Box 3. Global supply-side influences on Romania's industry in 2022: several coordinates

In 2022, the world economy was affected by major supply-side influences. In the foreground was the Russo-Ukrainian armed conflict, which not only sent commodity prices on international markets considerably higher, but also triggered a broad reshaping of global supply chains for such products, a process unfolding at a relatively swift pace, yet steadily menaced by supply-side bottlenecks. At the same time, however, there was a gradual easing of disruptions in supply chains of certain non-energy-manufactured inputs (notably electronic products that were in short supply, thus affecting particular industries in 2021), amid the softening pandemic-related restrictions, as well as the flagging global demand. This box aims to summarise the manner in which these influences were reflected in the activity of some domestic industries, while also prompting substantial changes in foreign trade.

The local energy sector in the context of the Russo-Ukrainian conflict

The outbreak of the Russo-Ukrainian war and the European economies' actions to reduce imports from Russia posed challenges in terms of energy supply. Romania has lower energy dependency than the EU average, albeit not negligible, with net imports accounting for about 32 percent of its total available resources in 2021 (Table A). Moreover, before the war broke out, exposure to Russia was high for certain categories of inputs. The adjustment included the reshaping of foreign supplier network, the enlargement of domestic production capacity and the cut in energy consumption. Looking at the external energy balance in 2022, the action of these factors caused a quantitative decline in the deficit, whereas the halt in purchases from Russia (in April for gas, in September for coal and in November for crude oil) did not entail supply-side bottlenecks.

Table A
The energy mix and energy dependence

percent

	2021	2022
Gross resources available, *of which:*	**100.0**	**100.0**
Solid fossil fuels	10.3	10.3
Crude oil	29.5	34.7
Imported petroleum products	11.9	9.5
Natural gas	29.8	28.0
Imported renewable sources, nuclear energy, electricity	16.8	16.2
Energy dependence*	**31.6**	**n.a.**
Higher rank coal	89.1	85.5
Crude oil	67.6	74.7
Petroleum products	-5.0	-12.7
Natural gas	23.5	18.5

*) net imports/domestic consumption; negative readings refer to net exporters

Source: NIS, Eurostat, NBR calculations

The breakdown shows that the natural gas, diesel and solid fossil fuels segments (Table B) were highly vulnerable to commodity imports from Russia. In this context, the authorities had to take steps to capitalise on local resources for addressing the supply disruption either over a short horizon (for example, by raising the coal mining capacity at Oltenia Power Complex in 2022, a decision that was abandoned a year later) or over the longer term (by starting gas extraction from the Black Sea platform[1] following the amendment of the Offshore Act in May 2022). Furthermore, trade in

[1] Midia Gas Development project (Black Sea Oil & Gas).

Table B
Fossil fuel imports from Russia (as a share in total imports)

	2021	2022
Solid fossil fuels*	94.5	58.5
Crude oil and petroleum products	33.1	30.3
Crude oil	26.6	26.4
Petroleum products	36.3	41.4
– petrol	0.0	0.0
– diesel	58.5	62.0
Natural gas	77.4	12.8

*) pit coal and lignite (if coke is included, the share falls to 65.3 percent in 2021 and 41.2 percent in 2022)

Source: Eurostat

solid fuels with long-standing partners such as Poland and Italy gained momentum and new agreements were signed with coal producers from Kazakhstan, Colombia, South Africa.

The option to diversify the network of external suppliers also applied to crude oil imports. Specifically, adding to the portfolio of former suppliers, chiefly Kazakhstan, Azerbaijan and Iraq, were Norway and Saudi Arabia towards the end of 2022, ahead of the entry into force of the EU decision to ban imports of Russian seaborne oil on 5 December 2022. As for petroleum products, Romania is, traditionally, a net exporter[2] on the entire segment, but its dependence on diesel imports is substantial, and Russia is a significant supplier thereof. Hence, direct purchases from Russia were lower in 2022 Q4 (their share in total imports fell below 50 percent, from 67 percent in the first nine months of 2022), also in the light of the EU's decision to prohibit the maritime transport of Russian petroleum products from 5 February 2023. In addition, a number of partners such as India, Bulgaria, Italy and Türkiye widened their share on the local market, yet, in some cases, there are products using Russian crude oil.

The impact of costlier energy commodities on several domestic industries

The key industries affected by the upturn in international energy prices were the energy-intensive ones, especially chemicals and metallurgy. At EU-27 level (2020), production in these segments shed 6 percent and 4 percent respectively in 2022, but in Romania declines were much stronger (-22 percent and -15 percent respectively).

