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COVID-19 Crisis and Supply Side Bottlenecks in the EU. Shorter and Longer Term Prospects

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ABSTRACT

The COVID-19 shock affected the global economy mainly through the collapse of demand, labour supply and industrial output, supply chains, commodity prices, international trade and capital flows. From the second half of 2020, various bottlenecks (logistical disruptions; shortages of raw materials and parts) in the EU economy have had a growing impact on growth. Following the recurrent pandemic shocks, the war shock has caused further severe supply-side disruptions from February 2022 onwards, in particular in raw materials markets (including energy sources and agricultural raw materials) and international logistics. Supply shortages in the EU have not only a one-off but also a ripple effect throughout the economy. Spill-over effects across Member States are of great importance. Together, the shortages of production inputs can have a significant negative impact on output and the recovery of the economy. At the same time, supply-side shocks can have a significant impact on the restructuring of supply chains, the deepening of green and digital transformation, and productivity growth.

INTRODUCTION

This paper highlights the main supply-side effects of the COVID-19 crisis in the EU economy. Based on a systematic analysis of the main mechanisms of the COVID-19 crisis, it focuses on the impact of supply-side bottlenecks (raw materials, maritime transport, microprocessor supply) during the crisis. In addition to an EU-wide overview, it presents a case study of a new Member State, a small open market economy. Investigating the impacts of bottlenecks on the EU economy requires the analysis of cross-sectional data in the Business and Consumer Surveys. In addition, the cross-sectoral and cross-country spillovers can be examined in terms of input-output relationships. This is followed by a case study of the main supply-side bottlenecks in the Hungarian economy.

These present a comprehensive picture of the supply-side effects of the COVID-19 crisis in the EU economy, which can also provide key lessons for the main economic policy challenges in the post-COVID period. These effects have been exacerbated by the shock of war from February 2022¹.

1. FUNDAMENTALS OF COVID-19 ECONOMICS IN THE EU ECONOMY. LITERATURE REVIEW

The next chapter first summarises the basic literature on the main economic mechanisms of the COVID-19 crisis. The main question is: how, through what mechanisms, has the COVID-19 shock exerted its effects? This brief systematic analysis can provide a basis for outlining the economic policy options for recovery.

1.1 Mechanism of the COVID-19 crisis

As a huge *external shock*, the COVID-19 crisis led to a deep recession in the global and European economies. The pandemic had economic spillovers. The global shock had a strong impact on emerging as well as on developed economies.

The COVID-19 shock affected the global economy mainly through the collapse of demand, labour supply and industrial output, supply chains, commodity prices, international trade and capital flows. (See Halmai, 2021) The recovery in 2021 was limited, as the collapse of some global value chains caused by the pandemic has long-lasting effects. This painted a gloomy picture of the EU and the euro area export markets at the beginning of the crisis.

The economic activity in the EU and the euro area were hit by a variety of shocks. These led to a sharp decline in private consumption and investment at the onset of the crisis. Extreme downward and upward trends seemed both possible. This depends to a large extent on the effectiveness of economic policy responses. However, the downturn could cause long-term economic damage.

The main transmission channels of the COVID-19 crisis were: (a) supply shock - the collapse of supply chains and (b) demand shock - a sharp decline in consumption and investment demand, with spill-over effects in the sectors concerned. These shocks were mixed with many additional ones: (a) liquidity shocks, (b) uncertainty shock, (c) financial sector shock.

Unlike the financial crisis, the COVID-19 crisis immediately caused a shock in the real sector: a fall in production and income. These shocks are definitely global. Disaggregating the impacts of shocks is a very difficult task in economics. The main impacts can be grouped in the following order.

- *Increased uncertainty.* The pandemic and the large number of unknown factors created considerable uncertainty for businesses and consumers. These had a significant impact on spending and savings decisions (e.g. precautionary savings), as well as on recruitment and investments².
- *Decrease in labour supply.* Strict containment measures necessarily led to a decline in available labour force. The labour supply was also fundamentally affected by changes in people's health and the need to care for family members in changing circumstances.
- *Collapse of sectors, supply shocks.* Certain sectors (e.g. tourism, air transport), regions and countries were particularly hit hard by distancing and forced restrictive measures. In some sectors (e.g. car manufacturing), disruptions and breaks in global supply chains caused major problems and significant downtime losses. (See Chapter 3 for more details.)

Wider economic crashes. Depending on their severity and duration, the restrictive measures, in some of the more severe cases, put pressure on the whole economy.

¹ The supply-side effects of the war shock are currently subject to ongoing research and therefore cannot be addressed in this paper.

² See Leduc - Liu (2016), Baker et al. (2020).

