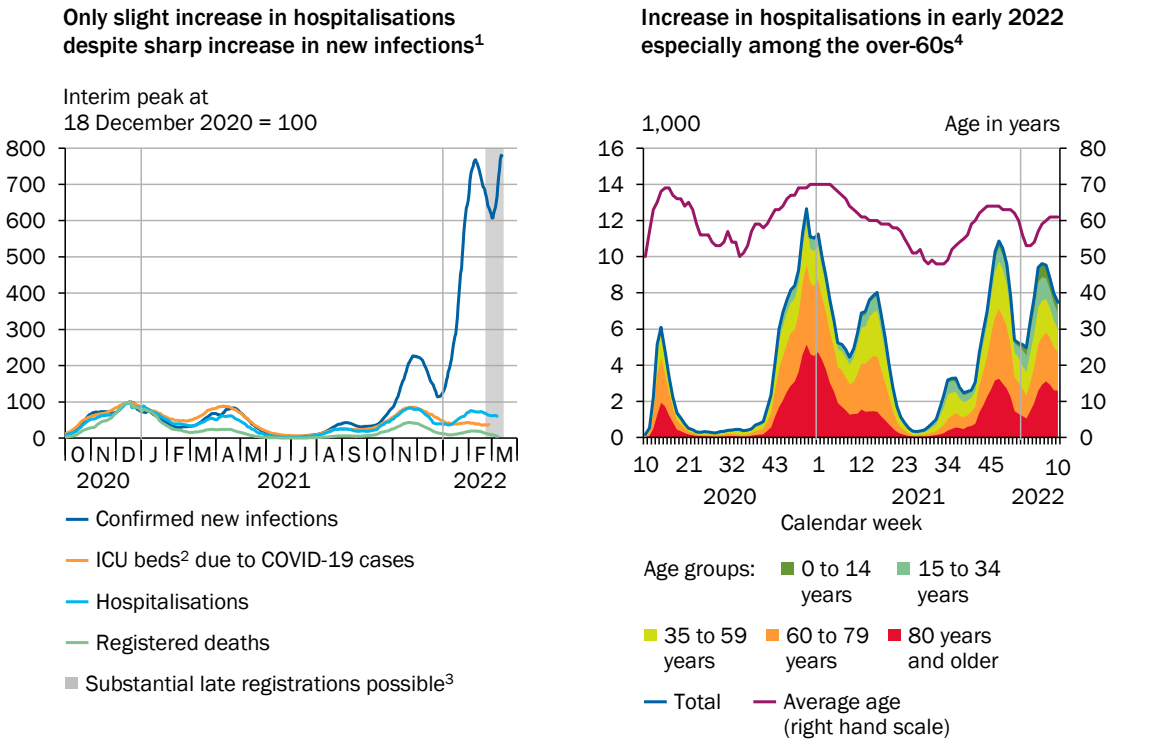
47. Price-adjusted GDP increased by 2.9 % in Germany in 2021. At the end of the year, it therefore stood at 1.1 % below the economic peak reached in the fourth quarter of 2019 before the coronavirus recession (GCEE Annual Report 2021 Box 5). Although the annual average **growth rate** is quite **close to the forecast** from the Annual Report 2021, there are **significant differences** over the course of the quarters. ↘ CHART 15 LEFT Compared with data from autumn 2021, GDP in **Q1 and Q2 2021** was **revised upward** by 0.2 and 0.3 percentage points respectively, after adjustments for seasonal and calendar effects. Compared to the first release from October 2021, growth in the third quarter has been revised downward by 0.1 percentage points. Overall economic output shrank by 0.3 % in the fourth quarter of 2021, thus falling short of the forecast. The main reason for this is that the **infections** increased more sharply than expected at **the end of the year**. The number of new infections reached new highs, while hospitalisations rose to levels similar to those seen in the winter half-year 2020/21. ↘ CHART 16 LEFT AND RIGHT However, the impact on value added is likely to have been much smaller compared to previous infection waves. ↘ ITEM 5

48. On the expenditure side, the **decline** in overall economic output is attributable in particular, as in the previous infection waves, to the drop in **private consumption** spending, which was down 1.8 % on the third quarter of 2021. After value added in contact-intensive services had largely returned to the summer half of 2021 to pre-crisis levels, both the pandemic and the erosion of purchasing power caused by increased inflation are likely to have weighed on real private consumer demand. For example, there was a seasonally and calendar-adjusted drop of 5.5 % in real sales in retail trade (excluding the motor vehicle trade) in December 2021 on the previous month, down to the level recorded for December 2020. In January 2022, the retail sector partially made up for the decline, increasing sales by 2.0 %. ↘ CHART 17 TOP LEFT A significant slowdown was already apparent in the hospitality industry from November 2021. Based on a quarterly average, sales in the fourth quarter were down 13.8 % on the previous quarter after adjustments for seasonal and calendar effects, but up 63.8 % on the fourth quarter of 2020. At the beginning of 2022, hospitality sales were up 9.7 % on the previous month.

49. **Government consumption spending** had a **stabilising effect**, increasing by 1.0 % after adjustments for price, seasonal and calendar effects. In addition, **gross fixed capital formation** rose by 0.5 % after contracting by 2.9 % in the third quarter of 2021. Government investment in machinery and equipment saw

↘ CHART 16

Development of the coronavirus pandemic in Germany



1 – Each key figure in percent relative to the value on 18 December 2020, on which a interim peak of new infections was reached. Observed delay between case confirmation, hospital admission, admission to ICU and death was taken into account. 2 – ICU beds: Intensive care unit beds. 3 – The area highlighted in grey covers subsequent reports for ICU bed occupancy, hospitalisations and deaths. 4 – COVID-19 cases reported to the RKI in Germany for the reporting weeks CW10 2020 to CW10 2022. As of 17 March 2022.

Sources: Our World in Data, RKI, own calculations

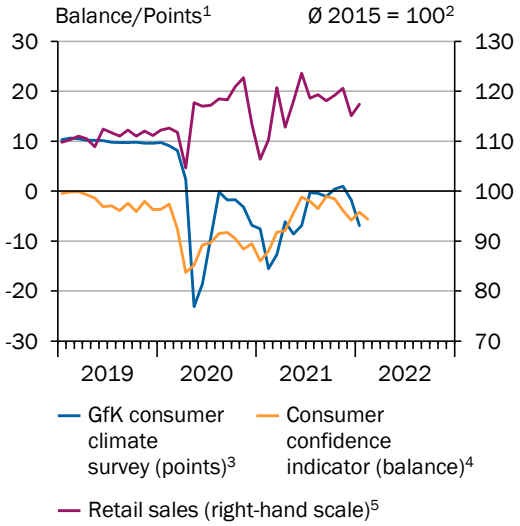
particularly strong growth in the fourth quarter of 2021. Following near stagnation in the previous quarter, exports and imports in the fourth quarter of 2021 increased by 4.8 % and 5.1 % respectively, resulting in slightly positive net exports.

50. At the beginning of 2022, there were positive signals from production in the industry and construction sectors. In January 2022, for example, seasonally and

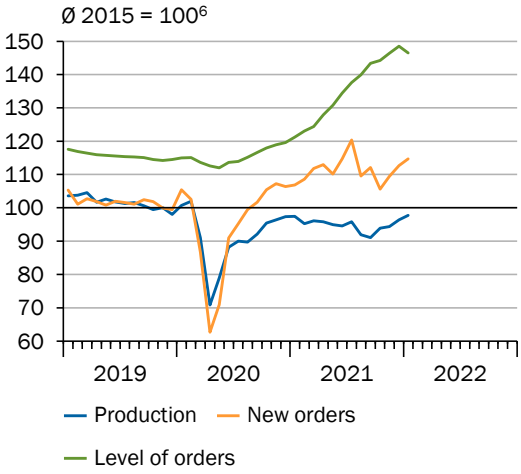
↘ CHART 17

Selected indicators for the economic development

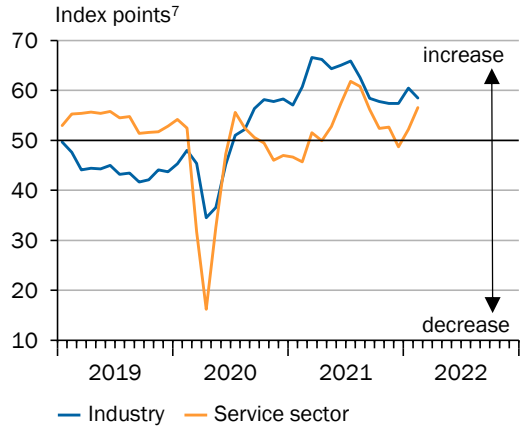
Retail sales declined in the winter half-year 2021/2022



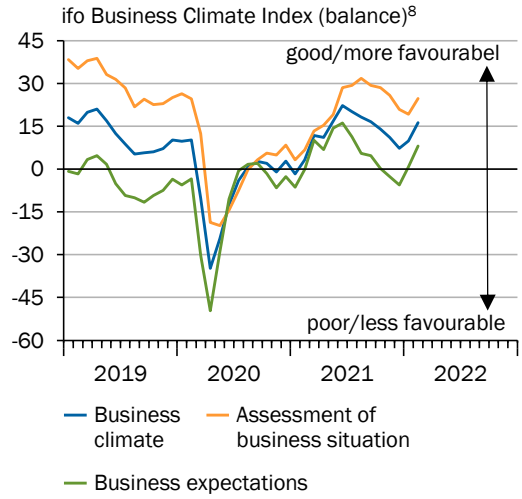
New orders in the manufacturing sector continue to show strong upward trend, production also increased until January



Purchasing managers' indices signalled positive development at the beginning of the year



Business expectations in particular rise at the beginning of the year



1 – Seasonally adjusted values. 2 – Seasonally and calendar adjusted values. 3 – Based on about 2,000 consumer interviews per month. 4 – The Consumer confidence indicator is based on selected questions asked of consumers in accordance with the Joint Harmonised EU Programme of Business and Consumer Surveys. 5 – Real index excluding the sale of motor vehicles. 6 – Volume index; seasonally and calendar adjusted values. 7 – The purchasing managers' index is based on a monthly survey among purchasing managers and managing directors. 8 – Manufacturing activity, service sector, trade and construction industry.

