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The economic impact of a boycott on Russian fossil fuels

Scenario update for the global economy

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Contents

Summary

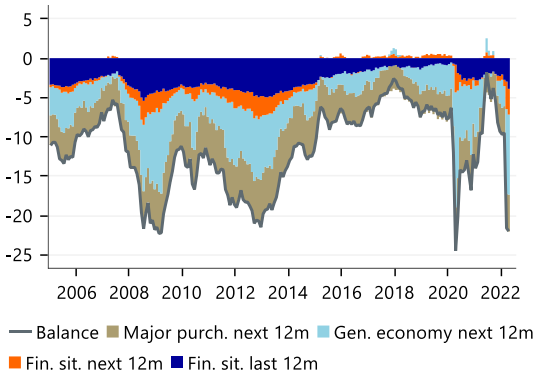
- European leaders have adopted plans to phase out Russian fossil fuels. Coal is already part of the fifth EU sanction package, and today EC President von der Leyen announced the Commission's proposal for a ban on imported oil.
- Europe has virtually no alternatives to substitute for Russian gas in the short term, which makes some member states reluctant to phase out these imports in the short term.
- The downside of postponing the decision to ban imports of Russian fossil fuels (or adopting an implementation date that lies in the future) is that Europe would continue to financially support Putin's war against Ukraine.
- The Russian economy would experience twice as much pain in case of a full-fledged boycott of Russian fossil fuels (GDP contraction of 21 percent) compared to a European sanction package excluding oil and gas (GDP contraction of 11 percent). This boils down to economic losses in absolute terms (against our baseline scenario) over two years ranging between USD 750 billion and USD 1300 billion.
- A full-fledged ban, however, would also push the eurozone economy into a deep recession. The euro area would experience a cumulative contraction of 2.6 percent in GDP over four quarters.
- A scenario where the EU only targets Russian oil imports would also result in a European recession, albeit with a much smaller impact (1.4 percent cumulative contraction over three quarters) compared to a full-fledged ban.

The war in Ukraine has triggered a severe humanitarian crisis in Europe, with more than 5.5 million Ukrainians fleeing their homeland since the start of the war on 24 February. Although the economic ramifications for Europe pales in comparison to the hardships the Ukrainian people are undergoing, it becomes ever more clear that the European economic recovery from the COVID-19 crisis will be hampered by the military conflict. Notably, the risk of significant energy shortages has risen considerably as the war has dragged on. With this in mind, we have updated and finetuned our scenario analysis. Below we discuss the rationale, outcomes, and implications for this fresh look at where we stand.

At a crossroads

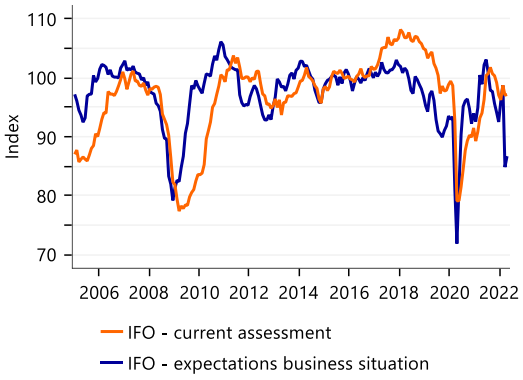
We have updated our scenario analysis, as we have arrived at a crossroads of new major decisions. There is no doubt that the war in Ukraine is having an economic impact, but the *extent* of the economic damage for Europe still largely depends on the political choices (to be) made. We highlighted the recession risk for the euro zone early on in the conflict. The IMF and the OECD have also lowered their outlook for the global economy, as sentiment is slipping (Figure 1) and consensus on GDP growth has been lowered continuously for the euro area.

Figure 1: Euro zone consumers downbeat…



Source: Macrobond

Figure 2: …and businesses are too



Source: Macrobond

There is for now, however, a big gap between expectations and people's (and businesses') actual behaviour and spending. Households are downbeat, but they still remain positive about the labor market. Likewise, businesses have become quite negative about the future, but are still reporting robust output growth as they work through backlogs, which are rising once again due to new supply-chain disruptions. Indeed, many high-frequency indicators do not directly point to a rapidly deteriorating *overall* business environment. The gap between expectations and current conditions in the IFO survey (Figure 2), for example, has never been this high (at least not since 1991). This observation has fuelled the debate among economists and policymakers as to whether or not Europe will enter a recession soon or even at all.

Although this implies that things could go both ways (i.e. expectations catching up with reality or vice versa) we need to bear in mind that inflation tends to be a "slow killer". Normally recessions play out 12 to 18 months after a significant supply-side shock. **But more important in our view are the political choices, which for oil have already been made and for gas may also be drawing closer now. This will largely determine which way the economic coin falls.**

Towards far-reaching sanctions?

Against the backdrop of this debate, European political leaders have decided to phase out imports of Russian fossil fuels, as with these purchases Europe continues to financially support Putin's war against Ukraine. Coal is already part of the fifth EU sanction package. In addition, the EU is finalizing an embargo on Russian oil, although EU member states seem to disagree on how soon Russian oil should be phased out. Moreover, Hungary has stated that it opposes such a move and has threatened to veto a European ban on Russian energy.

The reluctance of Hungary to join an embargo on Russian energy underlines the problem at hand. Europe is still largely dependent on Russian oil and gas, and a ban on these imports would definitely worsen the economic outlook for the EU. In this research note, we update two previous scenario studies (The Ukraine meta crisis and How we would pay for the war), using all recent and relevant information. Moreover, we add a new scenario to the previous ones wherein we simulate the economic impact of a full-fledged cessation of Russian gas and oil imports by the European Union.

Although the results from scenario analyses remain subject to a large amount of sensitivity and are reliant on certain assumptions as well, it provides at least an idea of the magnitude and direction of the economic impact under different circumstances, future events, and policy decisions.

Before we do so, however, we provide some further context to the political dynamics (the 'why' and 'why now?'-questions) that have made the scenario of a broader (or even total) energy ban more likely now. On the other hand, Europe is still divided, notably on a gas boycott. Therefore we look briefly at what has been swaying Europe towards a more heavy-handed sanctions approach.

Why and why now?

There's a number of angles from which we can approach this question. Let's first start with the war in Ukraine itself. The Russian army has pulled its forces back to the southeast part of the country. This will likely lead to an even more entrenched conflict. On the Russian side, victory in the eyes of President Putin may now only be achievable by destroying Ukraine rather than 'liberating' it. As such, the risk of a this becoming a long war of attrition is much higher now. But the West's aim to avoid direct military confrontation and instead focus on supplying military equipment to help Ukrainian forces maintain their defense (Germany's offer to supply mothballed Gepard anti-aircraft equipment, with the country struggling to obtain sufficient ammunition from other countries, only underscores this point), implies stronger economic sanctions will be utilized to make up for these inhibitions.

Meanwhile, Russia's aggression has only further stoked public opinion in the West on the need to make 'Russia pay'. This opinion is strengthened by:

- The observation that the Russian economy is still plowing on rather than collapsing and inflation has slowed after a huge spike early on in the war. Although the ruble's return to pre-war levels may not mean as much as it did before, in the context of the current sanctions and capital controls, this signals that Russia is coping with the situation better than the West would have hoped.
- The idea that Russia is still making big gains with its energy sales at elevated prices. According to some calculations (see here), Russia is reaping massive windfall profits from its oil and gas exports to the tune of nearly $321 billion this year. A report by the research organization Centre for Research on Energy and Clean Air (CREA) acknowledges these numbers and concludes that Russia earned EUR 63 billion by selling oil and gas in the first two months of the war, and Europe made up for EUR 44 billion of this revenue. That would be more than a third higher than last year and it likely offsets losses the country has been forced to take elsewhere.

Energy as a weapon

Moreover, the evidence that Russia is using its energy exports as an economic weapon (also in retaliation for the West's economic sanctions) is only getting stronger. Before the war in Ukraine started, there were already indications that Russia was using gas prices as a means to put pressure on Germany/the EU to get Nordstream II approved. That plan obviously failed.

In April, Moscow announced its plan that gas importers should pay in rubles instead of euros or dollars. Although that intention was initially 'softened' by introducing an artificial layer of ruble liquidity into European dollar and euro gas payments (through the possibility for gas importers to open two accounts at Gazprom bank), the EU asserts that the proposed mechanism breaks EU sanctions – which of course is why Russia proposed it.