- *Income losses, forced savings, lack of demand.* Many employed people and households suffered significant income losses. High precautionary savings also have a demand impact³.
- *Liquidity shocks, financial market consequences.* The immediate response of economic agents to the spread of the coronavirus was a sudden repricing of financial and real estate assets and the use of liquidity reserves. Growing market and sectoral difficulties had deep impacts on companies' financial situation and profit outlook. (E.g. liquidity shocks due to cash-flows.) This led to a sharp fall in equity prices and a decrease in safe government bond yields. Companies' liquidity and solvency problems can cause serious disruptions in the financial system. Some of these effects are heterogeneous (country-specific). They often depend on the state of public finances and the ability of the state to bail out otherwise healthy companies that have been hit by shocks. The situation of the banking sector and the specific economic structure (e.g. the size of the tourism sector) of each Member State add to the risk of structural divergence. This could result in a weakened and fragmented EU single market.

A wide range of *economic policy measures* are taken to reduce the impact of the pandemic. The main objectives are:

- *Direct treatment of health problems.* To this end, strict and sometimes drastic measures (lockdowns, social distancing, etc.) were adopted.
- *Mitigating the economic impact of revenue, income and soaring liquidity.* Central banks, governments and the EU all provided support. An unprecedented mix of measures was announced and implemented. The fiscal policy measures imposed by the Member States included discretionary policies with a direct impact on budgetary expenditure as well as liquidity-oriented measures. The former can cover targeted tax cuts, shortened work schemes and partial or full public bank loan guarantees. These measures are aimed at mitigating the effects of employment losses, avoiding a massive shut-down of investments, as well as bankruptcy spillovers and damage.
- *Public support for recovery.* The ability to respond depends on the countries' initial conditions, financial strength and the political space. COVID-19 had a serious impact on some countries without a fiscal space to respond. Differences in national responses can cause asymmetric disparities. This can spill over because of the strong interdependence between the Member States. They could weaken the EU's overall recovery and lead to economic divergence in the future. There is an essential need for an adequate level of intervention at EU level.

It should be highlighted that COVID-19 caused a global shock, simultaneously affecting the external environment with consequences across regions. Just like the global financial crisis, this shock hit various countries and regions around the world. This has and will have consequences for the severity of shocks to the EU economy. (E.g. through foreign inputs that may be missing, or through lower demand for EU exports.) As the exposure to the external environment varies from country to country, additional country-specific characteristics may emerge.

The economic effect of COVID-19 is highly complex and varies widely (See Barro et al., 2020; Boissay et al., 2020; Huszka et al., 2022). Economic impacts affect supply and demand differently in different time dimensions. The duration of the effects depends on the length of the pandemic as well as on other factors: trade policies, globalisation attitudes, consumer behaviour, working methods and production chains are stabilised. The accumulation of debt during the recession has a lasting impact on companies, investors' risk perceptions and the banking sector (non-performing loan ratio). Pre-existing economic conditions and the impact of the pandemic may prolong some effects.

³ See e. g. Dossche- Zlatanos (2020), Davenport et al. (2020), Christensen et al. (2020).

1.2 Recovery and economic policy. Rebound optimism

The downturn caused by the pandemic marked an enormous and sudden change. It can be described as an extraordinary event because the deliberate reduction in economic performance came from public health considerations, rather than the accumulation of cyclical surpluses. This situation provided central banks and fiscal authorities with opportunities that they did not have in an average recession. At the same time, this also posed challenges in terms of the most effective policy instruments. E.g. what measures can be effective in supporting aggregate demand in the face of supply-side constraints and containment measures; what measures can help to maintain supply capacity, etc.

The recovery did not depend on an adjustment phase that first had to correct the previous cycle or structural surpluses. There were high hopes that the recovery could start sooner than in a typical recession. After lifting the containment measures (“hibernation”), “warming up”, together with a certain level of “rebound optimism”, seemed less difficult.

During the first wave of the pandemic, there were very optimistic expectations of a rapid recovery and fast growth in the period that followed. Yet the recent waves of COVID-19 have resulted in *a series of permanent shocks*. The recovery is underway, but the increase varies from one Member State to another and is not necessarily linear. It is becoming increasingly clear that *boosting the aggregate demand is no substitute for effective supply-side policies*.

At the same time, from the second half of 2020, the various bottlenecks in the EU economy have had a growing impact on growth. The supply side has more and more become the focus of attention.

2. SUPPLY-SIDE BOTTLENECKS IN THE EU ECONOMY

An exceptionally rapid recovery in global demand in the second half of 2020 met a supply weakened by the restrictive measures introduced to contain the spread of the pandemic. This affected several key sectors including global logistics, raw material production and microprocessor manufacturing. A series of natural disasters, lockdown measures due to the pandemic as well as emerging labour shortages in different sectors and regions continued to cause major supply-side problems throughout the second half of 2020 and in 2021.

Consequently, various bottlenecks have emerged at a global level from the second half of 2020. They fundamentally affect the smooth operation of global supply chains, having a growing impact on sentiment and growth into 2021. These main bottlenecks include: (a) logistic disruptions in the transport sectors, especially in container shipping, a key channel for growing merchandise trade in the post-lockdown reopening; (b) production of microprocessors, a highly cyclical industry, which faced with capacity constraints and an increase in orders; (c) raw materials: metals, wood, energy (e.g. natural gas and other energy sources, where a sharp increase in demand, coupled with supply disruptions, was accompanied by very strong price hikes), agricultural raw materials, foods.