Sources: European Commission, Federal Statistical Office, GfK, ifo, IHS Markit

calendar-adjusted industrial production rose by 1.3 % and by as much as 10.1 % in the construction sector. Industrial production was already **trending upward** in the **fourth quarter of 2021**, increasing by 1.8 % on a seasonally and calendar-adjusted basis compared to the previous quarter. ↘ CHART 17 TOP RIGHT However, **persistent** supply-side **bottlenecks** are likely to have prevented stronger growth in **many sectors.** The high demand for German industrial goods continued unabated in the winter half-year 2021/22, reaching a new peak in December 2021 (ifo Institute, 2022a; Federal Statistical Office, 2022b). In January 2022, incoming orders continued to exceed sales. However, cancellations of old orders could explain why the seasonal and calendar-adjusted order backlog shrank compared to the previous month for the first time since May 2020 (Federal Statistical Office, 2022c; GCEE Annual Report 2021 item 59). The number of corporate insolvencies fell by 11.7 % in 2021 compared to the previous year (Federal Statistical Office, 2022d) and is also likely to have been lower than last year's level at the start of this year (IWH, 2022).

51. At the start of the year, survey data was cautiously optimistic about the **further development of supply-side bottlenecks**. ↘ ITEM 9 In December 81.9 % of industrial companies surveyed by the ifo Institute (2022b, 2022c) reported production-restricting shortages of raw materials and intermediate products. This value fell to 67.3 % in January, which is still considerably elevated by historical standards. However, by February 2022, the share of companies reporting these shortages rose to 75.6 %. Similar developments are evident in the retail sector (ifo Institute, 2022d, 2022e). However, **new pandemic-induced restrictions in China and**, above all, **war-related shortfalls** in the **European value chains** are likely to put a greater strain on production again, at least in the short term. ↘ ITEMS 8 F. The automotive industry in particular is likely to be affected by the shortage of critical intermediate products and raw materials (ifo Institute, 2022f). There may be ways of finding substitute suppliers. But significant cuts in production are expected until early summer. The extent to which the situation will ease afterwards is difficult to predict. For example, a lack of raw materials from Russia and the Ukraine along the value chains could give rise to new bottlenecks in the coming months (VDA, 2022), In addition, the war in the Ukraine is likely to put further pressure on already strained supply chains, due to the loss of many Ukrainian truck drivers (BVMW and ELVIS AG, 2022) and as a result of sharply increased petrol and diesel prices (AMÖ et al., 2022). Furthermore, labour shortages have worsened compared to the autumn, according to surveys. ↘ ITEM 24 Days off work due to infection and quarantine are likely to exceed seasonal sick leave (Scheuermeyer, 2022).

2. Deteriorating economic environment due to Russia's war of aggression against Ukraine

52. The **economic environment has deteriorated significantly** compared with the conditions outlined in the GCEE Annual Report 2021. The impact of the COVID-19 pandemic, which led to a renewed decline in economic activity in the winter half-year 2021/22, is expected to recede in the second quarter of 2022. However, the **external economic environment** has deteriorated considerably

as a result of the Russian war of aggression. Aside from the fall in exports to Russia, Belarus and Ukraine, ↘ BOX 1 the growth prospects in other sales markets worsened, particularly in the European Union. However, the high level of global demand and orders on hand for German industrial products should make it possible, after a period of adjustment, to make up for the loss of business caused by the war and sanctions in other sales markets. ↘ CHART 22 APPENDIX LEFT

53. In terms of **price competitiveness,** rather positive stimuli are to be expected this year. ↘ CHART 22 APPENDIX RIGHT The decisive factors here are that inflation outside the euro area, especially in the United States and United Kingdom, is likely to be even higher than in Germany and that the euro has recently depreciated more sharply. ↘ ITEM 32 The situation is likely to deteriorate slightly in 2023. ↘ CHART 22 APPENDIX RIGHT

54. **Monetary conditions** remain favourable by historical standards. ↘ ITEM 30 However, against the backdrop of Russia's war of aggression against Ukraine, the financing conditions of German companies have **deteriorated** as a result of increasing risk premiums. ↘ BOX 1 In particular, financing via the capital markets has become more expensive for companies. For example, the current yield on bonds issued by non-financial corporations has nearly doubled since the beginning of 2022. It stood around 2.2 % at the time of data cut-off.

55. Purchasing power has recently been eroded as growth in nominal disposable income failed to keep pace with price increases in 2021. However, **robust developments on the labour market** are likely to have a positive impact on wage trends over the forecast period. ↘ ITEM 70 ↘ BOX 2 **In addition,** private households have built up **considerable excess savings** as a result of the pandemic. These are likely to be used for additional consumer spending over the forecast period (GCEE Annual Report 2021 items 69 and 72) and will thus partly offset the drop in demand caused by the erosion of purchasing power, especially among higher-income households.

56. Based on the latest information, **fiscal policy,** compared with 2021, is expected to have an expenditure-reducing discretionary effect over the forecast period as a result of the gradual scaling-back of pandemic-related support measures. ↘ ITEM 72 It can be assumed that the Federal Government will adopt further measures to mitigate the effects of energy price increases in addition to those already adopted. In addition, significant spending increases are already envisaged in the area of defence. Since some of these proposals are to be **subsequently submitted in a supplementary budget**, estimating the effect, and in particular the timing of the stimuli is currently subject to a high level of uncertainty. ↘ BOX 5

3. Economic growth significantly lower than expected in the GCEE Annual Report 2021

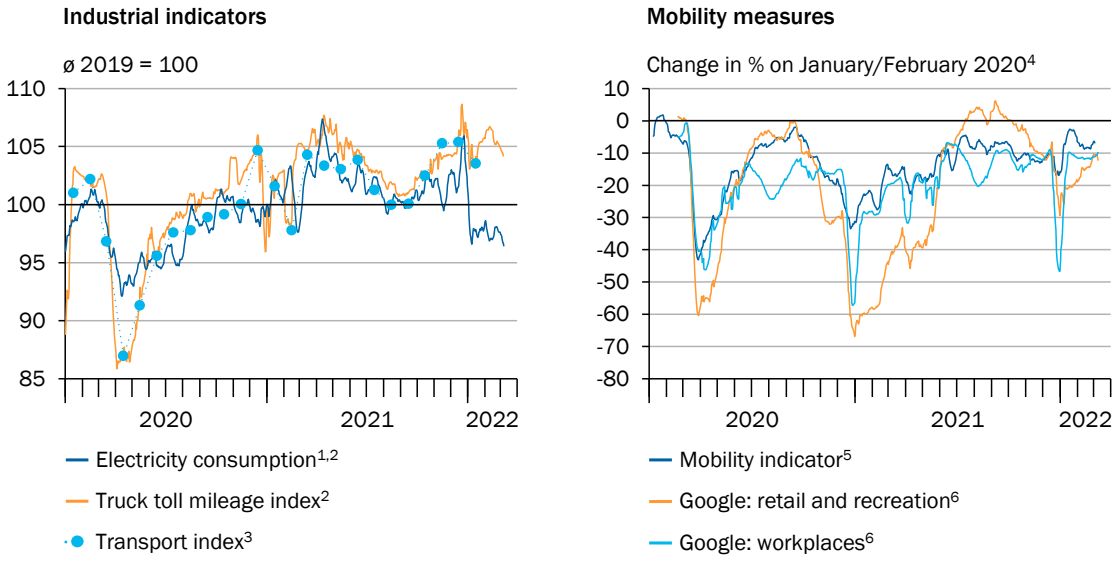
57. **GDP** is expected to **contract again** in the **first quarter of 2022**. On the one hand, **private consumption spending is likely to fall as a result of the pandemic**. With the Omicron variant, it appears that the link between new

infections and hospitalisations has weakened. ↘ CHART 16 LEFT However, due to the more extensive and sustained level of infection compared to the delta wave, value added in retail and contact-intensive services is likely to have declined compared to the fourth quarter of 2021. For example, in the first weeks of 2022 the sentiment indicators ↘ CHART 17 TOP LEFT and the mobility indicators for private consumption ↘ CHART 18 RIGHT were below the average level of the fourth quarter in 2021. **Worker absence due to infection and quarantine** is also likely to affect value added. According to Scheuermeyer (2022), this worker absence is the equivalent of 1.2 % of the workforce not being available in the first quarter of 2022. The percentage is likely to be even higher in the wake of the recent sharp rise in new infections. Since working from home can alleviate the effects of worker absence at least in some sectors of the economy and in particular when related to quarantine, and since sick leave usually rises at the beginning of the year, the impact on seasonally adjusted GDP is likely to be lower than the contraction in the workforce.

58. Second, **Russia's war of aggression against Ukraine** is likely to **dampen economic activity** in a variety of ways. In particular, industrial production is likely to be impacted from the end of February 2022 onwards as a result of renewed disruptions to value chains, despite the sustained upward trend from the previous quarter at the start of the year. ↘ ITEMS 8 F. The sentiment indicators available so far do not yet cover this development due to the early survey date. ↘ CHART 17 BOTTOM LEFT AND BOTTOM RIGHT According to the latest figures, real-time indicators for industry are already hinting at a trend reversal, which is likely to

↘ CHART 18

Real-time indicators indicate a slowdown in growth



1 – The decline in reported electricity consumption observed since the beginning of 2022 is likely, at least partially, a result of incomplete data. 2 – Seasonally and calendar-adjusted. 14-day moving average. 3 – Seasonally and calendar-adjusted monthly value. 4 – Not adjusted. 14-day moving average. The reference value corresponds to the median for the corresponding weekday from 3 Jan 2020 to 6 Feb 2020. 5 – Change in mobility based on anonymised and aggregated mobile data from the network of the telecommunications company Telefónica. Missing values for 4 to 7 December 2020, 27 to 28 February 2021, 17 May 2021, 17 to 21 June 2021, 18 to 19 July 2021 and 9 to 11 October 2021; averages calculated over existing values. 6 – Change in mobility based on anonymised and aggregated location history information collected by Google compared to a reference value.

Sources: Deutsche Bundesbank, Federal Office for Freight Transport, Federal Statistical Office, Google Mobility Report, own calculations

intensify in the coming weeks. ↘ CHART 18 LEFT The significant drop in reported electricity consumption since the beginning of 2022 can probably be explained in part by incomplete data. The original data is revised at irregular intervals by the Federal Network Agency as new information becomes available (Bundesnetzagentur, 2021). For example, the values for December 2021 were recently revised significantly upward. At the time of data cut-off, the unadjusted data from the Federal Network Agency showed no noticeable drop in consumption, at least until the end of February (Bundesnetzagentur, 2022). ↘ CHART 18 LEFT Furthermore, increased geopolitical uncertainty is likely to dampen corporate investment activity and, in conjunction with the steep rise in energy prices, consumer demand.