Several EU member states immediately responded that they wouldn't comply with Russia's demands, while others have signalled preparedness to open those accounts out of fear that gas deliveries may stop (too) soon. **To back up its threats, Russia stopped its supply of gas to Poland and Bulgaria as of 27 April**. With the European winter in retreat and these countries still having several alternatives (such as coal in Poland), this is not a full-blown stop to Europe yet. Indeed, we'd argue that Moscow aims to send a signal that it is willing to fight an economic war as well (even if it would stand to lose massively on it), retaliate for particular countries' stance in

the conflict (such as Bulgaria's acceptance of more NATO troops), and drive a wedge between EU member states.

EU President Von der Leyen told reporters last week *that "… it's very clear, and the request from the Russian side to pay in rubles is a unilateral decision and not according to the contracts."* Following questions for more guidance from Brussels, this view was confirmed later. This raises the possibility that Russia may halt supplies to other countries. But it would then become Russia's decision and if this was Russia's aim one might wonder why it came up with the plan of ruble accounts in the first place.

This also explains the response by the EU: It argues that it will not be blackmailed and is calling Moscow's bluff. At the same time, the escalatory nature of recent developments raises the possibility that Europe will take matters in its own hands.

How united is Europe?

Although the EU has largely succeeded in putting up a united front against the Russian aggression, this unity is again being tested. But the political state of play in Europe has changed as well. Some even argue that French President Macron, who just got a new lease of life, has become the EU's de facto new leader following the departure of former Chancellor Merkel in Germany. Macron was also one of the key leaders in Europe keeping communications with Russia open (until recently, at least).

Merkel's successor, Olaf Scholz, has definitely made a break with the Merkel era, announcing early on in the Ukraine war that Germany will spend an additional EUR 100 billion on defense and vowing to raise structural NATO spending. Germany has even given up its reluctance to provide Ukraine with heavy military equipment. Still, Mr. Scholz may be operating at the boundaries of what his grassroots supporters – and even the German public at large – are willing to do on that front. On stopping oil imports, Germany also made a U-turn and dropped its opposition to a ban. Germany now believes that, although a ban on oil imports would be quite painful, it can manage this, while also acknowledging that some countries would require more time and/or support from other member states to cope with it. Reuters reported this week that the European Commission may spare Hungary and Slovakia (which are strongly dependent on Russian oil deliveries through the Druzhba pipeline) from an oil import embargo. This underlines the EU's aim to maintain a 'united front', albeit with some internal flexibility to make this work.

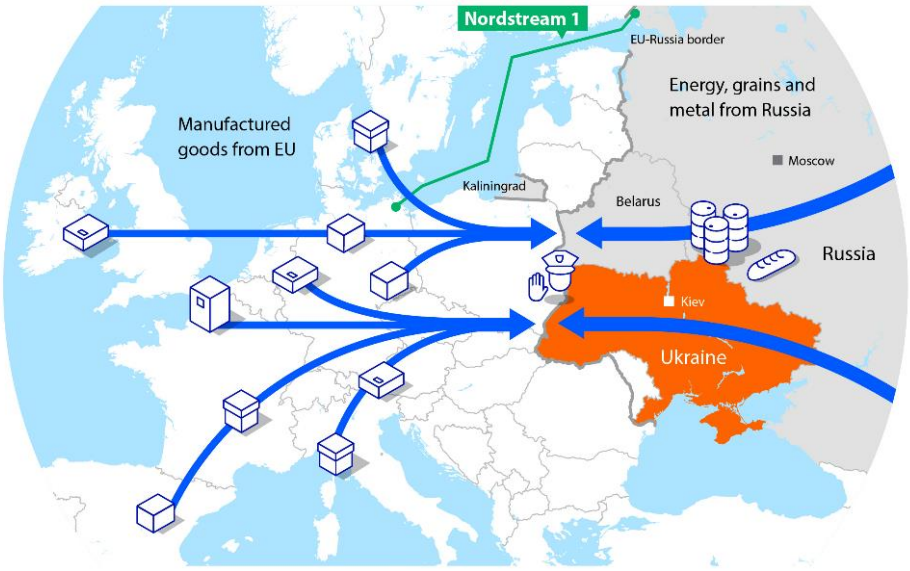
Today's announcement by European Commission President Von der Leyen on its proposal for an oil ban is proof that internal hurdles have been largely overcome, although all member states would still have to approve the Commission's proposals.

Scenarios

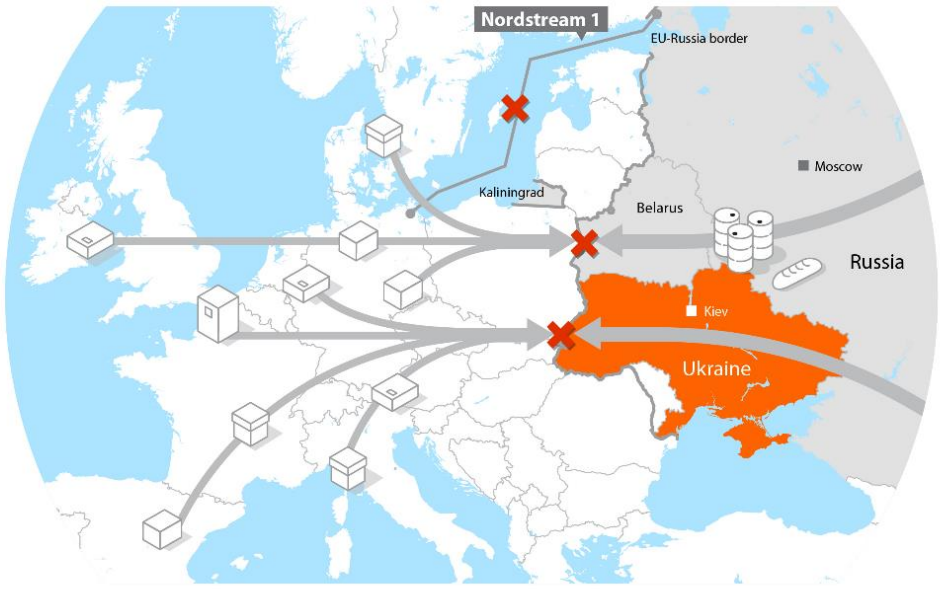
In our previous scenario study, we introduced a taxonomy in which we distinguished three different scenarios to reflect possible developments in Ukraine. Below, we will shortly recapitulate on the previous scenarios and include a new one (scenario B+):

- **Scenario A**: a short-lived war and a return to normality after a six-month period of turbulence. Production and exports are temporarily disrupted, and the West imposes weak sanctions against Russia, comparable to what we saw in 2014 when Russia invaded Crimea. Needless to say, we are already past this scenario.

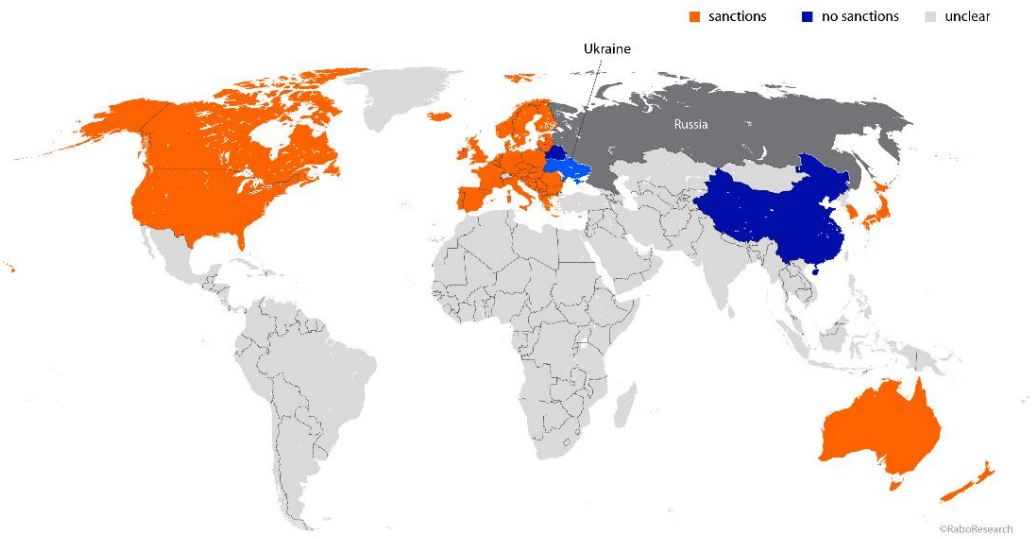
- **Scenario B** (see figure below): a longer-lasting conflict, wherein Russia is heavily sanctioned by the West. Necessity goods, such as gas and oil, are exempt from European sanction packages.