These characterise the three main types of bottlenecks. To carry out a more in-depth analysis of their impacts on the EU economy, cross-sectional data in the Business and Consumer Surveys (BCS) can play a central role. In addition, the cross-sectoral and cross-country spillovers can be investigated in terms of input-output relationships. This is followed by a case study of the main supply-side bottlenecks in the Hungarian economy.

Following the recurrent pandemic shocks, the war shock has caused further severe supply-side disruptions from February 2022 onwards, in particular in raw materials markets (including energy sources and agricultural raw materials) and international logistics.

2.1 Post-pandemic demand growth is of crucial importance

The bottlenecks in transport, semiconductors and raw material production reflect an exceptionally fast, almost unprecedented pace of global recovery. This applies particularly to advanced economies,

which, as a whole, experienced an economic growth rate of 9.3% in the third quarter of 2020. (Sixteen times the historical average. See Figure 1).

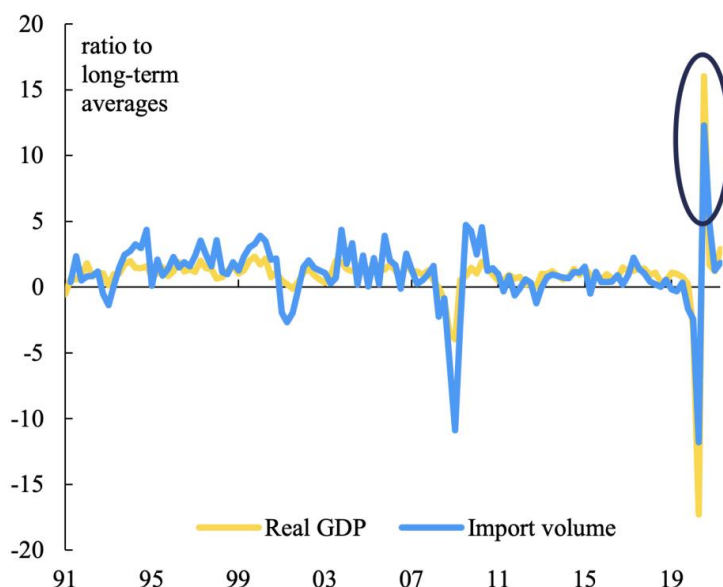


Figure 1. Quarterly real GDP and import volume growth rates in advanced economies

Source: EC 2021, p. 41.

Reflecting this robust recovery, global demand for goods rose at an outstanding pace during the summer of 2020. (This was coupled with a significant shift in consumer preferences in response to restrictions targeting contact-intensive services⁴.) Accordingly, advanced market economies' imports experienced a very rapid rate of growth in the third quarter of 2020 (thirteen times the historical average), fostering recovery. Unsurprisingly, this fast growing demand quickly hit capacity limits in different markets and sectors. (From transport to rare metals.) Given the buoyant global activity, these backlogs may continue to build up, often exacerbating capacity disruptions in individual markets.

However, these shortages and bottlenecks can have a significant impact on the functioning of global supply chains (Baldwin – Freeman 2020). Global value chains (GVCs) are channels for the spread of supply chain collapse (Carvalho et al., 2021; Setyaningsih & Kelle, 2021). The spread of shocks along GVCs was pervasive at the beginning of the COVID-19 crisis. (Baldwin – Freeman 2020, Bonadio et al. 2020) Shortages and bottlenecks together with economy-wide price pressures have increasingly affected manufacturing.

2.2 Impact on European economies

According to the EU Business and Consumer Surveys (BCS)⁵, material and equipment shortages considerably grew in importance during 2021. Replacing shortfall in demand, it became the most important factor limiting industrial production (See Figure 2). In the construction sector, it was identified as the second major constraint after labour shortages.

⁴ Including, for example, home electronics, household appliances and furniture driven by lockdowns and teleworking, as well as products to improve home environment in a broad sense.

⁵https://ec.europa.eu/info/business-economy-euro/indicators-statistics/economic-databases/business-and-consumer-surveys/download-business-and-consumer-survey-data/time-series_en#industry-business-climate-indicator-bci

