GERMAN COUNCIL
of Economic Experts

Estimates of the consequences of an intensification of the conflict on the economic outlook

Excerpt from BOX 3 of the GCEE's updated Economic Outlook
March 2022

This is a preliminary translation of an excerpt of the original German-language publication "Aktualisierte Konjunkturprognose 2022 und 2023", which is the sole authoritative text. Please cite the original German-language publication if any reference is made to this text.

German Council of the Economic Experts, Gustav-Stresemann-Ring 11, 65189 Wiesbaden, E-Mail: info@svr-wirtschaft.de.

ESTIMATES OF THE CONSEQUENCES OF AN INTENSIFICATION OF THE CONFLICT ON THE ECONOMIC OUTLOOK

(EXCERPT FROM BOX 3 OF THE GCEE'S UPDATED ECONOMIC OUTLOOK MARCH 2022; PRELIMINARY TRANSLATION, THE GERMAN-LANGUAGE "AKTUALISIERTE KONJUNKTURPROGNOSE 2022 UND 2023" IS THE SOLE AUTHORITATIVE TEXT)

Overall, the impact of Russian's war of aggression against Ukraine on the German and European economy – especially in case if sanctions will be extended – is highly uncertain. In order to evaluate the impact of an intensification of the conflict on economic output, different institutions prepared **risk scenarios for the economic development of Germany and Europe** as part of their economic forecasts (Deutsche Bank Research, 2022; EZB, 2022b; Goldman Sachs, 2022; Köppl-Turyna et al., 2022; Liadze et al., 2022; Oxford Economics, 2022). ↘ TABLE 3 Thereby, potential economic effects due to suppressed consumption by households and worsened financial conditions caused by a rise in uncertainty, further trade restrictions with Russia, as well as a rise in commodity prices, among others, are considered. ↘ BOX 1 Due to Russia's important role as Europe's energy supplier 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 in imports of crude oil and natural gas from Russia that is at least temporarily leading to higher prices for crude oil and natural gas in Europe. The scenario analysis of Oxford Economics (2022), in particular, assumes that prices for natural gas stay high for a longer period of time. In this scenario, the price increases immediately to 190 Euro per MWh due to an import stop in 2022 and, subsequently, slowly decrease 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 size and the duration of the assumed rise in energy prices and a potential amplification through the financial market, these studies yield a **deduction of 1.2 % to 2.2 % to** the **euro area GDP in 2022** compared to 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 % and 2.6 %** depending on the respective scenario.

↘ TABLE 3

Selected scenarios on the consequences of an intensification of the conflict for the economic outlook

Institution	Scenario	Assumptions	GDP-deduction[1]	Additional inflation[1]	Region
Effects relative to a baseline scenario incorporating the state of the conflict and sanctions at time of publication					
Deutsche Bank Research[2]	Negative scenario with a temporary import stop of natural gas and oil from Russia	Sharply higher energy prices (Oil 140 US-$/barrel; natural gas 150 €/MWh)	1.5	1–1.5	Germany
ECB[2]	Adverse scenario	Sharp temporary increase of natural gas prices and increase of oil prices	1.2	0.8	Euro area
ECB[2]	Severe scenario	Sharper and longer increase of natural gas and oil prices; strong second round effects	1.4	2.0	Euro area
Oxford Economics[2]	Stop of Russian natural gas imports for 6 months	Oil price between 100 and 115 US-$/barrel, natural gas price at 190 €/MWh	1.5	2.6	Euro area
Goldman Sachs[2]	Stop of russian natural gas imports		2.2	–	Euro area
Effects relative to a baseline scenario not incorporating the state of the conflict and sanctions at time of publication					
EcoAustria[2] (Köppl-Turyna et al.)	Increase of natural gas prices and stop of 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 140 US-$/barrel higher public spending	0.8	2.5	Euro area
Estimates of Bachmann et al. (2022)					
Bachmann et al.[3]	Cessation of trade between Russia and the EU	Introduction of trade barriers in the model of Baqaee and Farhi (2021), which lead to a stop of all imports from Russia to the EU	0.2–0.3	–	Germany
Bachmann et al.[4]	Stop of Russian natural gas imports	30 % decline of natural gas imports; elasticity of substitution between natural gas and other inputs of 0.1	2.2	–	Germany
Bachmann et al.[5]	Stop of Russian energy imports	30 % decline of energy imports; change of the cost share of energy imports in the GNE by 5 percentage points to 7.5 %	1.4	–	Germany

1 – In percentage points relative to the baseline. 2 – Deduction or addition for the year 2022. 3 – The estimate based on the trade model of Baqaee and Farhi (2021) compares two different long run equilibria with different levels of trade barriers between Russia and the EU. It does not incpororate common macroeconomic amplification mechanisms. 4 – Based on a production function approach with conservatively estimated elasticities of substitution, without common macroeconomic amplification mechanisms. 5 – 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 mechanisms.