- **Scenario B+** (see figure below): In this scenario, we assume that the West cuts all economic ties with Russia and imposes a 'Iran-style' full-fledged economic boycott of Russia. In this scenario, Europe would also implement a full ban of Russian oil and gas imports from Q3 2022 onwards. We assume that Russia still has some trade ties with countries, especially China and India, that so far have not been willing to join Western sanctions.

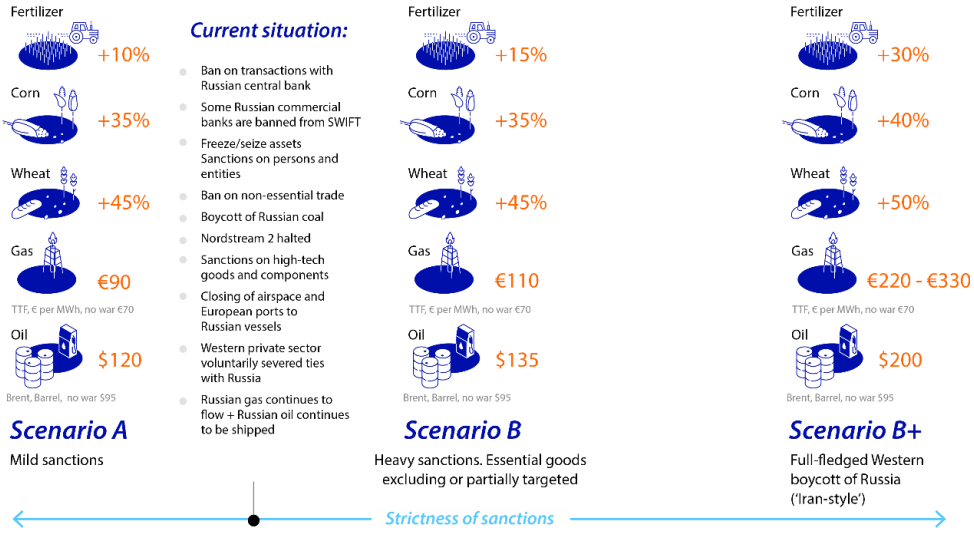


- **Scenario C** (see figure below): the West imposes secondary sanctions on parties still trading with Russia. The US administration has already warned China of consequences if China were to come to the aid the Kremlin. We have decided not to quantify this 'cold war' scenario, because the global economic order as we know it would be seriously shaken up, and there is no telling what would happen in terms of, for instance, supply chain disruptions.



Where do we currently stand

Circumstances have changed rapidly since the war started in February. Currently, we are somewhere in between scenarios A and B. This is also reflected in the commodity price rises that we assumed would materialize under each scenario (see figure below and the Appendix). The current situation could drastically change in the event of an announcement by the EU that it plans to adopt a ban on Russian oil, which would push us well beyond scenario B and closer towards B+.



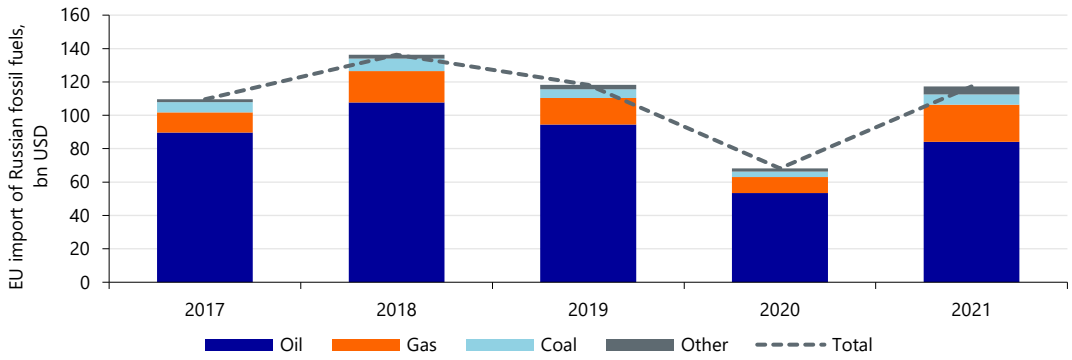
Scenario B+: moving towards a European full-fledged ban of Russian fossil fuels

Already back in the 1980s, the newly installed Reagan administration dug in its heels to prevent Europe from starting the construction of a gas pipeline with the Soviet Union. Reagan feared that Europe would be become too dependent on Russian energy and that this would weaken Europe's geopolitical position. The administration even went as far as to launch sanctions targeting foreign firms using American technology in the export of equipment for the construction of the Yamal pipeline. After talks with European leaders, in which Margaret Thatcher, with whom Reagan had a

good relationship, played an important role, the US administration eventually caved in and lifted the sanctions. With geopolitical tensions between the West and Russia reaching a boiling point over Russia's attack on Ukraine, Reagan's warnings are echoing from a distant past, as Europe is facing an incredibly difficult decision: either continue buying Russian gas and oil, thereby supporting the Kremlin in financing the war against Ukraine, or stop buying Russian gas and oil, with considerable self-inflicted economic pain.

In March, European leaders launched REPowerEU, a plan to phase out Russian gas by two-thirds before the year is out and "*make Europe independent from Russian fossil fuels well before 2030.*" Moreover, the EU has agreed to ban the import of Russian coal, which would result in a revenue loss for Russia of about EUR 8 billion per year. The ban on coal, however, pales compared to a full stop of European import of Russian gas (USD 22 billion) or oil (USD 84 billion) (see Figure 3). Russia's revenues from the export of fossil fuels to Europe likely have skyrocketed in 2022, as gas and oil prices have risen sharply since the start of the war in late February.

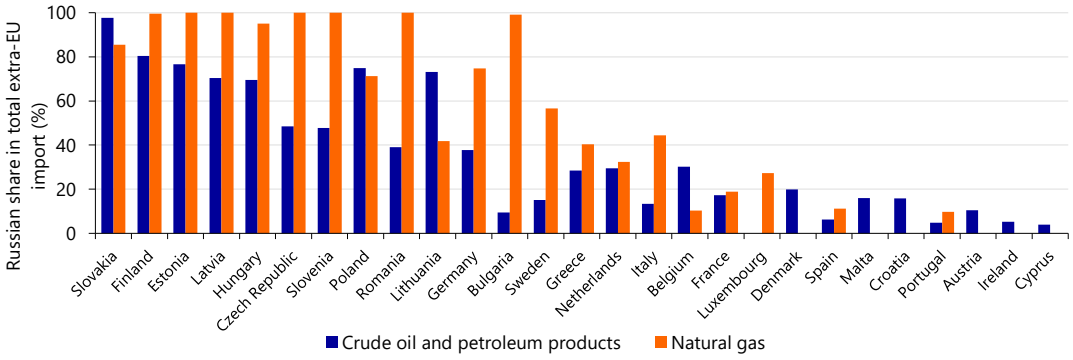
Figure 3: EU clearly finances the Kremlin



Source: UN comtrade database, RaboResearch

Dependency on Russian fossil fuels varies considerably between European countries (see Figure 4). This raises the risk that the anticipated EU ban on oil will be watered down in the final proposition or at least that the date of effectuation will be pushed back to late 2022; the latter appears to be the case when looking at today's announcement by Ms. Von der Leyen. For gas, consensus appears to be more difficult, and Germany has so far resisted a ban on the import of Russian gas.