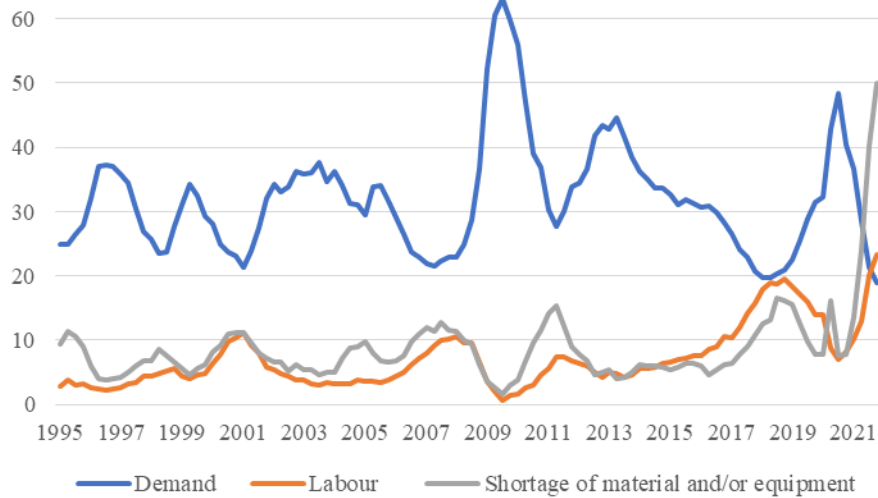


Figure 2. Factors limiting production in EU industry (%)
Source: Own construction

In terms of value added, severe shortages emerged in October 2021⁶: 43% in the EU manufacturing sector and 15% in construction, compared to less than 1% in October 2020. (See Figure 3) Far less severe shortages were reported in the service industry⁷ in the EU: only 1% of value added in October 2021, compared to 0.1% in October 2020 (EC (2021))

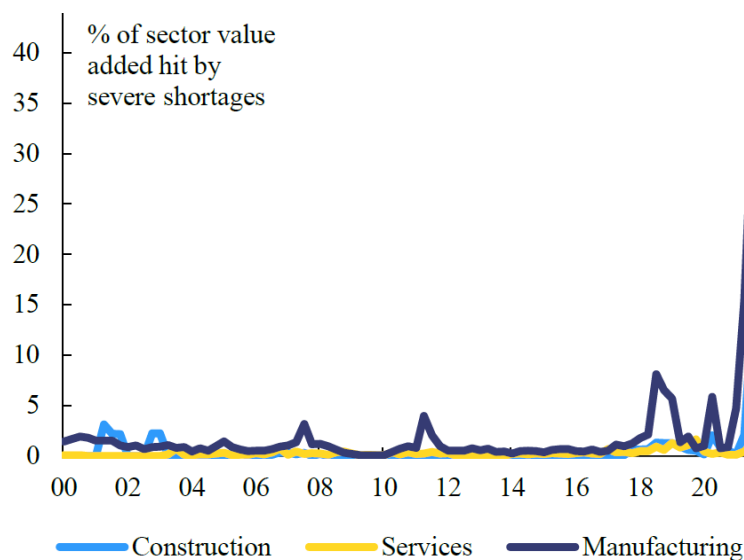


Figure 3. Pervasiveness of supply-side shortages in the EU in October 2021
Source: EC 2021, p. 45.

Note: The sum of value added of sectors subject to severe shortages across Member States weighed by the % of positive responses.

⁶ “Serious shortages” occur in sectors where a significant proportion of managers consider that “shortage of materials and/or equipment”, a factor hindering production, exceeds historical averages for that sector and country by at least two standard deviations. See Kataryniuk et al. (2021)

⁷ For this area, the question referred to space and/or equipment and not material.

The supply-side bottlenecks in the European economy worsened in January 2022. (EC 2022) 51% of managers in manufacturing and 28.6% in construction believe that the shortage of materials and/or equipment was the main limiting factor. (However, it was only a marginal factor in services, 3.5% in January 2022.) In the manufacturing sector, input-related problems in machinery and equipment and the manufacture of electrical equipment continued to grow. The sector most affected is still the automotive sector. (See Figure 4) Labour shortage mainly affected construction (31.4%), but the impact of this factor was also significant in services (26.3%) and manufacturing (25.9%). The risk of labour shortages is holding back further progress in digital transformation and may exacerbate supply chain bottlenecks. The fields reporting serious labour shortages include computer programming, consultancy and other related activities. The transport sector, a critical link in the supply chain, was also hit hard by the same challenges. Construction and engineering activities and services also face similar problems.