Given the sizeable energy shock (producer prices for the domestic energy market surged 123 percent in 2022, placing Romania second in the EU) and strong vulnerability, and considering the relatively high energy intensity of local industries among European countries – third place for chemicals and first place for metallurgy[3], cost control to contain production declines became particularly important. The rather low unit value of exports for both industries at European level – ranking around 19 in recent years[4] – also supports the idea of preserving price/cost competitiveness as a prerequisite for a favourable (or at least not very unfavourable) path of energy-intensive industries. However, the real effective exchange rate by

[2] In recent years, negative trade balances have been recorded only occasionally (in July-October 2021 and March 2022), amid a number of shocks (an accident at the main local refinery, the outbreak of the war in Ukraine).

[3] The indicator is calculated on the basis of the input-output table for 2019 as the ratio between the consumption of products under NACE divisions 19 and 35 and total intermediate consumption. When using GVA as a denominator, Romania ranks 4th (chemicals). The ranking does not include Bulgaria, Ireland, Lithuania, Luxembourg and Malta (incomplete data series). Source: Eurostat.

[4] In an EU-27 ranking (2020) that excludes Cyprus and Malta.

sub-sector[5] shows large appreciations, in particular for chemicals (13 percent in 2022, the highest value for the EU Member States included in the sample).

Energy costs made a significant contribution thereto – in 2022 H2, companies' bills surged in annual terms. For natural gas, prices rose 2.7 times (and even more for large consumers, i.e. 3.2 times), their level exceeding the European average by over 44 percent; for electricity, prices for non-household customers increased 2.4 times (1.9 times for large consumers), also above the European average (by 44 percent and 11 percent respectively). These developments probably also reflect the fact that the authorities are more willing to support households, rather than the big industrial consumers, the latter generally leading the way at sector level – both chemicals and metallurgy industries are concentrated business sectors, as the companies with more than 250 employees account for 57 percent and 78 percent respectively of total turnover.

Similarly, labour force developments did not allow for less pronounced cost hikes. The large production declines were not matched by the attendant staff cuts – in the chemical industry, the number of employees dropped by only 1 percent, whereas in metallurgy it even grew by 3.9 percent. The latter suggests that some businesses were, however, able to seize the opportunities arising during the year, such as the buoyant construction activity locally or the high demand for tubes, pipes and hollow profiles at European level. Moreover, wages increased markedly, by 21.4 percent and 12.8 percent respectively, so that both sectors reported significant labour productivity losses and changes in unit labour costs that were three times higher than the EU-27 average.

In turn, the output breakdown appears to somewhat explain the larger contraction of the domestic energy intensive sector, at least in the case of chemicals, which in 2022 was characterised by extremely fragile worldwide developments in the manufacture of basic chemicals[6] (NACE group 20.1), while the manufacture of pesticides and other agrochemical products, as well as of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations (20.2 and 20.4) fared much better. This pattern was visible both across the EU and in most countries with reporting at group level[7]. Eurostat data (Prodcom) show that countries such as France, Italy, Greece, Bulgaria or Poland, whose production is more oriented towards the latter two groups, were at an advantage from this perspective[8], and the dynamics of the industry as a whole were much more favourable than those recorded locally – the former three economies saw declines in chemicals production by only 3-4 percent, while the latter two posted increases of 8-9 percent.

5 The indicator is calculated on the basis of industrial producer price indices in the following trade partners: Japan, USA, Türkiye, UK, Switzerland, China, Brazil, Norway and EU-27 states (2020) less Slovakia, Luxembourg, Malta, and Cyprus. The indicator for metallurgy excludes Estonia.

6 Manufacture of basic chemicals, fertilisers and nitrogen compounds, plastics and synthetic rubber in primary forms.

7 Germany, France, Italy, Spain, Greece and Lithuania.

8 The image provided by Prodcom data may be affected by the confidentiality of records for certain products, but errors most likely do not change the overall picture.

The grim picture painted by the two local industries amid the challenging environment of 2022, translating into competitiveness losses and a wider trade deficit (due to the decrease in exports and the increase in imports), was recorded against an already relatively vulnerable background, especially in the chemical industry, where investment (expressed as a share of total investment in manufacturing) reverted to lower levels in 2016-2021 (around 3 percent) as compared to the 2010-2015 period (4.5 percent). Nonetheless, after posting a very low level in 2019 (a record low for the 2005-2021 period), investment rebounded somewhat in 2020, possibly amid the outbreak of the COVID-19 pandemic, which fuelled demand for certain chemical products, and improved further in 2021. Meanwhile, over the past 10-15 years, metallurgy benefited from relatively favourable conditions: investment stood at 5.9 percent in 2010-2015 and at 5.6 percent in 2016-2021. The latter period bore the hallmark of digitalisation concerns, a sizeable percentage of investment targeting software purchases.