Figure 4: Eastern Europe very dependent on Russian energy

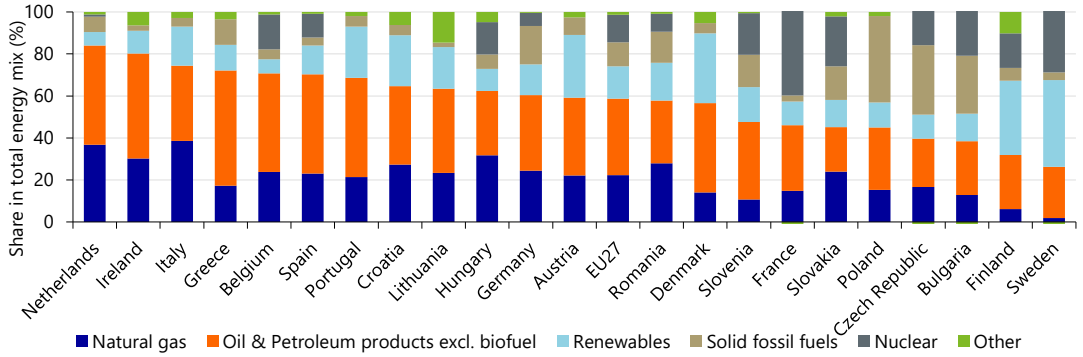


Source: Eurostat, RaboResearch

All in all, phasing out Russian fossil fuels will be an arduous task to say the least. In some countries, such as the Netherlands, Ireland, and Italy, energy consumption is very dependent on

the use of fossil fuels (see Figure 5), which renders them vulnerable to price and supply fluctuations.

Figure 5: Big differences in fossil fuel dependency



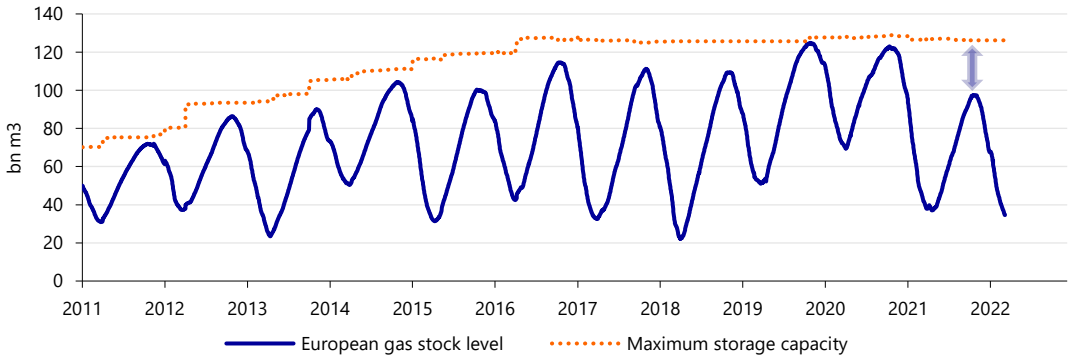
Source: Eurostat, RaboResearch, Macrobond

Below, we discuss the difficulties of a European phase-out of Russian gas and oil, possible substitutions of other suppliers and energy sources, and the expected impact of an all-out European embargo on Russian gas and oil imports on wholesale market energy prices.

Gas

Cutting back on Russian gas imports by Europe is easier said than done (see this report for the EU and this one for the Netherlands (in Dutch)). Europe entered the winter of 2021/2022 with extremely low reserves (see Figure 6), and the main reason why gas reserves were not depleted at an earlier stage can be attributed to a relatively mild winter. Europe currently faces the challenge of replenishing its gas storage levels from their present lows during the 2022 spring and summer time.

Figure 6: Low European gas storage levels



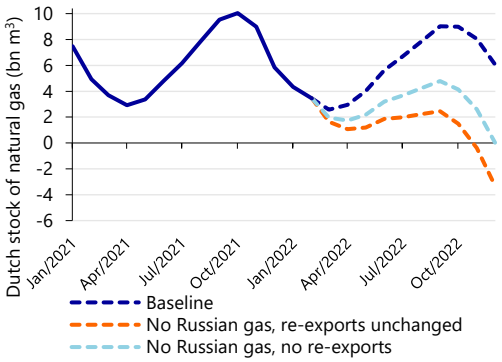
Source: Gas Infrastructure Europe (GIE), RaboResearch Macrobond

In the event of a complete cessation of Russian gas deliveries, what would the potential alternatives be? Europe does have meaningful Liquid Natural Gas (LNG) import capacity (e.g. Spain). On the other hand, a great deal of new pipeline plumbing would be required to shift away from traditional Russian pipeline natural gas imports and towards waterborne LNG imports. LNG-exporting countries such as the US, Qatar, Algeria, and Australia are already operating near maximum capacity. Furthermore, more LNG import capacity and pipelines would have to be invested in and built, which takes years to complete and comes with significant costs. Considering the lack of alternative supplies over the short term, the market will have to raise prices high enough to significantly ration demand, especially during periods of extreme weather. The same

counts for renewable and nuclear energy: wind parks, solar fields, and nuclear power plants are not put up overnight, especially against the backdrop of disrupted global supply chains, a legacy problem from the pandemic. Of course, Europe could start burning coal and heating oil, but that would definitely come at the expense of Europe's climate goals.

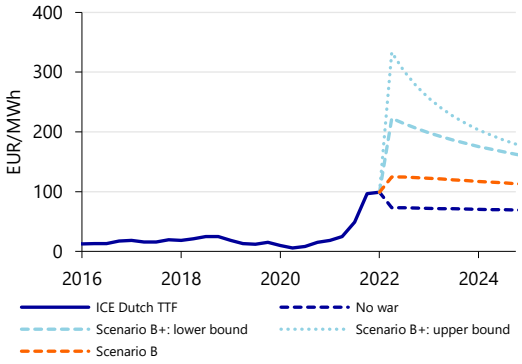
Ultimately, researchers at Bruegel conclude that Europe has no painless alternative to Russian gas, and, in the event of lower supply due to a sudden cutback, overall demand for gas in Europe would have to decline by 10 percent to 15 percent. For the Netherlands, we have calculated that Dutch gas storage levels would be completely empty by December if the Netherlands does not have to live up to its gas contract obligations with other European partners (see Figure 7) and would be empty by November if it does.

Figure 7: Imminent shortages in the Netherlands without Russian gas



Source: RaboResearch, Statistics Netherlands, Gas Infrastructure Europe (GIE)

Figure 8: Gas price could hit 200 EUR/MWh in Scenario B+ (or higher)



Source: ICE, RaboResearch, Macrobond

Would this mean physical gas shortages, and would people literally be left out in the cold next winter? We don't think this needs to be the case. But there will likely be a sharp increase in gas prices, as the price of natural gas is the market-clearing mechanism that ultimately results in lower demand for natural gas. The demand side of natural gas consists of three key sectors: residential and commercial heating and cooking, power generation, and industrial demand. Of the three, the European industrial natural gas sector would be the obvious choice for meaningful rationing to occur given demand from the other two sectors is more a necessity than a direct economic choice. Moreover, the economics of operating a natural gas-intensive plant in Europe would become so unfavorable that companies would be forced to offshore those operations to much cheaper alternatives such as Mexico or the US, where natural gas currently trades at a fraction of European prices, and that cost gap would only widen in this extreme scenario. This industrial wind down would likely take place over a multi-year timeframe, resulting in very high natural gas prices over several years.

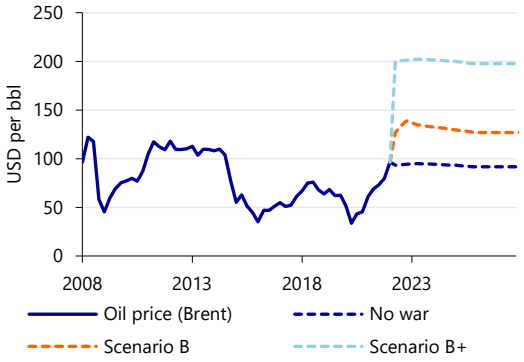
Using a price elasticity of demand of -0.239 in the short term and -0.614 in the long term (both from a meta-study by Labandeira et al. (2016), we can calculate that a 10 percent to 15 percent decrease in demand can be achieved if prices go up to EUR 200 per megawatt hour (MWh). In case of a more inelastic demand of -0.15 in the short term, prices could even become as high as EUR 300/MWh (see Figure 8).

Oil

Cutting back on imports of Russian oil seems to generate fewer problems than cutting off Russian gas deliveries. This also explains the political convergence on a ban of oil imports in recent weeks. The most important reason is that a large share of Russian oil to Europe is not

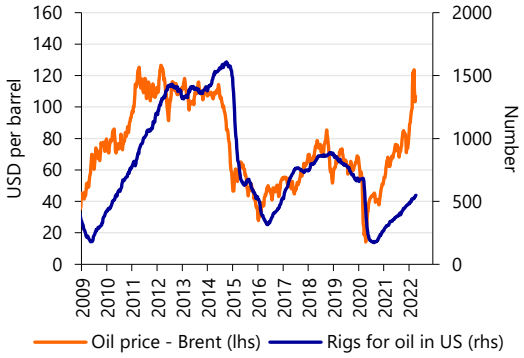
delivered via pipeline, but shipped physically. Moreover, the oil market is more liquid globally and less reliant on the infrastructure in place. Finally, there appears to be more spare capacity than in the LNG market. Still, against the backdrop of an already tight oil market, prices will probably take off substantially.