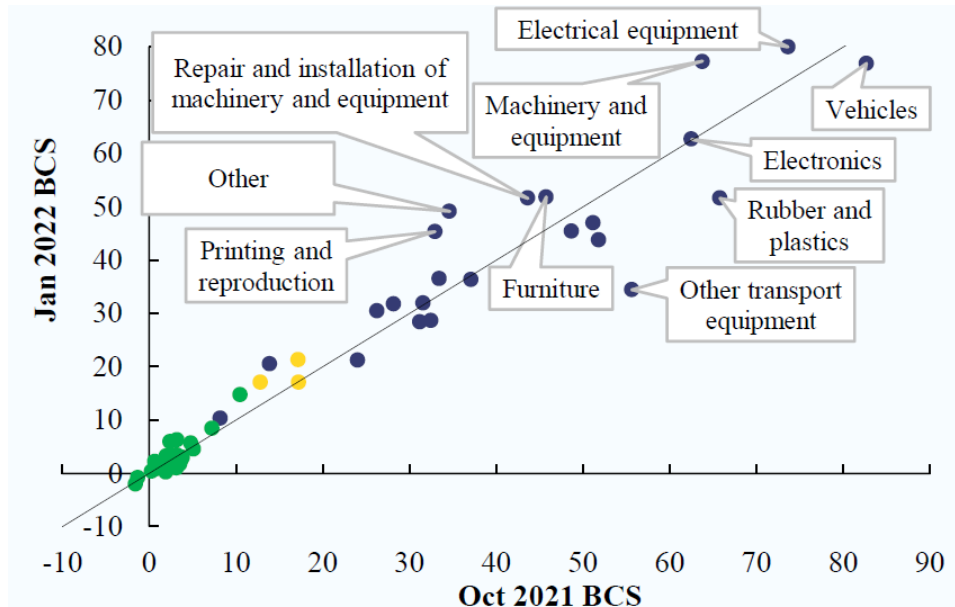


Figure 4. Percentage of EU managers reporting shortage of material and/or equipment as a factor hindering production

Source: EC 2022

The scatter plot (Figure 5) suggests that industrial sectors hit by severe shortages tend to show weaker output dynamics since spring 2021⁸. Regression analyses carried out with country-specific panel data indicate a strong negative relationship between shortages and output performance⁹. The country-sector panel data models¹⁰, together with a combination of variables explaining the changes in the industrial production index (IPI), including the severity of shortages, as well as the changes in other factors from BCS data hindering production, indicate that industrial output was significantly affected by severe shortages: Between January and October 2021, EU performance was on average 5.1% lower than would otherwise have been possible¹¹. Sectors the most seriously affected by shortages were most likely to report a drop in output between May and July 2021.

⁸ Given that the October BCS survey reflects data collected at that time. The corresponding change in output (industrial output, NACE2 sub-sectors) was calculated for the latest available three-month period (May – July 2021). The relationship was generally robust during the months of January – April 2021.

⁹ The proportion of positive responses to questions on material and/or equipment shortages in the October 2021 BCS exceeded respective country-specific historical averages (2000-2021).

¹⁰ A linear regression was based on country-sector panel data. The data cover 23 NACE rev. 2 industrial subsectors in 21 EU Member States. (Exceptions: Cyprus, Estonia, Hungary, Luxembourg, Malta, Slovenia.)

¹¹ The average effect is a simple average calculated from four alternative models.

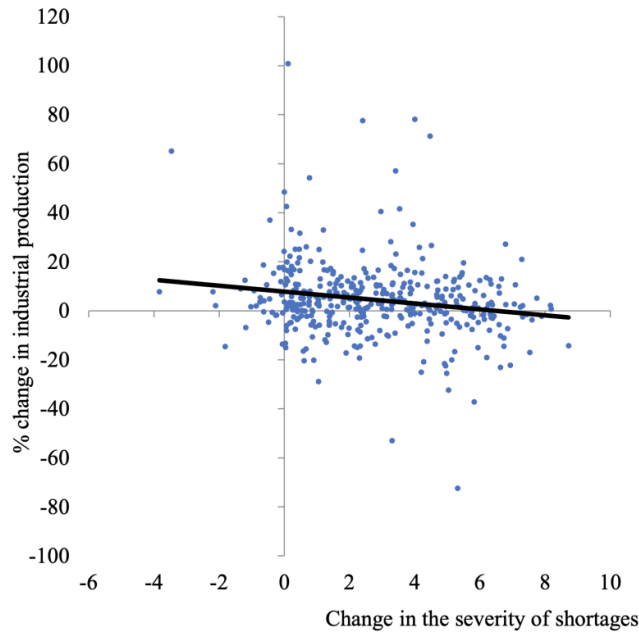


Figure 5. Changes in the severity of shortages of material/equipment (October 2020 to October 2021) versus change in the Industrial Output Index (January to October 2021)
 Source: Axioglu – Wozniak 2022
 Note: "Actual" refers to the actual change in the seasonally adjusted IPI between October and January for individual Member States and the EU. "Hypothetical" refers to actual minus the impact of shortages per country.

Constrained sectors reported a drop in output. At the same time, they forecast increases in selling prices. These are already reflected in consumer inflation. The persistent and aggravating supply-side bottlenecks are likely to force producers to raise selling prices. Indeed, the October BCS results show a positive relationship between the severity of shortages and selling price expectations. (Standardised values are presented in Figure 6) Panel regressions show that the relationship becomes stronger at higher levels of shortages. (This is indicated by the statistical significance of the squared “severity of shortages”).