59. From the **second quarter of 2022**, **economic development** is expected to **pick up, at least in part**, as a result of the anticipated recovery in private consumer spending. Similar to developments in the summer half-years of 2020 and 2021, a limited **rebound** is expected in **economic sectors that were especially hard hit** by the pandemic. Due to the weaker decline in the winter half-year 2021/22, the rebound is also expected to be of a smaller magnitude than in the previous two years. In addition, the recent sharp rise in new infections is likely to initially weaken the effect of easing containment measures, adopted on 18 March 2022 (Bundesregierung, 2022a). ↘ CHART 15 LEFT ↘ ITEM 41 Industry is still likely to be grappling with the fallout from Russia's war of aggression against Ukraine in the second quarter of 2022. For example, finding substitutes for unavailable foreign suppliers of intermediate products and raw materials and searching for new sales markets will probably likely take some time.

60. As a result of the Omicron wave and especially the war of aggression, GDP is not expected to return to the **pre-crisis level** from the fourth quarter of 2019 **until the third quarter of 2022**. This is two quarters later than forecasted in the GCEE Annual Report 2021. In line with the current political situation, the GCEE's forecast assumes that there will be no import ban on Russian energy sources. ↘ BOX 3 In this case, the **economic recovery is expected to continue** in **2023**. It is likely, for example, that an increasingly stronger stimulus will be provided by industry, as supply-side bottlenecks are resolved in accordance with assumptions. ↘ ITEM 9 Furthermore, despite the inflation-driven erosion of purchasing power, private consumer spending is likely to still grow quite robust next year, owing to the cutback on the excess savings accumulated during the pandemic. However, the Russian war in Ukraine is expected to have lasting effects on the German economy's growth path. ↘ ITEM 36 ↘ ITEMS 39 F.

61. In its forecast for **2022**, the GCEE forecasts that **GDP will grow by 1.8 %** (1.9 % adjusted for calendar effects). ↘ TABLE 5 Supported by a high statistical overhang of 2.3 % ↘ TABLE 8 the annual average growth rate in **2023** is likely to be **3.6 %** (3.8 % adjusted for calendar effects). With a growth rate of 2.0 % over the course of the year, GDP in 2023 is still likely to be well above the trend potential growth rate forecasted in the Annual Report 2021 (GCEE Annual Report 2021 items 89 ff.). ↘ CHART 15 RIGHT However, it should be noted that the estimation methods used cannot reflect the pandemic-related constraints on economic output and changes in household behaviour that are likely to have caused a decline in potential output during the pandemic (Eichenbaum et al., 2020a, 2020b). Moreover, the contraction in GDP in the winter half-year 2021/22 and the slowdown in growth in 2022

were not taken into account in the estimate of potential output in the Annual Report 2021 (GCEE Annual Report items 89 ff.).

62. For the point forecast, there are **significant downside risks** related to the overall economic environment. ↘ ITEMS 39 FF. Risks specific to Germany must also be considered. First and foremost, an **ban import stop of Russian energy** could hit the German economy particularly hard due to its high dependence on Russian energy sources. This could lead to a significant contraction in GDP. ↘ BOX 3 Since complete substitution does not appear possible in the short term, particularly with respect to Russian natural gas, production losses could occur, especially in energy-intensive sectors of the economy and those sectors that use natural gas as an input factor. In addition, **energy prices** could **skyrocket** in this case, which

↘ TABLE 5

Key economic indicators for Germany

	Unit	2020	2021	Forecast[1]		
				2022		2023
				Update	Difference to AR 2021/22[2]	
Gross domestic product[3]	**Growth in %**	**– 4.6**	**2.9**	**1.8**	**(– 2.8)**	**3.6**
Final consumption expenditure	Growth in %	– 3.2	1.1	2.7	(– 2.4)	3.6
Private consumption[4]	Growth in %	– 5.9	0.1	3.2	(– 4.2)	4.4
Government consumption	Growth in %	3.5	3.1	1.6	(1.5)	1.9
Gross fixed capital formation	Growth in %	– 2.2	1.5	1.8	(– 2.4)	4.5
Investment in machinery & equipment[5]	Growth in %	– 11.2	3.4	0.6	(– 6.2)	10.1
Buildings	Growth in %	2.5	0.7	1.7	(– 0.9)	1.8
Other products	Growth in %	1.0	0.7	3.9	(– 0.6)	4.4
Domestic uses	Growth in %	– 4.0	2.2	2.3	(– 2.4)	3.9
Net exports	Growth contribution in percentage points	– 0.8	0.8	– 0.4	(– 0.5)	– 0.2
Exports of goods and services	Growth in %	– 9.3	9.9	2.8	(– 3.8)	6.1
Imports of goods and services	Growth in %	– 8.6	9.3	4.0	(– 3.1)	6.7
Current account balance[6]	**%**	**7.1**	**7.4**	**4.7**	**(– 1.4)**	**5.1**
Persons employed (domestic)	**1,000**	**44,898**	**44,920**	**45,378**	**(4)**	**45,652**
Persons employed, covered by social security	**1,000**	**33,579**	**33,900**	**34,371**	**(85)**	**34,832**
Registered unemployment, stocks	**1,000**	**2,695**	**2,613**	**2,347**	**(– 20)**	**2,238**
Unemployment rate[7]	**%**	**5.9**	**5.7**	**5.1**	**(0.0)**	**4.9**
Consumer prices[8]	**Growth in %**	**0.5**	**3.1**	**6.1**	**(3.5)**	**3.4**
General government balance[9]	**%**	**– 4.3**	**– 3.7**	**– 2.6**	**(– 0.7)**	**– 2.2**
Gross domestic product per capita[10, 11]	**Growth in %**	**– 4.6**	**2.9**	**1.8**	**(– 2.7)**	**3.5**
Gross domestic product, calendar-adjusted[11]	**Growth in %**	**– 4.9**	**2.9**	**1.9**	**(– 2.8)**	**3.8**

1 – Forecast by the GCEE. 2 – Difference in percentage points except for unit 1,000. 3 – Price-adjusted. Change on previous year. Also applies to all listed components of GDP. 4 – Including non-profit institutions serving households. 5 – Including military weapon systems. 6 – In relation to GDP. 7 – Registered unemployed in relation to civil labour force. 8 – Change on previous year. 9 – In relation to GDP; regional authorities and social security in according to national accounts. 10 – Population development according to medium-term projection of the GCEE. 11 – Price-Adjusted. Change on previous year.

Sources: Deutsche Bundesbank, Federal Employment Agency, Federal Statistical Office, own calculations

would also likely hamper production and significantly reduce private consumer demand because of a greater pass-through to end customers. Furthermore, there is a risk that if **the pandemic intensifies**, for example as a result of new virus variants of concern in the winter half-year 2022/23, more extensive restrictions on public life will be necessary. ↘ ITEM 41 This risk is higher in Germany because of its lower vaccination rate compared to other advanced economies, ↘ BACKGROUND INFO 1 in terms of a primary immunisation based on a 2-dose protocol or administered booster shots, especially among older population groups.

63. **On the expenditure side**, **GDP** growth is expected to continue to be strongly **shaped** by the development of **private consumer spending**. The Russian war of aggression against Ukraine is likely to have a dampening effect on German exports in particular this year. Aside from a decline in export business with Russia, Ukraine and Belarus, even greater shortages of intermediate products due to disruptions to international value chains caused by war and sanctions are also likely to result in a slowdown. Negative net exports are expected, due to low exports and relatively expensive imports. The bottlenecks and heightened uncertainty regarding the economic outlook are also likely to dampen private capital formation – especially with respect to gross fixed capital formation in machinery and equipment. Government spending should have a stabilising effect.

64. Since the beginning of 2022, the rise in **consumer prices** has been **considerably higher** than expected in the GCEE Annual Report 2021. ↘ BOX 4 For example, the overall index averaged for January and February was up 5.2 % on the same period of the previous year. **In particular,** the increase in the **food and energy components** almost fully made up for the absence of the inflation-increasing base effect, especially as a result of the temporary reduction in the rate of VAT in the second half of 2020. The core rate, i.e. excluding energy and food, was also well above the long-term average, rising by around 3.0 %. This was influenced by the significantly increased costs faced by companies for intermediate products and energy last year, which were increasingly passed on to consumers towards the end of the year.

↘ BOX 4

Revision of the model-based inflation forecast for 2021 and 2022

Over the course of 2021, the GCEE, like other institutions, revised **upwards** its **forecasts for consumer price inflation in 2021 in Germany** and the euro area. ↘ CHART 19 LEFT For 2022, a similar trend is to be expected in the forecasts of the various institutions, primarily because prices increased more sharply at the beginning of the year than had been expected in the autumn (GCEE Annual Report 2021 item 74). ↘ ITEMS 64 F. The underestimation of inflation dynamics last year also represented an end to the period from 2014 onwards in which price increases were mostly overestimated (GCEE Annual Report 2021 box 4).

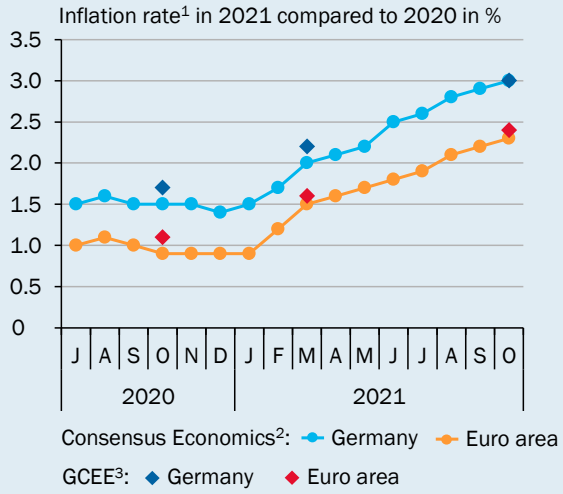
The **sharp rise in import prices is likely to** be a major **driver** of the stronger-than-expected increase in consumer prices since mid-2021. In addition to intermediate products, such as metals, import prices have risen in particular for natural gas, crude oil and other energy sources. The weaker inflation dynamics in the euro area from 2014 to 2020 are also likely to be partly due to the subdued development in import prices (Wieland, 2021; GCEE Annual Report 2021

item 40). Moreover, fluctuations in import prices correlate closely with the forecast errors made by the GCEE and other institutions. ↘ CHART 19 RIGHT

↘ CHART 19

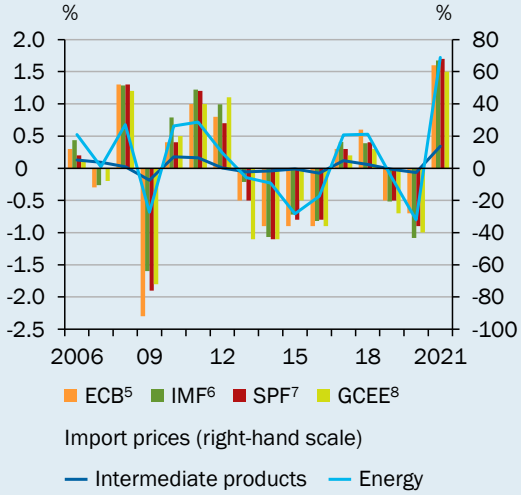
Forecasts for consumer prices in 2021 have been revised significantly upwards over the year

Forecasts for consumer price inflation in 2021 have been revised significantly upwards over the year



Forecast errors for the HICP in the euro area and realised change in import prices[4]

Change on previous year



1 – Overall index. 2 – Mean value of individual forecasts of professional forecasters. 3 – Forecasts by the GCEE. 4 – Autumn forecasts of various institutions from the corresponding previous year. Negative values indicate that the forecast was higher than the actually realised value. 5 – Macroeconomic projections by the ECB staff. 6 – IMF World Economic Outlook. 7 – Survey of Professional Forecasters, each of the 4. quarter of the previous year. 8 – Forecasts by the GCEE from the Annual Report.