Figure 9: Oil price could hit 200 USD/bbl in Scenario B+ (gas + oil import ban)



Source: RaboResearch, ICE, Macrobond

Figure 10: Rigs seem to fall behind



Source: Macrobond, ICE, Baker Hughes

In 2020, the EU imported roughly 170 million tons of crude oil and petroleum products from Russia, which is equal to 3.4 million barrels per day (mb/d). In case of a ban on Russian oil imports, Europe would have to resort to alternative sources:

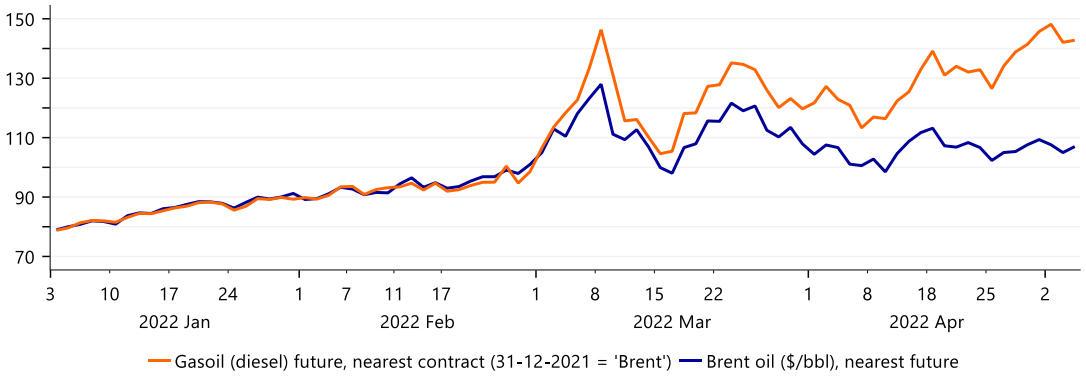
1. OPEC has up to 4mb/d spare capacity (see Bruegel), but it is important to keep in mind that Russia is part of OPEC+, which would likely result in reluctance from OPEC countries to meet additional European demand for oil.
2. The US lowered its rigs for oil after COVID hit the global economy, but shale-drilling companies are already discussing additional rigs with US officials to ramp up production. Oil rigs usually respond to higher oil prices quite flexibly with a six-month time lag, but at the moment, they seem to lag behind the oil price curve a bit (see Figure 10). If political consensus is being achieved in ramping up production, the US should be able to step in and replace Russian oil after a short period of disruption.
3. Finally, against the backdrop of a tight oil market, there are currently talks with countries like Venezuela to ease sanctions in exchange to additional oil deliveries. From a geopolitical standpoint, however, this would imply shifting sanctions from one party to another.

Despite more options to substitute Russian oil and access to substantial strategic reserves, a transition away from Russian oil will face challenges in the short term. For instance, many European refineries use a blend of Urals, which have a specific density and sulphury content. These refineries cannot change their blend profile overnight. To prevent loss of efficiency, these refineries would have to find crude oil with the same profile, which is difficult for Urals.

We expect oil prices to rise to USD 200 per barrel in the event of a European combined embargo on Russian gas and oil (see Figure 9). **In case of an embargo on Russian oil only (excluding gas), we expect gas prices to spike to more than USD 170 per barrel (see box 1).** This is still a substantial rise from current levels, given that oil prices barely budged since news on an European boycott broke. However, there are many reasons to believe the current price levels might not reflect levels of tightness on the oil market properly. For one, Brent prices have stabilized over lower demand in China due to renewed lockdowns in e.g. Shanghai. These effects are temporary and the tightness will become increasingly obvious as we enter the high-demand summer months and driving season in the West. More importantly, underneath the relatively smooth surface of the crude oil prices, there is much more dynamics at play. For example, there is no spare refining capacity to process crude into finished fuels. Already, wide spread diesel shortages have been reported and diesel prices have surged far higher than Brent oil prices, when converted into Brent

oil equivalent price levels (see Figure 11). As it stands, the market for finished fuels is tighter than that of crude oil and this dynamic is likely to drag crude oil prices higher over time and as refining margins normalize.

Figure 11: Widening spread between diesel and crude



Source: Bloomberg, RaboResearch

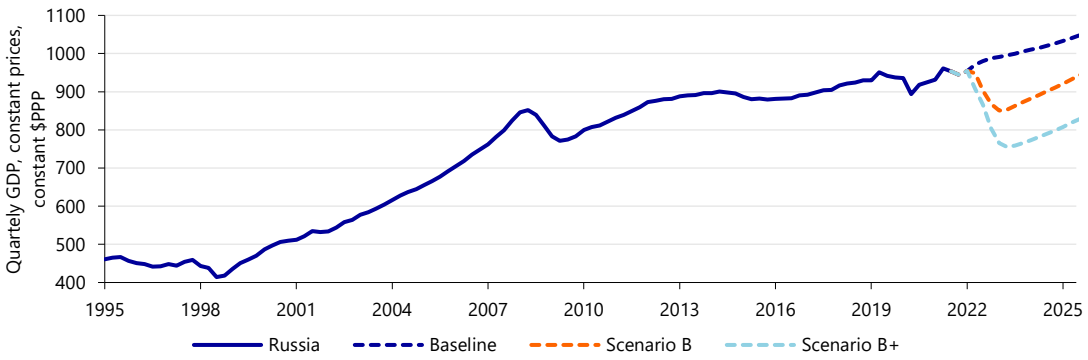
Results

Turning to the results of our scenario analysis. The impact on GDP depends heavily on the severity of the sanctions imposed on Russia. In scenario B, where parts of Russia's commodity exports are still exempt, the impact on growth is milder than in the situation where all trade between Russia and the West ceases, i.e. Scenario B+. In Scenario B, we see global GDP growth dropping to 3.2 percent in 2022 and to 2.3 percent in 2023 compared to 4.2 percent and 3.1 percent in our baseline. In Scenario B+, global GDP growth would drop more heavily to 2.4 percent in 2022 and 1.0 percent in 2023.

Russia would suffer the most

In Scenario B+, Russia's GDP would drop well below levels observed during the Global Financial Crisis (GFC) (Figure 12). A full ban on Russian energy by the West would see Russia's exports drop significantly. Russian industry exposed to the West would also face difficulties given a lack of inputs. The Russian economy would experience twice as much pain in case of a full-fledged boycott of Russian fossil fuels (GDP contraction of 21 percent) compared to a European sanction package excluding oil and gas (GDP contraction of 11 percent). This boils down to economic losses for the Russian economy (against our baseline scenario) over two years ranging between USD 750 billion (scenario B) and USD 1300 billion (scenario B+).

Figure 12: Russian economy contracts by 11% (Scenario B) to 21% (Scenario B+) versus pre-war level



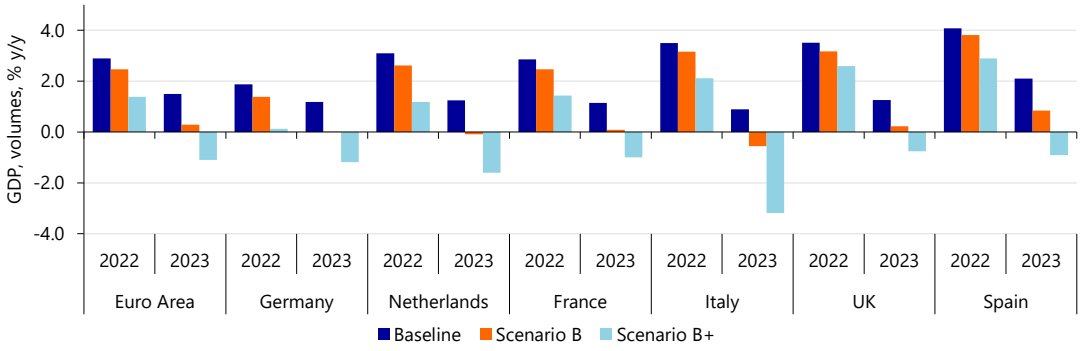
Source: OECD, RaboResearch

In a scenario where only oil is banned by Europe, we expect economic losses for Russia to be closer to scenario B than scenario B+, as Russia will be able to sell at a discount some of its oil previously intended for Europe to countries that have not joined the sanctions, i.e. India and China. Still, those countries may be wary of scrutiny from the US if they decided to ramp up their oil imports or shift their purchases to Russian oil.