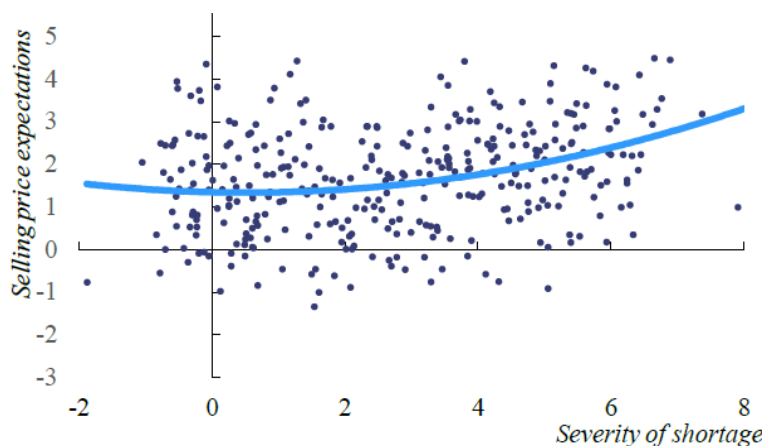


Figure 6. Changes in the severity of shortages of material/equipment (October 2020 to October 2021) versus change in the Industrial Output Index (January to October 2021)
 Source: EC 2021, p. 46.
 Note: Dots correspond to country-sector pairs; standardised values Severity of shortages defined in the preceding graph.

2.3 Supply-side challenges of recovery: the case of Hungary

The shortages of raw materials and chips as well as supply chain disruptions pose increasingly serious challenges to small, open EU-Member market economies too. To provide an illustration of this, a case study of Hungary, one of the most open, small market economies in the EU, is presented below.

Supply-side bottlenecks has been a growing problem in Hungary too. During the pandemic-related restrictions, Hungarian companies were faced with the huge problem of demand shortfall. However, during the recovery phase, both manufacturing and construction sectors have mainly been constrained by shortages of raw materials and capacity.

So far, this has not been identified as a systemic problem in Hungary. Some companies have already been forced to shut down or reduce production capacity. At the end of 2021, however, the situation became increasingly tense. According to BCS data, in the fourth quarter of 2021, shortages of raw materials and/or capacity represented the main obstacles to growth for 30% of manufacturing companies in Hungary. (See Figure 7)

This is the highest rate recorded since 1999. All of this indicates that input shortages pose a systemic problem in the Hungarian economy.

The shortage of raw materials and parts has been compounded by increasingly serious labour shortages from 2021. Together, the shortage of production inputs can have a significant negative impact on output and the recovery of the economy. In terms of the number of employed and unemployed individuals, the economic situation is close to full employment: there have never been more people working in Hungary than in 2021. Hiring new employees is a challenge for companies. According to the BCS, half of the industrial companies report labour shortages as a factor limiting their growth.

Supply-side bottlenecks are increasingly reflected in prices. Producer prices rising by [more than 25%](#) on an annual basis in October 2021 put upward pressure on consumer prices. (See Figure 8).

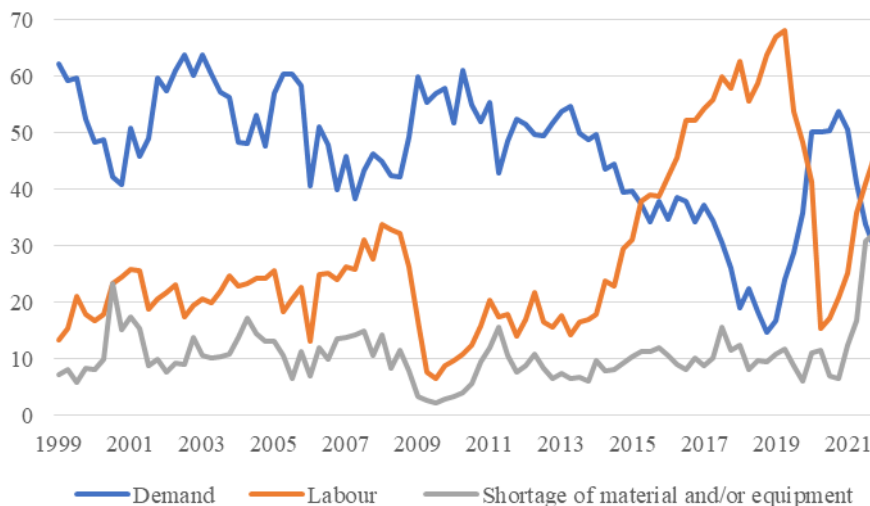


Figure 7. Factors hindering production in industry, HU (%)
Source: Own construction