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

In addition to these scenarios which particularly estimate 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 different 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 of trade flows, which are likely to take place in the long run, the resulting deduction to GDP of 0.2 % to 0.3 % is very low. ↘ TABLE 3 On the other hand the authors use a production function approach with very conservative substitution elasticities. In order to use this approach, 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 change in GDP by the way of a sufficient statistic. Thereby one can use an assumption on the change of the average price of energy imports instead of an assumption on the elasticity of substitution in order to arrive at an estimate of the change in GDP. They present a pessimistic scenario in which a stop of Russian gas imports induces a **decline of German gas imports by 30 %** and the **elasticity of substitution between natural gas and other energy inputs is 0.1 which is very low**. In this scenario which the authors interpret as a very pessimistic scenario for the short run, the **German GDP declines by 2.2 %**. ↘ TABLE 3 In another scenario the authors assume a complete cessation of all Russian energy imports and an increase of the expenditure share of energy imports in the GNE by 5 percentage points to 7.5 %. In this scenario German GDP declines by 1.4 %. ↘ TABLE 3 This approach however does not incorporate common macroeconomic amplification mechanisms such as investment adjustment costs, price rigidities or financial market frictions. Thus, these estimated effects could potentially come on top of the aforementioned scenarios which does not incorporate a full cessation of Russian energy of natural gas imports.

Using the sufficient statistic derived by Bachmann et al. (2022), the GCEE has produced its **own estimates in additional scenarios regarding the decline in natural gas imports and the increase in natural gas prices**. These scenarios complement the current forecast at hand which is based on the sanctions that have been decided at the date of completion of the forecast (March 18, 2022) and the corresponding evolution of energy prices. These estimates are however not to be understood as full-fledged risk scenarios. ↘ ITEM 39 In particular these estimates, like Bachmann et al. (2022) **do not incorporate common macroeconomic amplification mechanisms**. In the extreme case that only a quarter of Russian natural gas imports could be compensated and thus **German gas imports would drop by 30 %** (assuming 40 % of German natural gas imports are imported from Russia, which according to the BAFA was the average import share from Russia in the years 2016 to 2020) and an increase of the **average import price** for the remaining **natural gas imports to 350 Euro per**

MWh (seven times the average from December 2021), the **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 produced. Using the same assumptions as for Germany (stoppage 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 less affected due to their lower natural gas imports or 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

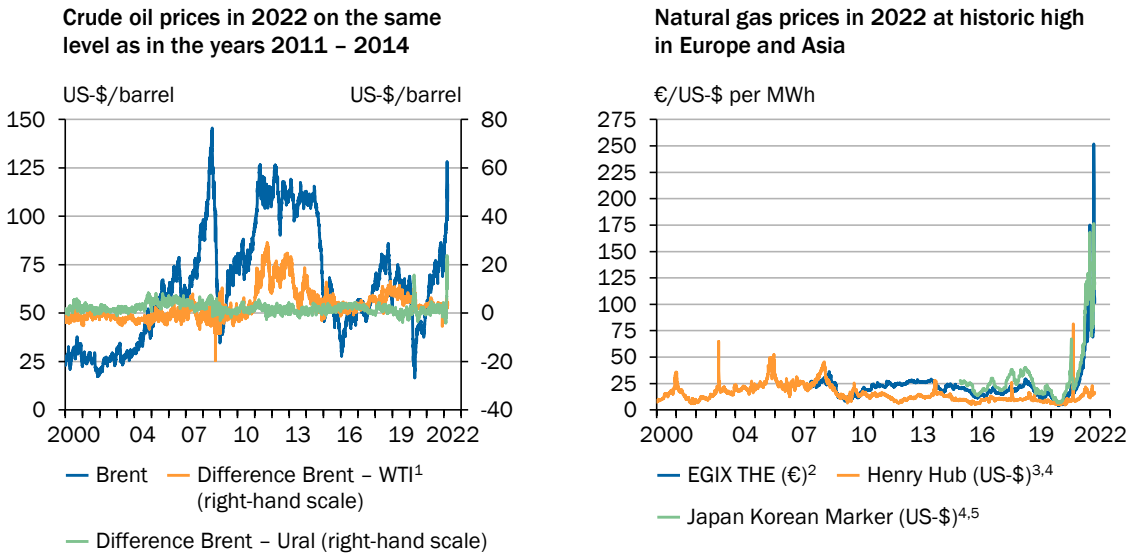
In addition to restrictions on the natural gas imports from Russia, restrictions on Russian crude oil supply, i.e. an **adverse oil supply shock**, may lead to **further negative GDP effects**. In general, the price for crude oil follows the global economy. Exogenous events, such as the wars in Iraq or the sanctions against Iran, may lead to increases in the price for crude oil that are not caused by economic developments. From a historical perspective, the current monthly average oil price is still below the highest quotations seen during the period 2011 to 2014 – in contract to the price for natural gas in Europe. ↘ FIGURE 14 Moreover, there are usually just small differences between the prices for crude oil in Europe (Brent) and in the US (WTI). ↘ FIGURE 14 RIGHT