Europe enters four-quarter recession in B+

Europe will also feel a significant amount of economic pain in case of further steps in banning fossil fuels (see Figure 13). In Scenario B, the euro zone economy would stagnate between Q3 2022 and Q2 2023. In Scenario B+, the Euro Area would enter a four-quarter recession with an accumulated GDP contraction of 2.6 percentage points. Obviously, a phased introduction of a fossil fuels import ban would likely lead to a later staring point or a slightly more gradual impact, but in cumulative terms it would be similar.

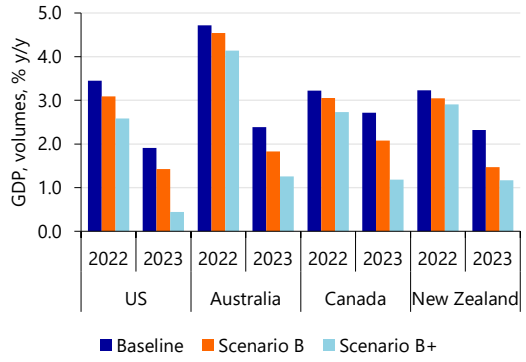
Figure 13: Severe recession in Europe under total Russian energy import ban



Source: OECD, RaboResearch

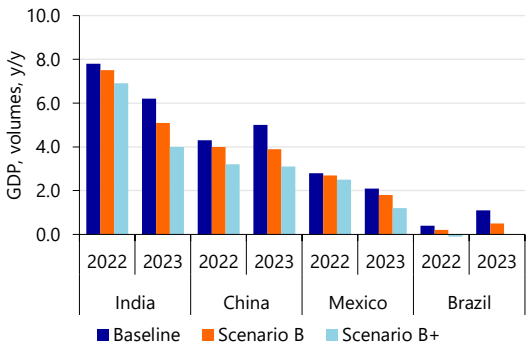
Energy rationing on the back of a ban on Russian energy would force industry to scale back production. European countries that are relatively less dependent on (Russian) energy imports, such as France and the UK, would experience smaller losses in GDP. Countries relatively exposed to Russian energy imports, such as Italy, and relatively open economies, e.g. the Netherlands, would be affected to a larger extent.

Figure 14: Non-European countries will fare better



Source: OECD, RaboResearch

Figure 15: GDP growth in emerging markets



Source: OECD, RaboResearch

Other non-European economies will likely fare better (see Figures 14 and 15). Some of them rely less on energy imports and produce large quantities of commodities domestically, e.g. Australia, Brazil, the US, Canada, and Mexico. Countries that have not joined the West in sanctioning Russia, e.g. China and India, will feel the pinch from higher commodity prices, but at the same time, they would be able to mitigate the negative impact by importing oil formerly exported to Europe at a discount (again with the caveat that if they did on a large scale this would likely draw criticism

from the West). Most of the countries outside Europe will likely escape a recession in Scenario B, as well as Scenario B+. We expect the US to face a small recession in Scenario B+ and Brazil would enter a recession under both scenarios. However, it must be said that Brazil already suffers from low growth in our baseline.

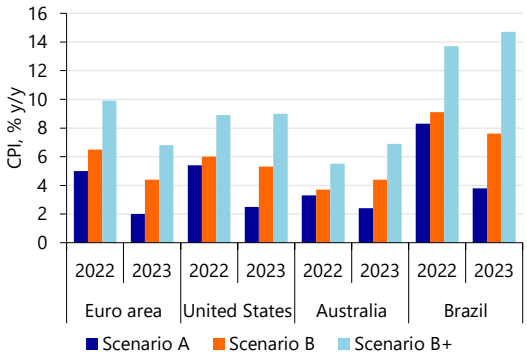
Surge in inflation weighs on growth

Sanctions on Russia and physical constraints on the Ukrainian F&A production will push producer and consumer prices higher (Figure 16). By how much will depend on the severity of the sanctions and on the disruptions to and uncertainty in global commodity markets. Producers faced with higher input prices will increasingly feel pressure to pass on their higher input prices to consumers. In scenario B+, Eurozone inflation could increase to roughly 10 percent in 2022 and 7 percent in 2023. An European ban on solely Russian oil would likely have a much more limited impact on inflation, though.

Other countries will also experience higher inflation, as higher prices of key inputs like energy, metals, and agricultural commodities will feed into prices of imported goods. Inflation expectations tend to de-anchor relatively more easily in developing economies. Inflation is therefore to expected to rise steeply in countries like Brazil and India.

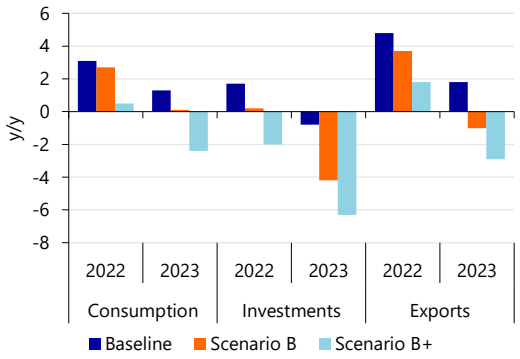
Substantially higher inflation will in turn put a brake on the consumption-led recovery from the pandemic (see Figure 17 for the expenditures components of euro area GDP growth). Households will be faced with significant purchasing power losses as a result of rapidly increasing consumer prices (Figure 17). Moreover, declining growth may eventually push unemployment up, reducing total labor income. Labor markets across the West are currently tight, which does put a lid on the rise in unemployment. Private investment growth will also be held back by an uncertain economic outlook, elevated risk premia, and higher interest rates. We expect private investment growth to hold up relatively better in countries that might be able to provide short-term alternatives for Russian energy, e.g. the US, and the Middle East.

Figure 16: Consumer prices rise across the globe



Source: OECD, RaboResearch

Figure 17: GDP expenditure components EZ



Source: OECD, RaboResearch

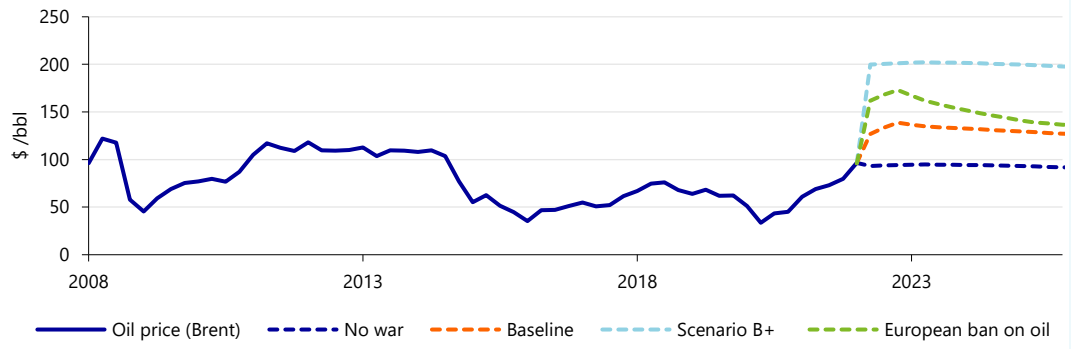
Global trade disrupted

The prospects for global trade will also deteriorate as energy sanctions on Russia become more forceful. The share of Russia and Ukraine in world trade is relatively small, but they are important exporters of key inputs, and supply may not be sourced easily from elsewhere. A lack of crucial inputs can have serious knock-on effects further down the value chain. In any case, higher input prices and elevated uncertainty reduces aggregate demand, including foreign goods and services. Finally, energy rationing and potential production stops in Europe will also be felt by its trade partners. Our analysis shows world trade may only grow by 2.6 percent in 2022 and 0.6 percent in 2023 in Scenario B+ compared to 5.2 percent in 2022 and 4.3 percent in 2023 in our baseline scenario.