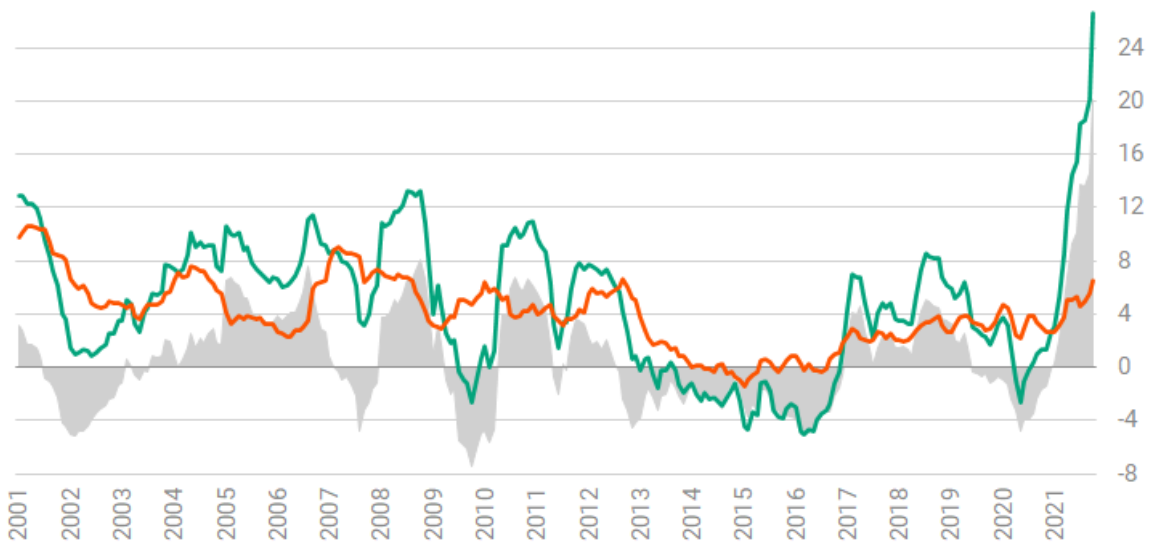


Figure 8. Changes in consumer and industrial domestic output* prices (y/y, %) and the difference between the two indicators (% points)

Source: Central Statistical Office, Budapest, Hornyák (2021)

On the supply side, the least problems are currently being experienced by the service sector in Hungary. This sector is directly affected only by few of the supply-side disruptions, if no domestic restrictive measures are otherwise in place because of the coronavirus. Demand shortfalls have constrained a quarter of firms in this sector. Labour shortages have caused problems of a similar magnitude for these firms. Given sufficient demand, the service sector is less affected by raw material shortages and supply chain disruptions.

However, demand in this sector can change very quickly. Depending on the coronavirus, restrictions can be imposed and lifted at any time. Tourism and hospitality are the sectors most exposed to these restrictions. However, given the broad diversity of service industry, the IT sector may well benefit from the restrictions. As shown in the figure above, demand shortfalls peaked during the two periods when restaurants had to close. If drastic restrictions (lockdowns) are no longer imposed in the following period, the recovery of the service sector could continue. Meanwhile, manufacturing and construction may still suffer from input shortages and supply chain disruptions.

CONCLUSIONS

The COVID-19 shock affected the global economy mainly through the collapse of demand, labour supply and industrial output, supply chains, commodity prices, international trade and capital flows. In some sectors, *disruptions and breaks in global supply chains* have caused major problems and significant downtime losses.

The study identified and gave a systematic analysis of the main characteristics of these supply-side bottlenecks. Following a series of waves of the COVID-19 crisis leading to a major downturn, cumulative processes unfolded in the global economy. At the same time, these extremely high demand dynamics have been faced with inflexible or limited supply. At the global and EU level, various bottlenecks (logistic disruptions; shortages of raw materials and parts) have emerged from the second half of 2020. They have had a deep impact on growth. Replacing demand shortfalls, material and equipment shortages have become the most important factors hindering industrial production in the EU from 2021. There is a clear link between these bottlenecks and rising inflation.

Supply shortages in the EU have not only a one-off but also a ripple effect throughout the economy. Spill-over effects across Member States are of great importance. The shortage of raw materials and parts

has been compounded by increasingly serious labour shortages from 2021. Together, the shortages of production inputs can have a significant negative impact on output and the recovery of the economy, while at the same time exerting inflationary pressures. As a result, supply-side bottlenecks can cause stagflation. There is a heightened risk of geopolitical recession in the global economy.

The pandemic disrupted global value chains. It highlighted Europe's reliance on a limited number of suppliers for specific products and raw materials. In view of the risks associated with international production, the question arises whether global value chains should become more flexible, diversifying their supply base and/or backshoring certain activities. Debates have also been launched in Europe on how to reduce reliance on international trading partners for certain strategically important products. A primary policy objective in recovery plans (both in the EU and the US)¹² is to build and strengthen *the resilience of supply chains*.

Contrary to initial expectations, COVID-19 did not prove to be a one-off shock. A system can adapt quickly, even in the event of a single, drastic shock. The initial "rebound optimism" of economic policies were underpinned by this assumption. However, in the case of permanent shocks, such as a longer-lasting pandemic, followed by a geopolitical (war) shock, the road to recovery is more difficult. The growing risk of stagflation, also linked to supply-side problems, poses a new challenge to the economic policies pursued so far.

In view of the above, some conclusions can be drawn concerning possible *structural changes and policy priorities*. Above all, the need to create and increase *resilience of supply chains* comes to the fore in the circumstances described. At the same time, the pandemic can act as a catalyst for longer-term structural changes, notably the *green and digital transformation*.