Sources: Consensus Economics, ECB, IMF, SPF, own calculations

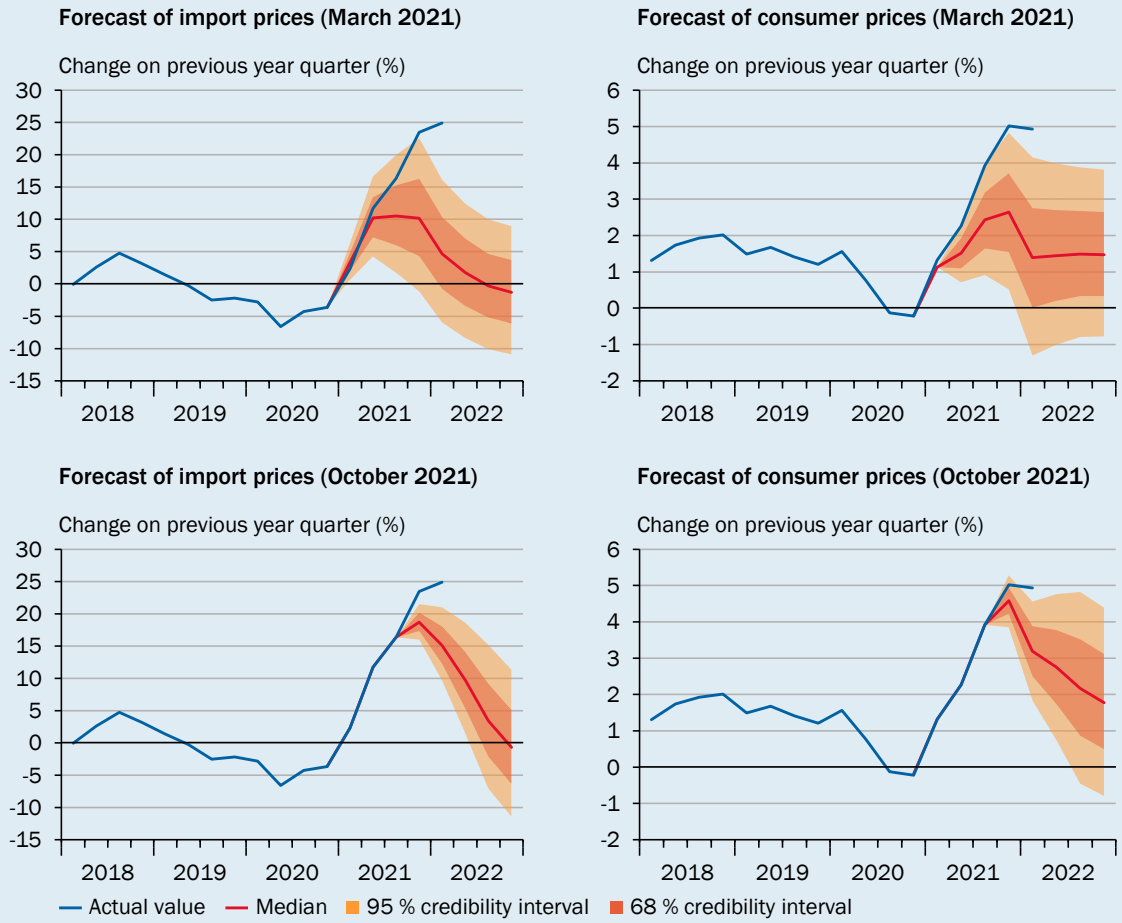
In order to **investigate** both the **extent of and** the **reasons** behind the most recently observed **forecast revisions of consumer prices** at the GCEE in a structured manner, a state-of-the-art VAR model is used in the following (Bańbura et al., 2010; Giannone et al., 2015). The model is estimated using Bayesian methods with quarterly data for Germany from 1999 onwards. The 16 variables used are based on Domit et al. (2019). The data vintage corresponds to the information available in real time at the time of the GCEE Economic Outlook 2021 (data cut-off 12 March 2021) and the GCEE Annual Report 2021 (data cut-off 29 October 2021). A comparison with the actual data shows that the model forecast for both data vintages would also have suggested a significantly weaker dynamic in import prices and consumer prices. ↘ CHART 20 Despite the **high level of uncertainty** surrounding the estimates, which is reflected in the rather wide credibility intervals, the values observed for import price inflation at the end of 2021 and the beginning of 2022 in particular are clearly above the range that would be expected from previous data in each case. This has significant implications for the model-based forecast of consumer price inflation in 2022. While the data available at the time of publication of the GCEE Annual Report 2021 indicated a median inflation rate of 2.5 %, the model forecast shows a median rate of change of 4.7 % based on the latest available data (18 March 2022).

While shocks, most notably **unexpected increases in energy and transport costs** and hence import prices, account for a good part of the forecast revision observed in the model, the **tendency inherent in the model to revert to the mean** is also likely to have played a role. Therefore, in most of the forecast models used, it is assumed that consumer price inflation follows a stationary process. As a result, the forecast in the longer term converges towards the mean

observed in the forecasting period. The estimated model coefficients, such as the mean, tended to adjust downwards in the previous phase of overestimating inflation rates between 2014 and 2020. This is because each additional observation systematically corrects for past forecast errors. Consequently, with a transition to persistently higher inflation rates, as in 2021, there is an automatic underestimation. This underestimation may persist for some time, as the inflation trend has also risen according to surveys of long-term inflation expectations. Taking into account additional indicators that may have had little explanatory power for the forecasting variable in previous periods, but that gain in importance as a result of a possible regime change, could systematically improve the forecasts. For example, the strong money supply growth observed in the euro area since 2020 could indicate monetary policy accommodation of relative price shocks, which in turn could translate into a higher trend inflation rate (GCEE Annual Report 2021 item 177).

↘ CHART 20

Model forecast[1] of import and consumer prices for Germany on the data vintage as of the Economic Outlook 2021 (March) and the Annual Report 2021 (October)



1 – Model forecasting of a Bayesian vector autoregressive (BVAR) model based on the algorithm of Giannone et al. (2015). The BVAR includes 16 variables following Domit et al. (2019). The estimation period starts in 1999Q1 and ends in 2020Q4 (Economic Outlook 2021) and 2021Q2 (Annual Report 2021). All data available at the respective data cut-off date are taken into account in the forecast.

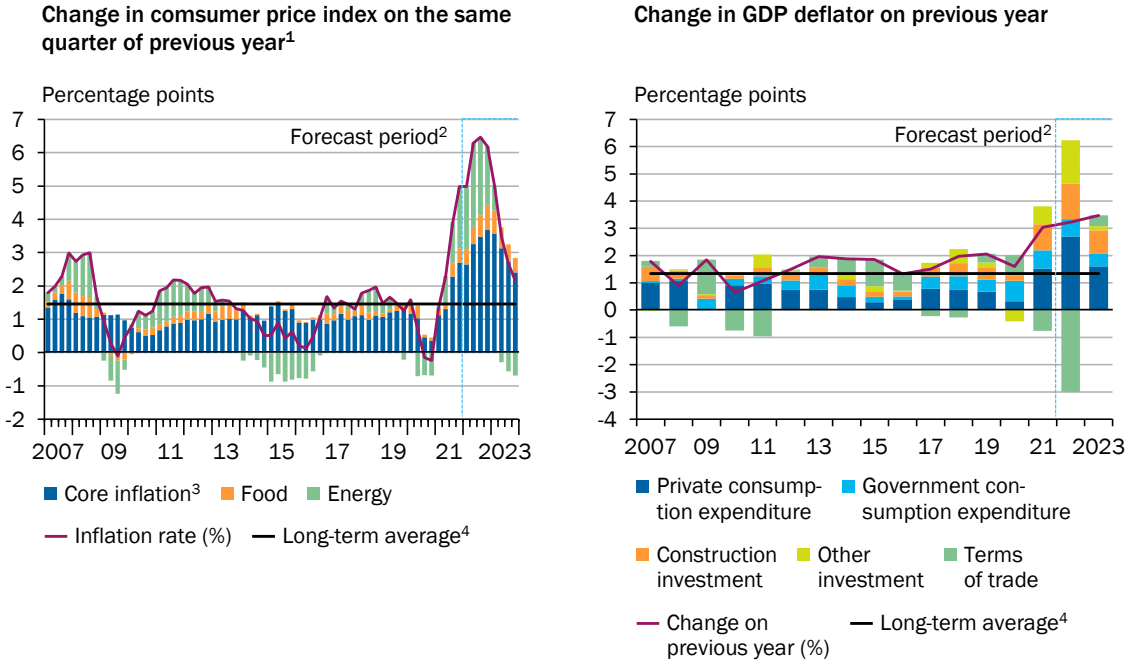
Sources: CPB, Deutsche Bundesbank, Federal Statistical Office, Refinitiv Datastream, own calculations

65. **Consumer prices** are expected to continue to **rise** considerably in **2022 and 2023, by around 6.1 % and 3.4 %.** ↘ CHART 21 LEFT The GDP deflator is likely to increase at a slightly slower rate of 3.2 % and 3.5 % as a result of the sharp rise in import prices. ↘ CHART 21 RIGHT That said, the upsurge in prices is expected to gradually lose momentum toward the end of 2022. At present, crude oil and natural gas futures prices are much more volatile than in previous years, due to Russia's war of aggression against Ukraine. ↘ ITEM 10 However, they do not currently point to any further increase in prices for these energy sources, at least from the summer half-year 2022. ↘ CHART 7 LEFT Since end-customer contracts are only updated gradually, the full pass-through of energy suppliers' increased costs (which are influenced only to a limited extent by current spot market prices) is likely to drag into 2023. The growth rate of core inflation on the other hand, which is driven by stronger wage increases, partly as a result of minimum wage adjustments, ↘ ITEM 70 and an increasing pass-through of higher production costs by companies to end customers is likely to remain above the average of recent years next year as well. The same applies to food prices, which are expected to rise globally, mainly due to the loss of Russian and Ukrainian wheat exports. In addition, shortages and price increases in fertilizers could generate a decrease in global food supply and a further upturn in prices in the coming year.