Box 1: EU embargo on Russian oil exports

The European Union is clearly pushing ahead with a ban on Russian oil, which should come into effect in late 2022. At the same time, Russian gas import will likely be left untouched for now. In order to gauge the potential impact of a ban on solely Russian oil, we performed an extra run of scenario B. In this scenario, we assume that only oil prices will increase to more than 170 USD per barrel in the first quarters of the ban (Figure 18). Underlying this path, we assume that Russia will be able to sell 50% of its oil previously shipped to Europe at a discount to countries that have not joined the sanctions, i.e. India and China. This, consequently, results in a short-term challenge to meet lower supply by reducing demand for oil globally by 2,5%. We also assume a larger proportion of this global lower demand for oil should be realized in Europe (roughly 5% lower demand). Using the short- and long-term demand elasticities from Labandeira et al. (2016), we end up with a oil price of roughly 170 USD/bbl in the short term, which trends lower in the medium to longer term.

Figure 18: Oil price peaks at 170 USD/bbl in the short term



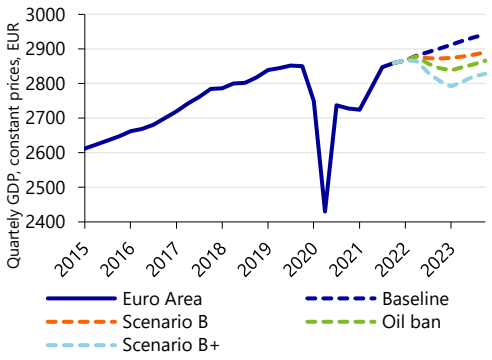
Source: RaboResearch, ICE, Macrobond

However, the oil price in this scenario does not remain elevated. As stressed earlier in this report, the elevated oil price might induce US shale-companies to increase the number of rigs for oil, which ultimately results in higher supply and pushes prices down.

In a scenario where Europe only imposes a ban on Russian oil, unsurprisingly we expect the economic impact on the euro zone economy to end up somewhere between scenario B and scenario B+ (see Figure 19). GDP growth would end up at 2.1% (instead of 2.9% in our current baseline), which still appears to be relatively mild. However, one has to take into account that a substantial part of the euro area economic growth in 2022 will be due to carry-over effects (1.9 percentage points). These carry-over effects are a result of the rapid economic recovery from the corona pandemic in 2021H2.

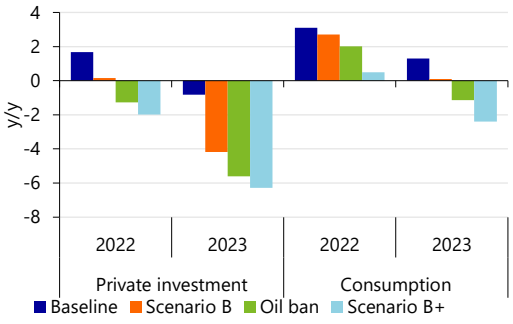
For 2023, we arrive at growth figure of -0.3%, compared to the 1.5% we have pencilled in in our baseline. The adverse impact on GDP moves primarily through lower consumption and private sector investments (Figure 20).

Figure 19: Impact on GDP if EU were to only ban Russian oil



Source: OECD, RaboResearch

Figure 20: Oil ban will negatively affect consumer spending



Source: OECD, RaboResearch

Conclusions

At the current juncture, Europe is facing a tremendously difficult decision: continue to buy Russian gas and oil, thereby supporting Russia's war against Ukraine, or stop buying Russian gas and oil, with considerable self-inflicted economic pain.

In this report, we show that the Russian economy would face a much larger hit in case of an 'Iran'-like isolation (GDP would contract by 21 percent up to Q2 2023) compared to a scenario where Russian fossil fuels are excluded from EU sanction packages (expected GDP contraction of 11 percent up to Q1 2023).

Given that Russia (in 2020/2021) earned almost four times more from oil exports to Europe than from gas, and given that an oil embargo is easier to cope with, both technically and economically, such a step would be the most logical by the EU. Indeed, that scenario seems to be materialising as this scenario study goes to press.

Our calculations also show that the negative economic impact on the European economy increases with each additional step the EU takes in banning imports of Russian fossil fuels (Table 1), with a move towards an oil embargo already significantly increasing the odds of a European recession. Timing of the implementation of import bans, its technical aspects (such as limited exemptions) as well as potential offsetting measures introduced by governments could impact these calculations. Hence, they are subject to considerable uncertainty.

But that any import ban would come with considerable economic sacrifice is without dispute. As such, the upcoming months will be the ultimate test case whether Europe is capable to operate as one united bloc.

Table 1: GDP growth euro zone (volumes, % y/y)

Scenario	*2022*	*2023*
Baseline (Q1 2022 Economic Quarterly)	2.9	1.5
Scenario B (weak sanctions on Russian fossil fuels)	2.5	0.3
European oil embargo	2.1	-0.3
Scenario B+ ('Iran-like' isolation of Russia)	1.4	-1.1

Source: RaboResearch, OECD

Appendix: methodology and assumptions

To run our scenario analyses, we again use the macroeconometric trade model NiGEM. We use the same approach as used in the scenario study mentioned earlier. However, we have adopted a few alterations on several parameters to match developments we have seen since the war actually broke out (see Box 2 below). In this appendix, we elaborate on all the assumptions underlying our calculations.

Higher energy prices and production shocks

Higher gas and oil prices will feed into the prices of other consumer goods, which will also increase and thus have adverse consequences for private consumption. Consumer prices tend to rise more in countries that rely heavily on gas- and oil imports. However, gas and oil exporters could also see substantially higher inflation because they are heavy importers of energy-intensive consumer goods. We have already elaborated extensively on our gas and oil trajectories in different scenarios in the previous section. We use the lower-bound trajectory in our calculations for scenario B+.

On top of higher gas prices, we also impose an additional shock to output. We suspect that substantial price increases need to be accompanied by explicit policy decisions in order to achieve the desired amount rationing. All governments have these types of emergency energy plans on the shelf and Germany has already launched the first steps of its plan. NiGEM does not have the flexibility of modeling such emergency plans. Instead, we keep the economy's energy intensity fixed, and at the same, time ignore any passthrough of higher gas prices into import volumes, thereby obviating all kinds of unrealistic side effects of higher energy prices. Instead, we design our own exogenous shock to industrial output to simulate lower demand for energy, albeit forced by government emergency plans or adopted voluntarily. We use Bruegel's estimate, which conservatively proposes that *"Europe would need to reduce demand by at minimum of 400 TWh"* and set rationing at 400 TWh. This is about 5.6% of the total energy use of European industry (including the UK). We then continue by allocating the energy savings across European states and condition our shock based on a country's energy import dependence. The larger its import dependence, the larger the adverse shock to industrial output. Furthermore, we assume countries that import less than 20 percent of their energy consumption do not have to ration energy.

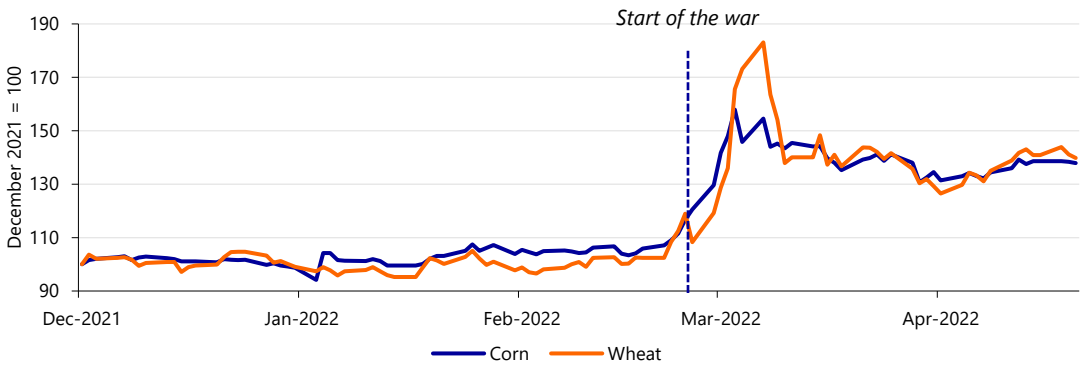
Food prices: wheat, corn, and vegetable oil

Ukraine and Russia combined export 60-70 million tonnes of grains, oilseeds and vegetable oils. The war has severely disrupted that movement, plus called in question each countries production capacity in 2022. This has sent buyers scrambling to find alternative supplies and bid up remaining supplies. As the war has progressed, there are some shipments making their way out of Ukraine and Russia, either by rail out of Ukraine to the Danube countries or Russia shipping vessels out of the Sea of Azov. However, it is a fraction of pre-war volumes.