Previous macroeconomic studies find **moderate and lagged effects of oil supply shocks on real economic activity and inflation** (Kilian, 2008, 2009; Carsten-sen et al., 2013; Baumeister und Hamilton, 2019). One study on Germany from 2013 shows that 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 respective shock. An analysis based on the method of Känzig (2021) conducted by the German Council of Economic Experts yields similar magnitudes for the effect on industrial production. Further, the consumer price increase may peak by 0.4 %.

↘ FIGURE 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 Loui-siana. 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-$ per MMBtu (1 million British thermal unites) converted to US-$ 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

Various reasons may explain why the estimated effects of a rise in the price for crude oil is moderate. It is argued that the share of crude oil in value added is lower today than in 1970s and 1980s (Blanchard und Galí, 2007; Herrera und Pesavento, 2009). Moreover, larger **fluctuations in crude oil prices** can be **mainly explained by** aggregated, oil-specific and expectation driven **demand factors**. Consequently, crude oil price increases were often not accompanied by negative economic growth in the past (Kilian, 2008, 2009; Baumeister und Hamilton, 2019). Indeed, rather expectation driven oil-specific demand factors – i.e. a rise in demand for inventory purposes in anticipation of future supply shortages and involving increases in prices – as well as other non-supply related oil shocks were the main driver of the sharp increases crude oil prices during the energy crises of the 1970s and 1980s (Kilian, 2009; Baumeister und Hamilton, 2019; Känzig, 2021). Finally, the global market for crude oil is highly integrated. Consequently, restrictions in the production of crude oil in one country were compensated – at least partially – by an expansion of production in another country (Kilian, 2009). Such developments were observable during the Gulf War and as a result of the US sanctions against Iran (Kilian und Murphy, 2014; Caldara et al.,

2019). A direct consequence is that oil supply shocks led only to transitory and moderate increases in the price for crude oil. This may also apply to the current situation if Russian's share of 16 % on the global oil production would be sanctioned by Western industrial countries. A rerouting of Russian's oil production with a considerable haircut on the price to China, for example, is likely to cushion the supply shock through the global market.

Given the aforementioned evidence the recently observed **increase in oil prices by more than 40 %** implies a decline of industrial production in Germany by 2 % to 4 % over the course of 2 years. Given that industry accounts for roughly 20 % of gross value added in Germany, the **resulting deduction to GDP** could be **less than 1 %**. ↘ TABLE 4 More sharply increasing prices due to a stoppage of imports to Western economic and additional multiplier effects could nonetheless result in larger effects. The effect on GDP particularly depends on the reaction of the central bank to the increase in inflation and inflation expectations induced by the increase in oil prices. The 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 stoppage of Russian energy imports may have a considerably negative effect on GDP growth. The estimates could be interpreted as **potential deductions** to the baseline scenario of **the GCEE's economic forecast**. The different deductions could come on top of each other, for example because the scenarios that are calculated within the established forecasting models have a hard time to estimate the consequences of a complete stoppage of Russian energy import and potentially resulting physical shortages. The estimates for such a complete stoppage however don's incorporate potential spillover effects via financial markets.

In particular in the short run **possibilities to substitute Russian energy supplies** in the case of a complete stoppage of Russian energy imports could be **more constrained** than presumed in these estimates, which would result in a stronger decline in GDP growth. Consequently, a number of parties have argued that short run shortages of natural gas and coal supplies could result in incisive **interruptions of production in energy-intensive companies** (Bardt et al., 2022; Fuest, 2022), which would result in unemployment or short time work and consequently in demand cutbacks (Dullien and Krebs, 2022; Schaefer and Küper, 2022). These interruptions of production could further exacerbate the supply shortfalls in various sectors. Additionally, the further increase in energy prices could further fuel inflation and thus dampen demand and put an additional strain on the economic outlook. In addition, the effects mentioned by these authors a sharp increase in energy prices and a decrease in GDP could lead to **credit losses** and disruptions in financial markets. For example, utilities in the energy sector could come under pressure from sharply rising energy prices if these higher prices cannot be passed through to their customers.