66. A sharp **surge** in both private and public demand for capital is expected in the coming years. Because of Russia's war of aggression against Ukraine, there are plans to increase defence spending, in addition to the spending required to transform the economy through digitalisation, climate protection and demography

↘ CHART 21

Inflation remains elevated over the forecast period



1 – Based on seasonally and calendar adjusted data. 2 – Forecast of the GCEE. 3 – Overall index excluding food and energy. 4 – Average over the period from 1999 to 2021.

Sources: Deutsche Bundesbank, Federal Statistical Office, own calculations

(GCEE Annual Report 2021 items 200 ff.). The war has also exposed additional issues in energy security. This is likely to be accompanied by an **increase in the long-term real equilibrium interest rate**. If the monetary policy response is accommodative, it could stimulate demand and thus increase inflationary pressure.

4. Employment and wages trending upward

67. After the significant decline in employment in the first half-year of 2020, the development of the labour market was very positive in 2021. Nonetheless, due to the negative statistical overhang of 2020, **employment** hardly changed on average in 2021 (+22,000). Employment subject to social insurance contributions, which has already been growing steadily since June 2020, recorded an increase of 312,000 people last year. **Unemployment** has fallen accordingly. In 2021, an average of around 2.6 million people were registered as unemployed. In the previous year, the average was around 82,000 higher. ↘ TABLE 6 However, the average level of the pre-crisis year 2019 of just under 2.3 million people could not be reached.

At the beginning of the year, there were only slight traces of the Omicron wave on the labour market. Projections by the ifo Institute indicate that the **use of short-time work** increased slightly in December 2021 and January 2022 compared with the previous months, but was already receding again in February 2022 (Sauer, 2022). The continued **decline in unemployment** and increase in **reported job vacancies** also indicate that the positive momentum on the labour market is currently only being slightly held back by the COVID-19 pandemic.

68. The GCEE expects the positive trend to continue over the forecast period. In particular, the continued phasing out of pandemic-related restrictions is likely to have a positive impact on the labour market. ↘ ITEM 59 However, the consequences of the **Russian war of aggression against Ukraine** and the sanctions against Russia may slow the speed of this development. ↘ BOX 3 Companies may be forced to temporarily reduce their **labour input along the intensive margin** due to supply bottlenecks or high energy prices. Hiring of new employees could also be put on hold in certain industries due to uncertainty. However, given the current shortages of skilled workers, skilled personnel are unlikely to be laid off for the time being.

There is considerable uncertainty regarding the effects of the **planned increase in the statutory minimum wage** from the current level of €9.82 to €12 per hour in October 2022 (Bossler, 2022). With demand for labour at a high, the GCEE assumes that the reform will initially have only a minor impact on the employment situation. The increase could however have an adverse impact on the working hours of low-wage employees subject to social insurance contributions. In 2015, this type of effect was already evident a few months after the introduction of the minimum wage (Burauel et al., 2020). Another effect observed was that immediately after the introduction of the minimum wage, many marginally employed persons were switched to employment subject to social insurance contributions, because the wage increase tipped them over the earnings threshold of

€450 per month (Caliendo et al., 2018; vom Berge et al., 2018; Minimum Wage Commission, 2020, p. 83 ff.). However, the increase in this threshold to €520 per month, which is also due to be implemented in October 2022, should counteract such switches.

69. Overall, **employment is expected to increase** by around **458,000 this year**. However, shortages of skilled workers could make it increasingly difficult next year to fill vacancies (GCEE Annual Report 2021 item 80). Growth in employment is therefore likely to be somewhat less dynamic in 2023 (around +275,000 persons). **Unemployment** is expected to fall **below 5.0 %** on average in 2023 for the first time since reunification. ↘ TABLE 6

70. With collectively agreed wages rising by an average of 1.3 % in 2021, current inflation and higher inflation expectations are likely to shape **employee wage demands** over the forecast period, leading to higher wage growth. ↘ TABLE 10 APPENDIX ↘ BOX 2 Due to the time lag in collective bargaining, however, momentum is likely to pick up mainly in the later part of the forecast period. The GCEE expects real

↘ TABLE 6

Labour market in Germany

1,000 persons

	2020	2021	Forecast[1]					
			2022		2023	2022		2023
			Update	Diff. to AR 2021/22		Update	Diff. to AR 2021/22	
	Annual averages					Change on previous year in %; (diff. in percentage points)		
Labour force[2]	46,467	46,310	46,640	(– 8)	46,847	0.7	(0.1)	0.4
Unemployed persons[3]	1,664	1,506	1,397	(– 12)	1,321	– 7.3	(3.8)	– 5.4
Commuter balance[4]	95	116	134	(0)	126	15.6	(11.7)	– 6.2
Employed persons[5]	44,898	44,920	45,378	(4)	45,652	1.0	(– 0.1)	0.6
Employees subject to social security contributions	33,579	33,900	34,371	(84)	34,832	1.4	(0.0)	1.3
Exclusively marginally employed[6]	4,290	4,104	4,113	(– 108)	4,023	0.2	(– 1.7)	– 2.2
Registered unemployed persons	2,695	2,613	2,347	(– 20)	2,238	– 10.2	(– 0.1)	– 4.6
Underemployment excluding short-time work[7]	3,488	3,368	3,173	(– 41)	3,138	– 5.8	(0.0)	– 1.1
Short-time workers (Employment equivalence)	1,217	880	124	(50)	46	– 85.9	(6.0)	– 62.6
Unemployment rate (FEA)[8,9]	5.9	5.7	5.1	(0.0)	4.9	– 0.6	(0.0)	– 0.3
Unemployment rate (ILO)[9,10]	3.8	3.5	3.2	(0.0)	3.0	– 0.3	(0.1)	– 0.2

1 – Forecast by the GCEE. 2 – Unemployed and employed persons in their working age with residence in Germany (national concept); as defined by the national accounts systems. 3 – According to the measuring concept of the ILO (International Labour Organization). 4 – Difference of employed workers commuting from foreign countries to Germany and those commuting from Germany to foreign countries. 5 – Employed persons in Germany independent of their residence (domestic concept). 6 – Employed workers with a wage up to 450 euro (§ 8 Absatz 1 Nr. 1 SGB IV) and, from 1 October 2022, with a wage of up to 520 euro (Bundesregierung, 2022b). 7 – According to the concept of underemployment by the Federal Employment Agency. 8 – Registered unemployed persons in relation to civilian labour force. 9 – Yearly averages in %; change on previous year in percentage points. 10 – Unemployed persons in relation to the labour force, in each case persons in private households aged from 15 to 74 years.

Sources: Federal Employment Agency , Federal Statistical Office, own calculations

wages to grow by 2.5 % in 2022 and by 4.4 % in the following year. Nominal unit labour costs are expected to rise by 3.0 % and 2.1 % in 2022 and 2023 respectively, but they are expected to fall in real terms in both years. ↘ TABLE 10 APPENDIX

However, the forecast regarding employment and wage developments is subject to **great uncertainty**. ↘ ITEMS 39 FF. A continuation or escalation of the Russian war of aggression, combined with sanctions against Russia, is likely to influence more than just the rate at which companies increase their workforce. If a deeper recession follows, wage demands could also be more moderate. On the other hand, the **migration of refugees from Ukraine** to Germany could have a positive impact on labour supply and help meet existing labour demand. However, it is still unclear how large the impact will be and how quickly integration into the labour market will occur (Brücker et al., 2022).

5. Responses to the crises are driving public finances

71. At around €132.5 billion (3.7 % of GDP), the **general government budget deficit** in **2021** was lower than forecast in the GCEE Annual Report 2021. ↘ TABLE 7 In particular, this was due to additional revenue from direct and indirect taxes. On the expenditure side, there has been significant excess expenditure compared to the forecast, including in the area of intermediate goods, which should be attributed to increased expenditure needs connected to the vaccination campaign. As part of the second supplementary budget of 2021, unused spending entitlements were shifted to the newly created Climate and Transformation Fund and thus should not be reflected in the budget balance until they are used in the future. ↘ BACKGROUND INFO 2

↘ BACKGROUND INFO 2

Consideration of the second supplementary budget of 2021 in the government accounts

Under the second supplementary budget of 2021, **unused expenditure and credit authorisations** from the 2021 budget amounting to €60 billion were transferred to the Climate and Transformation Fund. This took place at the end of the 2021 budget execution. The national accounts **rely on the date at which funds are used** for including them in government accounts. This means that the effect of the second supplementary budget on the government budget balance as well as on public debt is not yet shown in the government accounts. In contrast to the accrual approach of the national accounts, replenishment of the special fund under the debt brake applies as soon as the resource allocation takes place (BMF, 2022a).

72. For **2022**, the GCEE expects a **general government budget deficit** of €97.3 billion (2.6 % in relation to GDP). ↘ TABLE 7 The **debt-to-GDP ratio** is expected to fall to 68.6 % at the end of the year. This development is underpinned by various factors. A contractionary partial impulse is likely to be triggered as a result of withdrawing some of the fiscal measures adopted in the stimulus package and in connection with the COVID-19 pandemic. The constraints of provisional budget

execution will also have a potentially limiting effect on the first half of 2022. ↘ BOX 5 By contrast, a significant expansionary partial impulse should result from the measures taken by the new Federal Government in light of the war in Ukraine, rising energy prices and the second government draft budget for 2022. Examples include the Fourth Coronavirus Tax Assistance Act, the 2022 Tax Relief Act and additional spending in the area of defence. On balance, the GCEE expects **discretionary fiscal policy measures to exert a contractionary impulse** of €37.8 billion (1.0 % in relation to GDP).