The EU particularly has a feed grain problem, as Ukrainian corn is a key to balance the EU's feed demand. The EU typically imports heavy volumes of corn to allow it to export wheat to global food import markets, rather than feeding the wheat to domestic EU livestock. Ukraine typically accounts for over half of the EU's imported corn, with the remainder largely arriving from Brazil and Serbia. With the EU largely unable to import US and Argentine corn, the disruption of the flow of grains to the EU will keep EU prices for feed grains supported.

Sunflower oil accounts for roughly 10% of the worlds vegetable oil consumption. The disruption of the Ukrainian crushing and exporting industry is contributing to an already tight global vegetable oil supply/demand situation.

Figure 21: Corn and wheat +40% higher



Source: Macrobond, Euronext, CME Group, RaboResearch

We have revised our food price forecast somewhat. Regardless of what scenario you pick, the war is going to have a long tail. The longer it lasts, the more that uncertainty around planting and harvesting translates into lower production and less supply available for export. When looking at the corn and wheat balance sheets for Ukraine and Russia at various levels of reduced harvested acre levels as compared to history and then applying that to global supply and demand, we can conclude that:

- Stocks tighten up and stocks-to-use (STU) ratios decline;
- To make Russia's and Ukraine's balance sheets 'work', exports have to be decreased significantly. Both Russia and Ukraine will hold on to as much of their production as possible to feed livestock and people.
- Comparing the various outcomes to similar past stock levels, STU ratios and resulting futures prices, the market is trading at a significant price premium versus history. Hence, the price volatility may be more dramatic than just the price appreciation alone.
- In the case of the US, where we applied a modest 200 million bushel increase in wheat and corn exports for the 2022/23 crop year, the baseline model showed a 50% increase in the national average producer-received wheat price and a 13% in the corresponding corn price.

Ultimately we assume that wheat will continue to face a 45% price increase vis-à-vis January levels under Scenario B and a 50% price increase under Scenario B+. For corn, we assume an increase of 35% (Scenario B) and 40% under B+. Finally, vegetable oil is expected to continue selling on average at 25% higher prices (B) and 30% (B+) at wholesale markets globally compared to January 2022 levels.

Fertilizers

Broadly speaking, there was a falloff in fertilizer prices between January 1 and the invasion on February 24, which can be partially attributed to seasonality. As such, when you look at prices against January 1, the price action may appear more modest vs. the date of the invasion. The most significant subsequent price action has been on products with direct exposure to Russian production/exports – urea, MAP, and potash – as well as substitutes for these products (TSP and SSP).

Brazil has seen the most price upside post-February 24. This is primarily due to seasonality, net fertilizer import needs, and its exposure to Russian products. It has been forced to bid up, and we currently see abnormal spreads between NOLA and Brazil, such as ~USD 300/short ton on potash, incentivizing greater North American re-exports.

When comparing US price responses to Brazil, consideration should be given to the timing of the invasion, the inventory in the channel, and seasonality more broadly. Europe usually starts its next season fill in July/August. But, it would be logical to assume this time frame may be brought forward if there are concerns about the supply of natural gas in the second half of 2022 or more

broadly about fertilizers in general. Similar to Q4 2021, we may also see a shift in products imported. More precisely, it is highly likely we will see large nitrogen producers in Europe arbitrage between the high natural gas prices and the regional price of ammonia, choosing to import more ammonia into Europe to upgrade into finished product, or rely more on importing finished product. As long as the conflict persists, opacity around trade flows is likely to increase risk and volatility. As we have seen in the last ten days, markets could sell off in the search of news or in pockets of the absence of demand as buyers look for clarity. But these windows could be short lived, simply adding to the broader tapestry of market volatility.

Ultimately, we expect fertilizer prices to be 15% above January levels in Scenario B and 30% in Scenario B+.

Trade

The sanctions directly result in distorted trade between Russia, occupied Ukraine, and Belarus and the rest of the world. Trade between China and Russia will likely benefit from the current situation, whereas trade between Russia and the West will be severely affected. In Scenario B, we assume all non-vital exports from Russia to the West cease for the foreseeable future. Furthermore, we assume energy and commodity exports from Russia to individual Western countries will drop by 50 percent compared to pre-war levels, which is partly based on voluntary withdrawal of activities by the private sector from Russian oil-related economic activities. Essential goods are: energy, cereals, animal fats, fertilizers, aluminum, oil seeds, nickel and palladium.

We have set Russian energy imports to zero for countries that already announced a ban on Russian energy imports, such as the US and Canada. At the same time, we assume 25 percent of Western exports to Russia will continue. Furthermore, we assume 50 percent of Ukrainian non-essential exports to the world can continue. Essential products such as food will no longer be exported. Ukrainian exports will drop to 30 percent of pre-war levels.

In Scenario B+, we adopt a full-fledged 'Iran-like' isolation of Russia, Belarus, and occupied Ukraine, meaning Russia no longer exports vital energy- and other commodities to all Western countries.

Risk and country risk premia

To reflect financial market turbulence and investor uncertainty, we raise risk premia in several countries. These shocks are in addition to rising long-term rates which, in contrast to our previous scenario study, have been endogenized this time (see again Box 2).

We use the global investment premium increases seen over the past couple of weeks as our point of reference, and we add 56bps in Scenario B and 80bps in Scenario B+. We diversify the investment premium shocks across countries, as not all countries are hit equally. To simplify which countries would be hit and by how much, we focus on the direct macroeconomic impact of energy prices as a standardized measure, as well as the exposure to Russian energy imports. Methodologically:

- Countries that are net energy exporters do not face a higher investment premium.
- For the remaining countries, we look at:
  a. the share of energy imports within total imports
  b. the share of Russian energy within energy imports

Of course, there can be other financial risk transmissions. However, we believe this energy metric speaks best to the most powerful, immediate economic and financial shock that would be delivered globally.

For Russia, the investment premium increases by 600bps, more or less comparable to the increases that heavily impacted countries experienced during the GFC. Moreover, we assume the

Russian government will experience extreme difficulty when attempting to borrow on sovereign debt markets and thus have to pay a hefty country risk premium. We upgrade Russia's country risk premium to the one Venezuela faced in 2017. In Scenario B+, we assume Russia is cut off entirely from Western financial markets and increase the investment and country risk premia to infinity.

Box 2: Modelling approach

Compared to the scenario analysis we published just before the war in Ukraine started, we made a couple of adjustments in our modeling approach. All in all, the results for Scenario B remain quite similar to what we reported earlier, albeit a bit more to the downside. In this box we elaborate on some of the changes we made in our modelling approach:

- We switched from *adaptive expectations* to *rational expectations* in NiGEM. With adaptive expectations, predictions of agents are based solely on historical data and will change as soon as new data on economic variables becomes available. With rational expectations, economic agents are assumed to be capable of anticipating future economic effects of adverse shocks. This means the response of rational agents to economic shocks feeds into economic data compared to agents that learn adaptively.
- We endogenize the long-term interest rates, which previously have been fixed. Central bank policy rates are exogenous for the first three years and endogenous thereafter, because the policy rate equation in NiGEM assumes severe rate hikes across countries in response to high inflation, not making a distinction between cost-push inflation and demand-pull inflation. Long-term rates do respond directly, as financial markets anticipate future policy rate increases, something we see happening in OECD countries across the board. Higher long-term interest rates feed into higher user cost of capital and weigh on private investments. We lowered the passthrough of higher rates on the user costs of capital for net exporters of oil and gas (i.e. Australia, Canada, the US, Brazil, the Middle East, Africa, Norway, and Mexico).
- We model financial sanctions imposed by the West on Russia as follows:
  - We imposed a shock to the ruble (to 105 per USD for the coming three quarters in Scenario B and 150 per USD in Scenario B+), which increases Russia's import price
  - Both the country risk and investment premia are increased
  - We impose shocks on Ukraine
  - We model re-routing of oil and gas to China and India, two major economies that have not joined the West in imposing sanctions against Russia
  - We assume no gas that was formerly exported to Europe can be re-exported
  - We assume that 50 percent of the oil can be re-exported to China and India. Seventy percent goes to China, 30 percent to India. We assume China and India can obtain oil at a 30% discount to the world price.
  - We decrease Chinese and Indian import prices. Also, we decrease Russian export prices with the discount and Russian exports to reflect revenue loss of gas and oil exports.

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A summary of the methodology can be found on our website