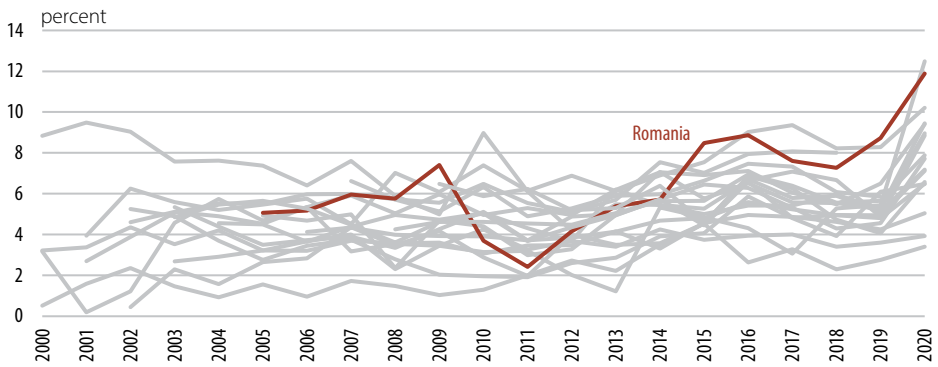

Chart A
Operating profit rate in the chemical industry (median)

Note: The figures refer to: Belgium, Croatia, Czechia, Denmark, Finland, France, Germany, Hungary, Italy, Lithuania, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and Switzerland. Data cover companies with 20 or more employees.

Source: CompNet dataset, 9th vintage

Given that corporate financing hinges largely on own resources[9], a possible explanation for the relatively subdued advance of investment in the chemical industry in recent years was the performance of profitability. Indeed, the ratio of gross operating surplus to turnover decreased in the 2016-2020 period compared to the 2010-2015 period, from 13.2 percent to 7 percent (the decline was lower in metallurgy, i.e. from 6.9 percent to 5.1 percent)[10]. For the last one-and-a-half decades, the two sectors saw mixed developments: large swings in energy prices (and an increasingly strong impact on financial performance once with the deregulation of the domestic energy market for non-household consumers), an EU legislative framework requiring large energy-intensive consumers to implement energy efficiency measures (sometimes with a negative impact on activity, according to market signals) and fierce external competition. However, judging by the distribution of the companies' operating result, profitability of the chemical industry is in line with that at European level[11], with an upward, albeit volatile, path

9 According to the NBR *Survey on the access to finance of the non-financial corporations in Romania*, June 2021.

10 Based on the Eurostat's Structural Business Statistics data.

11 According to CompNet dataset (9th vintage), information on the median of operating profit distribution.

in the 2011-2020 period. This suggests that chemical manufacturers with better results may not have had the necessary capacity to improve the financial situation of the sector as a whole, hinting at the need to reallocate resources in the field as smoothly as possible, with a view to harnessing the current potential (Chart A).

Another energy-intensive sub-sector is the manufacture of other non-metallic mineral products, but its performance in 2022 was different from that of the chemical and metallurgy industries, with production shedding only 2.3 percent. One explanation refers to the clearly smaller impact of higher international prices, given the still lower energy intensity (approximately 28 percent), while investment has thrived in recent years. Another factor was that firms could pass through to prices part of the increase in costs, amid the authorities' support to construction firms, i.e. compensating the higher prices of materials used in developing public investment projects. This support measure was also motivated by the approaching end of the absorption cycle for EU funds under the 2014-2020 multiannual financial framework, which called for ensuring an adequate pace of construction works. In addition, this sector is generally more focused on the domestic market, with the ratio of foreign trade transactions to local production being steadily lower in the non-metallic mineral products industry than in other manufacturing sub-sectors on a sample of 66 economies[12]. Hence, the large excess domestic demand was reflected accordingly in the activity of local firms.

Gradual easing of disruptions in supply chains of manufactured non-energy inputs

In 2022, global production and trade were also influenced by the improved flows of supply of electronic products and other manufactured inputs, which were, however, affected by bottlenecks: two lockdown episodes in China in spring and autumn, as well as the outbreak of the war in Ukraine. The trend took shape amid the gradual slowdown in international demand for goods (subsequent to the substantial recovery that followed the first pandemic wave) and the easing of pandemic restrictions on supply.