It should also be noted that additional stimulus may result from the planned supplementary budget for the 2022 budget. This supplementary budget is intended to bundle various measures taken in light of the war against Ukraine. However, since insufficient information was available at the time of completing the forecast, this possible stimulus could not be included in the forecast.

↘ BOX 5

Provisional budget execution in 2022 and consideration in the forecast

At the beginning of the 2022 fiscal year, no federal budget was adopted by the Bundestag due to the change of government. The principles and limitations of **provisional budget execution** therefore apply **in 2022**. According to current plans, the adoption of the definitive federal budget is scheduled for the summer of 2022. Furthermore, this budget is to be expanded by a supplementary budget, which is to contain additional measures in view of the war in Ukraine.

The principles of provisional budget execution have the objective, on the one hand, of ensuring the functioning of the public administration and, on the other hand, of preventing or limiting public expenditure proposals unless they have already been adopted by the Bundestag in the past (BMF, 2022b). In this respect, up to **45 % of the target annual budget** is available for expenditure items that already existed in substance in the past or were adjusted by the first government draft of the 2022 budget. **Completely new expenditure proposals** or those scheduled for the first time in the first government draft **may not be implemented** during the period of provisional budget execution. The latter requirement **may be deviated from** if the new proposals involve **unforeseeable or unavoidable expenditure needs**.

The second draft budget for 2022, and thus the first of the new government, was approved by the Federal Cabinet on 16 March 2022. The consequences of the war in Ukraine and the accompanying sanctions have led to new expenditure needs arising in the short term, such as for the Bundeswehr. In addition to the cabinet decision, the Federal Government has announced that it will expand the draft budget in the following weeks with a supplementary budget (BMF, 2022c). This will allow the parliamentary process for the main part of the 2022 budget to begin without further delays and to introduce necessary changes over time into the ongoing process as the war against Ukraine evolves.

In its **forecasts**, the **GCEE** usually follows the premise of **only taking into account finally adopted legislative proposals**. Due to the **special situation** in 2022 with provisional budget execution and the need for swift fiscal action, the **GCEE will deviate from this policy.** Given these circumstances, measures such as the early abolition of the EEG surcharge, the expansion of the defence budget through a separate special fund, the Minimum Wage Increase Act, the 2022 Tax Relief Act as well as the Fourth Corona Tax Assistance Act, among others, are taken into account in the forecast for the government accounts.

73. For **2023**, the GCEE expects a **general government budget deficit** of €89.8 billion (2.2 % in relation to GDP) and a **debt-to-GDP** ratio of 66.2 % at the end of the year. While further relief is expected from the reduction in pandemic-related spending, additional expenditure is likely to result in particular from the increase in defence spending and the Retirement Income Act. Overall, the GCEE expects a **mildly expansionary impulse from discretionary fiscal policy measures** amounting to €2.7 billion (0.1 % in relation to GDP). ↘ TABLE 7

↘ TABLE 7

General government revenues and expenditures and selected fiscal indicators[1]

	2021	Forecast[2] 2022 Update	Forecast[2] 2022 Diff. to AR 2021 /22	2023	Forecast[2] 2022 Update	Forecast[2] 2022 Diff. to AR 2021 /22	2023
	Billion euro				%[3]	Percentage points	%[3]
Total revenues	**1,705.8**	**1,751.3**	**(33.0)**	**1,841.6**	**2.7**	**(– 2.1)**	**5.2**
Taxes	872.9	882.1	(17.6)	930.4	1.1	(– 3.6)	5.5
Social contributions	632.8	663.9	(2.5)	699.3	4.9	(0.0)	5.3
Other revenues[4]	200.1	205.3	(13.0)	211.9	2.6	(– 2.3)	3.2
Total expenditures	**1,838.2**	**1,848.6**	**(57.2)**	**1,931.4**	**0.6**	**(1.8)**	**4.5**
Intermediate consumption	232.5	245.1	(32.9)	253.4	5.4	(8.8)	3.4
Compensation of employees	294.1	302.7	(0.8)	316.1	2.9	(– 0.1)	4.4
Property income (including interest) payable	21.0	19.7	(3.2)	20.2	– 5.9	(7.2)	2.4
Subsidies payable	105.0	65.5	(9.4)	61.2	– 37.6	(9.4)	– 6.6
Social benefits other than social transfers in kind	609.0	614.0	(– 6.5)	641.1	0.8	(– 0.2)	4.4
Social benefits in kind	327.5	341.3	(5.4)	354.5	4.2	(1.0)	3.9
Gross capital formation	91.7	106.2	(9.7)	121.8	15.8	(10.7)	14.6
Other expenditures[5]	157.4	154.0	(2.3)	163.1	– 2.2	(– 6.5)	5.9
Net borrowing/net lending	**– 132.5**	**– 97.3**	**(– 24.2)**	**– 89.8**	**x**	**x**	**x**
Fiscal indices (%)[6]							
Public spending ratio[7]	51.5	49.3	(1.9)	48.0	x	x	x
Tax ratio[8]	24.9	23.9	(0.7)	23.5	x	x	x
Tax and contribution ratio[9]	41.4	40.4	(0.9)	39.8	x	x	x
Net borrowing /net lending	– 3.7	– 2.6	(– 0.7)	– 2.2	x	x	x
Debt-to-GDP ratio[10]	69.4	68.6	(0.4)	66.2	x	x	x

1 – National accounts (nominal values). 2 – Forecast by the GCEE. 3 – Change on the previous year in %. 4 – Sales, other subsidies on production, property income, other current transfers, capital transfers. 5 – Other current transfers, capital transfers, other taxes on production, and net acquisition of non-financial non-produced assets. 6 – In relation to GDP. 7 – Total expenditures. 8 – Taxes including inheritance tax and taxes entitled to the EU. 9 – Taxes including inheritance tax and taxes entitled to the EU, and actual social contributions. 10 – Forecast by the GCEE for the general government gross debt as defined in the Maastricht Treaty.

Sources: Federal Statistical Office, own calculations

III. ECONOMIC POLICY CONCLUSION

74. The Russian **war of aggression** against Ukraine is **weighing on economic development** in **Germany**. The GDP forecast, which assumes that there will be no further escalation of the war, further tightening of sanctions against Russia or a disruption of Russian energy supplies, ↘ ITEM 36 already represents a drastic downward revision as compared to the economic forecast from the Annual Report 2021 (GCEE Annual Report 2021 items 71 ff.). ↘ ITEM 61 Accordingly, GDP is not expected to return to the pre-crisis level of the fourth quarter of 2019 until the third quarter of 2022. However, this **forecast** is subject to a very high level of uncertainty. According to the GCEE's assessment, downside risks dominate. ↘ ITEM 39 ↘ ITEM 62 Particularly strong downside risks are associated with a protracted war or escalation of the conflict between the West and Russia. Germany's high degree of dependence on Russian energy supplies means that, especially in the event of a disruption of supply, the risk of a downturn in economic output is substantial, and may go as far as a recession, accompanied by significantly higher inflation rates. ↘ ITEM 40

75. The German government should immediately make every effort to take **precautions against** a potential **suspension of Russian energy supplies and** to quickly **end** its **dependence** on Russian energy sources. These measures could include substituting gas-fired power generation by coal-fired power generation and extending the operation of nuclear power plants. Furthermore, substantial savings in oil and gas consumption could be achieved through energy-efficiency measures that can be implemented in the short term, for example by adjusting heating settings in buildings, rapid replacement of old boilers, digital control of facilities in industry, or offering alternative mobility options. The immediate measures to reduce gas demand must be taken with the particular aim of replenishing storage levels as much as possible, in order to build up a **buffer for the winter**. ↘ BOX 3 These measures may lead to adjustments in gas consumption in industrial production already during the summer. ↘ BOX 3

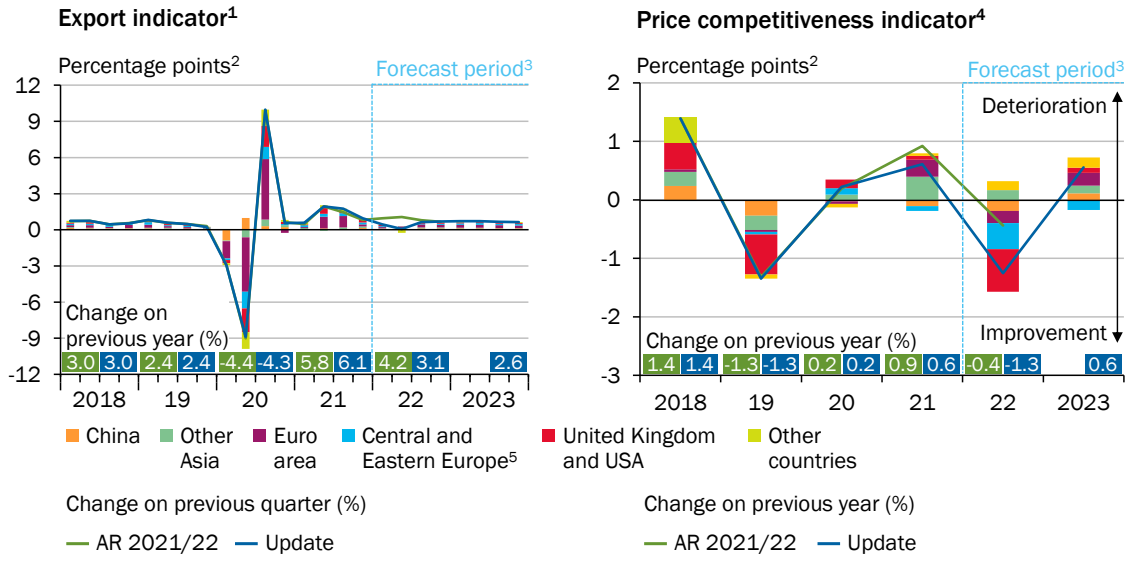
In the long term, greater energy security should be sought by diversifying the sources of supply for energy imports, for example by expanding the LNG and pipeline infrastructure. A diversification strategy requires high investment and is likely to lead to higher energy prices in the medium term. However, **higher energy security strengthens the position of Germany and the European Union** in relation to Russia, as will the agreed rampup up of defence capabilities.

76. Since some EU member states are highly dependent on Russian gas imports and would be particularly affected by a stop in Russian energy supplies, ↘ BOX 3 **close intra-European coordination** with regard to energy supply and security is **necessary** to rapidly reduce dependence on Russian gas (IEA, 2022; Leopoldina, 2022; McWilliams et al., 2022c).

APPENDIX

↘ CHART 22

Expected development of the external environment



1 – The indicator is based on the GDP development of 49 trading partners. The weighting of each country corresponds to its share of German exports. Country definitions as in Table 1. 2 – Growth contributions of the respective regions. 3 – Forecast by the GCEE. 4 – Against 37 selected countries; an increase shows a deterioration in price competitiveness of German products. Calculation and country definitions based on the approach of the Deutsche Bundesbank. 5 – Bulgaria, Croatia, Czech Republic, Hungary, Poland, Romania.

Sources: Deutsche Bundesbank, national statistical offices, own calculations
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↘ TABLE 8

Components of the forecast for GDP growth[1] (in %)

	2017	2018	2019	2020	2021	2022[2]	2023[2]
Statistical overhang at the end of the previous year[3]	0.5	1.2	0.2	0.0	2.2	1.1	2.3
Growth rate over the course of the year[4]	3.7	0.1	0.9	– 2.9	1.8	3.2	2.2
Annual rate of change of GDP, calendar adjusted	3.0	1.1	1.1	– 4.9	2.9	1.9	3.8
Calendar effect (in percentage points)	– 0.3	0.0	0.0	0.4	0.0	– 0.1	– 0.2
Annual rate of change of GDP[5]	2.7	1.1	1.1	– 4.6	2.9	1.8	3.6

1 – Price adjusted. 2 – Forecast by the GCEE. 3 – Percentage difference between the level of GDP in the last quarter of year t and the average level of quarterly GDP in the total year t (Annual Report 2005 Box 5), seasonally and calendar adjusted. 4 – Percentage change of the fourth quarter on the fourth quarter of the previous year, seasonally and calendar adjusted. 5 – Deviations in sums due to rounding.

Sources: Federal Statistical Office, own calculations
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↘ TABLE 9

Contributions to growth of gross domestic product by expenditure components[1]
Percentage points

	2017	2018	2019	2020	2021	Forecast[2]		
						2022		2023
						Update	Difference to AR 2021/22	
Domestic demand	**2.5**	**1.6**	**1.7**	**– 3.7**	**2.1**	**2.2**	**(– 2.2)**	**3.8**
Final consumption expenditure	1.1	0.9	1.4	– 2.3	0.8	2.0	(– 1.7)	2.6
Private consumption[3]	0.8	0.8	0.8	– 3.0	0.1	1.6	(– 2.1)	2.2
Government consumption	0.3	0.2	0.6	0.7	0.7	0.4	(0.4)	0.4
Gross fixed capital formation	0.5	0.7	0.4	– 0.5	0.3	0.4	(– 0.5)	1.0
Investment in machinery & equipment[4]	0.3	0.3	0.1	– 0.8	0.2	0.0	(– 0.4)	0.6
Construction investment	0.1	0.3	0.1	0.3	0.1	0.2	(– 0.1)	0.2
Other products	0.2	0.1	0.2	0.0	0.0	0.2	(0.0)	0.2
Changes in inventories	0.8	– 0.1	– 0.1	– 0.9	1.0	– 0.2	(0.0)	0.1
Net exports	**0.2**	**– 0.5**	**– 0.7**	**– 0.8**	**0.8**	**– 0.4**	**(– 0.5)**	**– 0.2**
Exports of goods and services	2.3	1.1	0.5	– 4.3	4.3	1.3	(– 1.8)	3.1
Imports of goods and services	– 2.0	– 1.6	– 1.2	3.5	– 3.5	– 1.7	(1.2)	– 3.3
Gross domestic product (%)	**2.7**	**1.1**	**1.1**	**– 4.6**	**2.9**	**1.8**	**(– 2.8)**	**3.6**

1 – Contributions to growth of price-adjusted GDP. Deviations in sums due to rounding. 2 – Forecast by the GCEE.
3 – Including non-profit institutions serving households. 4 – Including military weapon systems.

Sources: Federal Statistical Office, own calculations
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↘ TABLE 10

Wage developments in Germany
Change on the previous year in %

	Collectively agreed wages (hourly concept)	Effective wages[1]	Wage drift[2]	Compensation of employees per working hour	Labour productivity[3]	Unit labour costs (nominal)[4]	Unit labour costs (real)[5]
2018	2.9	3.3	0.4	3.0	0.0	3.0	1.0
2019	3.2	3.1	– 0.1	3.5	0.4	3.1	1.0
2020	2.0	3.3	1.3	3.8	0.4	3.4	1.8
2021	1.3	1.8	0.5	1.7	0.9	0.8	– 2.2
2022[6]	2.3	2.5	0.2	2.4	– 0.6	3.0	– 0.2
2023[6]	3.4	4.4	1.0	4.3	2.2	2.1	– 1.3

1 – Gross wages and salaries (domestic concept) per employees hour worked. 2 – Difference between the increase in effective wages and the increase in collectively agreed wages in percentage points. 3 – Real GDP per working hour (employed person concept). 4 – Compensation of employees per working hour (employee concept) in relation to real GDP per working hour (employed person concept). 5 – Compensation of employees per working hour (employee concept) in relation to GDP per working hour (employed person concept). 6 – Forecast by the GCEE.

Sources: Federal Statistical Office, own calculations
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↘ TABLE 11

Key figures of the national accounts

Absolute values

	Unit	2021	2022[1]	2023[1]	2022[1]		2023[1]	
					1. half-year	2. half-year	1. half-year	2. half-year
Use of domestic product								
at current prices								
Final consumption expenditure	billion euro	2,564.3	2,754.4	2,933.0	1,313.5	1,440.9	1,430.3	1,502.7
Private consumption[2]	billion euro	1,763.0	1,916.8	2,061.8	909.4	1,007.4	1,005.3	1,056.5
Government consumption	billion euro	801.3	837.7	871.2	404.1	433.6	425.0	446.2
Gross fixed capital formation	billion euro	783.9	851.1	930.3	401.3	449.7	445.6	484.7
Investment in machinery & equipment[3]	billion euro	228.2	234.7	263.0	108.5	126.1	124.1	138.9
Construction investment	billion euro	414.3	465.6	506.6	221.9	243.7	245.5	261.1
Other products	billion euro	141.5	150.7	160.7	70.9	79.9	76.0	84.7
Domestic demand	billion euro	3,373.1	3,654.3	3,914.0	1,740.1	1,914.2	1,901.2	2,012.8
Exports of goods and services	billion euro	1,694.6	1,916.4	2,107.7	921.6	994.9	1,046.4	1,061.3
Imports of goods and services	billion euro	1,497.0	1,817.4	1,998.2	853.2	964.2	980.9	1,017.3
Gross domestic product	**billion euro**	**3,570.6**	**3,753.4**	**4,023.5**	**1,808.5**	**1,944.9**	**1,966.7**	**2,056.8**
Chained volumes								
Final consumption expenditure	billion euro	2,318.9	2,382.4	2,468.3	1,153.4	1,229.1	1,213.2	1,255.2
Private consumption[2]	billion euro	1,617.4	1,669.9	1,742.7	803.6	866.4	854.8	888.0
Government consumption	billion euro	699.6	711.0	724.3	348.9	362.1	357.8	366.5
Gross fixed capital formation	billion euro	674.1	686.0	717.2	327.3	358.8	346.2	371.0
Investment in machinery & equipment[3]	billion euro	214.9	216.3	238.0	100.3	116.0	112.5	125.5
Construction investment	billion euro	326.7	332.1	338.1	161.2	170.9	165.9	172.2
Other products	billion euro	131.2	136.4	142.4	64.7	71.7	67.7	74.7
Domestic demand	billion euro	3,006.1	3,075.7	3,194.9	1,487.6	1,588.2	1,566.4	1,628.6
Exports of goods and services	billion euro	1,573.5	1,617.8	1,716.0	794.6	823.3	855.2	860.8
Imports of goods and services	billion euro	1,396.5	1,452.7	1,550.4	700.5	752.3	759.5	790.9
Gross domestic product	**billion euro**	**3,186.3**	**3,244.7**	**3,362.2**	**1,583.1**	**1,661.8**	**1,663.3**	**1,699.0**
Price Development (deflators)								
Final consumption expenditure	2015=100	110.6	115.6	118.8	113.9	117.2	117.9	119.7
Private consumption[2]	2015=100	109.0	114.8	118.3	113.2	116.3	117.6	119.0
Government consumption	2015=100	114.5	117.8	120.3	115.8	119.7	118.8	121.7
Gross fixed capital formation	2015=100	116.3	124.0	129.7	122.6	125.4	128.7	130.6
Investment in machinery & equipment[3]	2015=100	106.2	108.5	110.5	108.2	108.8	110.3	110.7
Construction investment	2015=100	126.8	140.2	149.8	137.7	142.6	148.0	151.6
Other products	2015=100	107.8	110.5	112.9	109.6	111.4	112.3	113.4
Domestic demand	2015=100	112.2	118.8	122.5	117.0	120.5	121.4	123.6
Terms of Trade	2015=100	100.5	94.7	95.3	95.2	94.3	94.7	95.9
Exports of goods and services	2015=100	107.7	118.5	122.8	116.0	120.8	122.4	123.3
Imports of goods and services	2015=100	107.2	125.1	128.9	121.8	128.2	129.2	128.6
Gross domestic product	**2015=100**	**112.1**	**115.7**	**119.7**	**114.2**	**117.0**	**118.2**	**121.1**
Production of domestic product								
Employed persons (domestic)	1,000	44,920	45,378	45,652	45,157	45,598	45,425	45,880
Labour volume	million hours	60,611	62,033	62,906	30,305	31,728	30,840	32,066
Labour productivity (per hour)	2015=100	104.9	104.3	106.6	104.3	104.6	107.7	105.8
Distribution of net national income								
Net national income	billion euro	2,697.8	2,786.7	2,990.3	1,337.9	1,448.8	1,456.1	1,534.2
Compensation of employees	billion euro	1,920.4	2,018.7	2,137.4	960.3	1,058.3	1,014.7	1,122.7
Gross wages and salaries	billion euro	1,571.2	1,651.9	1,750.6	781.9	870.0	827.3	923.3
among them: net wages and salaries[4]	billion euro	1,064.2	1,130.5	1,179.9	528.3	602.2	550.0	629.9
Property and entrepreneurial income	billion euro	777.4	768.1	852.9	377.6	390.5	441.4	411.5
Disposable income of private households[2]	billion euro	2,013.3	2,094.4	2,225.3	1,033.3	1,061.1	1,099.0	1,126.3
Savings rate of private households[2,5]	%	15.0	11.1	9.9	14.5	7.8	11.0	8.8
For information purposes:								
Nominal unit labour costs[6]	2015=100	113.1	116.5	118.9	113.6	119.4	114.2	123.7
Real unit labour costs[7]	2015=100	100.9	100.7	99.4	99.5	102.0	96.6	102.2
Consumer prices	2015=100	109.1	115.7	119.7	114.1	117.3	119.1	120.2

1 – Forecast by the GCEE. 2 – Including non-profit institutions serving households. 3 – Including military weapon systems. 4 – Compensation of employees minus social contributions of employers and employees and income tax of employees. 5 – Savings relative to disposable income. 6 – Compensation of employees per working hour (employee concept) in relation to real GDP per working hour (employed person concept). 7 – Compensation of employees per working hour (employee concept) in relation to GDP per working hour (employed person concept).