The easing of supply bottlenecks boosted foreign trade in goods during 2022 H1, with companies taking advantage of the favourable context to cut backlogs and replenish stocks. Supply flows continued to improve in 2022 H2 as well (in terms of transportation costs and delivery times), but trade ties then became less intense, given that the bout of inflation took a heavier toll on global demand for goods. Furthermore, the latter was also affected by the reversal of the goods/services substitution effect first seen during the pandemic, with the substantial easing of mobility restrictions in 2022 favouring the consumers' shift to services (accommodation and food service activities and leisure activities in particular). A possible contribution came from inventories, which rose above the required level in 2022 H1 – expectations about the persistently robust dynamics of consumer demand proved overly optimistic, on the one hand, and the supply chain difficulties experienced in recent years brought about oversized orders (the so-called "bullwhip effect"), on the other hand.

[12] Source: OECD – TiVA, data for 2018.

In the case of Romania, the effects exerted by the easing of disruptions in the supply chains of non-energy manufactured inputs were most visible in three sub-sectors, i.e. the manufacture of motor vehicles, electronic products and electrical equipment, thereby affecting exports and imports. For example, the improvement in the global supply of semiconductors made it possible to fill external back orders. Special mention deserves the 23 percent increase in the volume of motor vehicle exports and the larger exports of goods used as inputs in partner economies, such as electronic components and peripheral equipment (+85 percent), electric motors and cables (+8 percent), automotive parts (+5 percent).

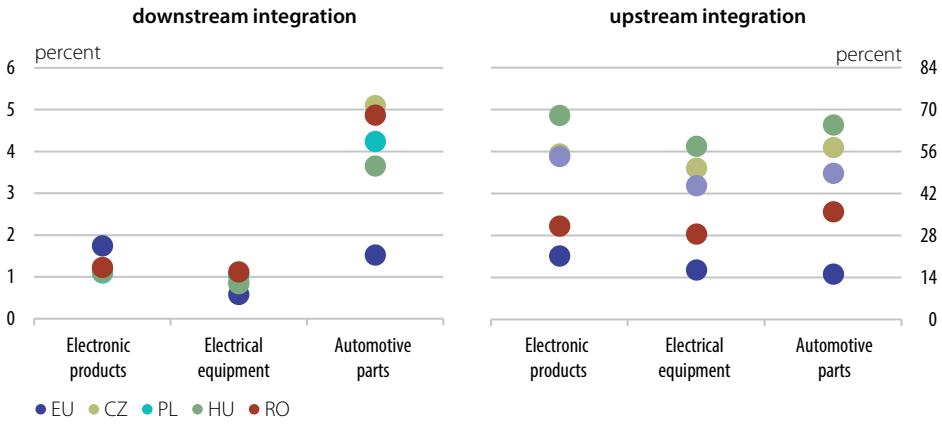

Chart B
Integration into global supply chains (several examples)

Note: Data for 2018.
Source: OECD – TiVA, data for 2021

As for exports of intermediate goods, the global recovery of the three sub-sectors exerted significant traction on Romania's total exports (similar to that seen in Czechia and more pronounced than in the case of Hungary or Poland). The conclusion is suggested by an OECD-designed "downstream integration" measure, according to which 7.2 percent of Romanian and Czech exports are incorporated into global exports of electronic products, electrical equipment and automotive parts, whereas the shares of their peers are 5.6 percent and 6.4 percent respectively[25] (Chart B).

Conversely, stepped-up activity of domestic companies in this ecosystem entailed additional imports of chemical products and base metals, rubber and plastic products, as well as of inputs specific to those sub-sectors[13]. In fact, compared to the economy-wide average, the production of electronic/electrical/automotive equipment is characterised by a high level of "upstream integration" in global value-added networks, with exports having an import content of between 29 percent and 36 percent[25].

Concluding remarks

Prices of commodities, especially those of energy, rose significantly in 2022. At the same time, the structure of global energy supply chains changed following the

[13] According to the symmetric input-output table for 2015 (Source: Eurostat).

outbreak of the war in Ukraine and the sanctions imposed on Russia. The local response to the new environment included the reshaping of foreign supplier network, heftier recourse to domestic energy resources, as well as lower consumption, driven *inter alia* by a notable reduction in the activity of energy-intensive sectors such as chemicals and metallurgy. These developments emerged amid the boom in production costs, given the strong link between price/cost competitiveness and the pursuit of business. Moreover, the authorities prioritised households, granting them support to pay energy bills, while firms did not take steps to keep labour costs under control, assessing probably that the shock would only be short-lived and the effort to hire new staff in the future on a still structurally weak labour market outstrips the current disadvantages. At the same time, 2022 saw an improvement in the functioning of global production chains, echoing in Romania's foreign trade operations, given the significant degree of integration of the domestic economy.