Sources: Federal Employment Agency, Federal Statistical Office, own calculations

↘ TABLE 11 (CONTINUED)

Key figures of the national accounts

Change on the previous year in %

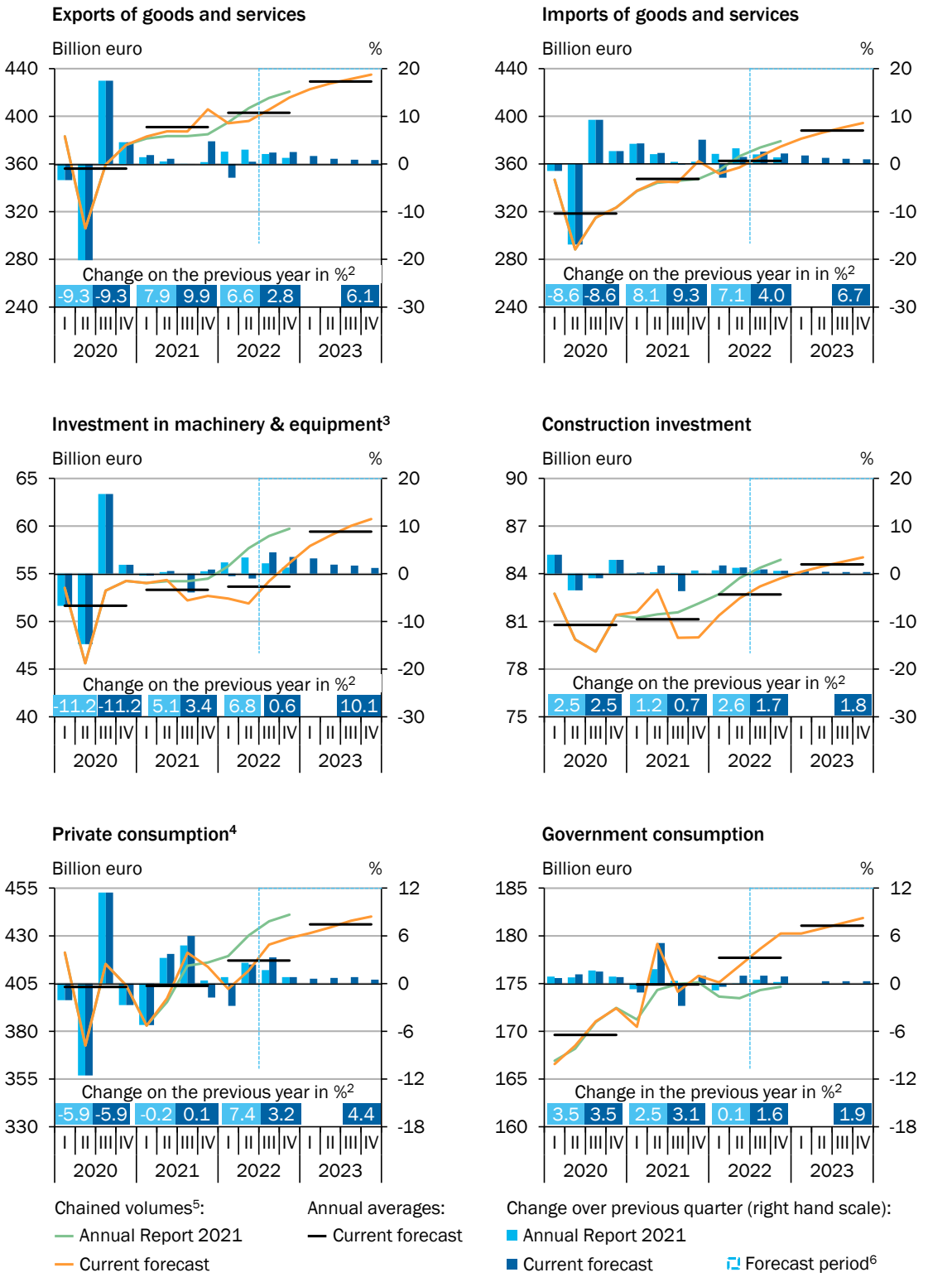
2021	2022[1]	2023[1]	2022[1]		2023[1]		
			1. half-year	2. half-year	1. half-year	2. half-year	
							Use of domestic product
							at current prices
4.1	7.4	6.5	7.9	7.0	8.9	4.3	Final consumption expenditure
3.2	8.7	7.6	9.5	8.0	10.5	4.9	Private consumption[2]
6.2	4.5	4.0	4.4	4.7	5.2	2.9	Government consumption
6.5	8.6	9.3	7.4	9.7	11.0	7.8	Gross fixed capital formation
5.2	2.9	12.1	– 1.2	6.6	14.3	10.1	Investment in machinery & equipment[3]
9.0	12.4	8.8	12.7	12.2	10.6	7.1	Construction investment
1.8	6.6	6.6	5.8	7.2	7.2	6.0	Other products
6.2	8.3	7.1	8.8	8.0	9.3	5.2	Domestic demand
15.9	13.1	10.0	13.6	12.6	13.5	6.7	Exports of goods and services
17.9	21.4	10.0	22.5	20.4	15.0	5.5	Imports of goods and services
6.0	**5.1**	**7.2**	**5.5**	**4.8**	**8.7**	**5.8**	**Gross domestic product**
							Chained volumes
1.1	2.7	3.6	3.3	2.2	5.2	2.1	Final consumption expenditure
0.1	3.2	4.4	4.5	2.1	6.4	2.5	Private consumption[2]
3.1	1.6	1.9	0.7	2.6	2.5	1.2	Government consumption
1.5	1.8	4.5	– 0.4	3.9	5.8	3.4	Gross fixed capital formation
3.4	0.6	10.1	– 3.5	4.5	12.2	8.2	Investment in machinery & equipment[3]
0.7	1.7	1.8	– 0.2	3.5	2.9	0.8	Construction investment
0.7	3.9	4.4	3.7	4.1	4.7	4.2	Other products
2.2	2.3	3.9	2.0	2.6	5.3	2.5	Domestic demand
9.9	2.8	6.1	2.7	2.9	7.6	4.6	Exports of goods and services
9.3	4.0	6.7	3.8	4.2	8.4	5.1	Imports of goods and services
2.9	**1.8**	**3.6**	**1.6**	**2.0**	**5.1**	**2.2**	**Gross domestic product**
							Price Development (deflators)
3.0	4.5	2.8	4.5	4.6	3.5	2.1	Final consumption expenditure
3.1	5.3	3.1	4.8	5.8	3.9	2.3	Private consumption[2]
3.0	2.9	2.1	3.7	2.0	2.6	1.7	Government consumption
5.0	6.7	4.6	7.8	5.6	5.0	4.2	Gross fixed capital formation
1.7	2.2	1.8	2.3	2.1	1.9	1.8	Investment in machinery & equipment[3]
8.3	10.6	6.9	13.0	8.4	7.5	6.3	Construction investment
1.2	2.5	2.1	2.1	2.9	2.5	1.8	Other products
4.0	5.9	3.1	6.6	5.2	3.8	2.5	Domestic demand
– 2.3	– 5.7	0.6	– 4.4	– 5.4	– 0.5	1.7	Terms of Trade
5.4	10.0	3.7	10.7	9.4	5.5	2.0	Exports of goods and services
8.0	16.7	3.0	18.0	15.6	6.1	0.4	Imports of goods and services
3.0	**3.2**	**3.5**	**3.8**	**2.7**	**3.5**	**3.4**	**Gross domestic product**
							Production of domestic product
0.0	1.0	0.6	1.3	0.8	0.6	0.6	Employed persons (domestic)
1.9	2.3	1.4	4.2	0.7	1.8	1.1	Labour volume
0.9	– 0.6	2.2	– 2.6	1.4	3.2	1.2	Labour productivity (per hour)
							Distribution of net national income
6.7	3.3	7.3	4.2	2.5	8.8	5.9	Net national income
3.7	5.1	5.9	5.7	4.6	5.7	6.1	Compensation of employees
3.8	5.1	6.0	5.8	4.6	5.8	6.1	Gross wages and salaries
4.2	6.2	4.4	6.5	6.0	4.1	4.6	among them: net wages and salaries[4]
15.0	– 1.2	11.0	0.6	– 2.9	16.9	5.4	Property and entrepreneurial income
1.9	4.0	6.2	3.6	4.5	6.4	6.1	Disposable income of private households[2]
.	.	.	.	.	.	.	Savings rate of private households[2,5]
							For information purposes:
0.8	3.0	2.1	3.9	2.4	0.5	3.6	Nominal unit labour costs[6]
– 2.2	– 0.2	– 1.3	0.1	– 0.3	– 2.9	0.2	Real unit labour costs[7]
3.1	6.1	3.4	5.8	6.2	4.4	2.5	Consumer prices

1 – Forecast by the GCEE. 2 – Including non-profit institutions serving households. 3 – Including military weapon systems. 4 – Compensation of employees minus social contributions of employers and employees and income tax of employees. 5 – Savings relative to disposable income. 6 – Compensation of employees per working hour (employee concept) in relation to real GDP per working hour (employed person concept). 7 – Compensation of employees per working hour (employee concept) in relation to GDP per working hour (employed person concept).

Sources: Federal Employment Agency, Federal Statistical Office, own calculations

↘ CHART 23

Components of the German GDP[1]



1 – All components of GDP reported price-adjusted. 2 – Not seasonally and calendar-adjusted. 3 – Including military weapon systems. 4 – Including non-profit institutions serving households. 5 – Reference year 2015, seasonally and calendar-adjusted. 6 – Current forecast period. Forecasts by the GCEE.

Sources: Federal Statistical Office, own calculations

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