Reallocation of resources towards dynamic sectors is essential. Supporting flexible structures to promote reallocation can be a key economic policy priority in the recovery and the post-COVID-19 period.

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REFERENCES

- Axioglou, Christos & Wozniak, Przemyslaw (2022), *The impact of shortages on manufacturing in the EU: Evidence from the Business and Consumer Surveys*, VoxEU.org, 18 January <https://voxeu.org/article/impact-shortages-manufacturing-eu>
- Baldwin, R. & Freeman, R. (2020). Supply Chain Contagion Waves: Thinking Ahead on Manufacturing Contagion and Reinfection from the COVID Concussion. VoxEU.org, 1 April. <https://voxeu.org/article/covid-concussion-and-supply-chain-contagion-waves>
- Baker, S.R., Bloom, N., Davis, S.J., Terry, S.J. (2020). COVID-induced economic uncertainty. *NBER Working Paper* 26983, April. https://www.nber.org/system/files/working_papers/w26983/w26983.pdf
- Barro, R. J. & Ursúa, J. F. & Weng, J. (2020). The coronavirus and the Great Influenza Pandemic: lessons from the 'Spanish flu' for the coronavirus' potential effects on mortality and economic activity. *NBER Working Paper*, No. 26866, https://www.nber.org/system/files/working_papers/w26866/w26866.pdf
- Boissay, F., Rungcharoenkitkul, P. (2020). Macroeconomic effects of Covid-19: an early review. *BIS Bulletin* 7, April 17 <https://www.bis.org/publ/bisbull19.pdf>

¹² See the US Executive Order on America's Supply Chains of 24 February, 2021 or France Relance, the French recovery plan that includes a €600 million budget to "*reduce the fragility of global value chains*" <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/02/24/executive-order-on-americas-supply-chains/> https://www.gouvernement.fr/sites/default/files/cfiles/mesures_france_reliance.pdf

- Bonadio, B., Huo, Z., Levchenko, A.A., Pandalai-Nayar, N. (2020), "Global supply chains in the pandemic", *NBER Working Paper*, No. 27224. https://www.nber.org/system/files/working_papers/w27224/w27224.pdf
- Canton, E., Colasanti, F., Durán, J., Garrone, M., Hobza, A., Simons, W., Vandeplas, A. (2021), "The Sectoral Impact of the COVID-19 Crisis: An Unprecedented & Atypical Crisis", *EU Economic and Financial Affairs, Economic Brief 69*, https://ec.europa.eu/info/system/files/economy-finance/eb069_en.pdf
- Carvalho, V.M., Nirei, M., Saito, Y.U., Tahbaz-Salehi, A. (2021), "Supply Chain Disruptions: Evidence from the Great East Japan Earthquake", *The Quarterly Journal of Economics*, Vol. 136, No. 2, pp. 1255-1321.
- Christensen, A.K., Maravalle, A., Rawdanowicz, L. (2020), "The increase in bank deposits during the COVID-19 crisis: Possible drivers and implications", *ECOSCOPE (OECD)*, December 10 <https://oecdecoscope.blog/2020/12/10/the-increase-in-bank-deposits-during-the-covid-19-crisis-possible-drivers-and-implications/>
- Davenport, A., Joyce, R., Rasul, I., Waters, T. (2020), "Spending and saving during the COVID-19 crisis: evidence from bank account data", *IFS Briefing Note 308 (Institute for Fiscal Studies)*, October.
- Dossche, M., Zlatanov, S. (2020), "COVID-19 and the increase in household savings: precautionary or forced?", *ECB Economic Bulletin 6*. https://www.ecb.europa.eu/pub/economic-bulletin/focus/2020/html/ecb.ebbox202006_05~d36f12a192.en.html
- European Commission (2021), *European Economic Forecast Autumn 2021*, European Economy Institutional Paper 160, DG ECFIN, Brussels.
- European Commission (2022), *European Economic Interim Forecast Winter 2022*, European Economy Institutional Paper 169, DG ECFIN, Brussels.
- Forsythe, E., Kahn, L.B., Lange, F., Witzer, D. (2020), "Labor demand in the time of COVID-19: evidence from vacancy postings and UI claims", *Journal of Public Economics* 189, September, Article 104238. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7357497/>
- Georgieva, K., Celasun, O., Kemmer, A. (2022), *Supply Disruptions Add to Inflation, Undermine Recovery in Europe*, *IMF Blog*, February 17, <https://blogs.imf.org/2022/02/17/supply-disruptions-add-to-inflation-undermine-recovery-in-europe/>
- Halmai, P. (2021), "COVID-crisis and economic growth: Tendencies on potential growth in the European Union", *Acta Oeconomica*, Vol. 71, S1, pp. 165-186.
- Hu, X., Ocloo, C.E., Akaba, S., Worwui-Brown, D. (2019), "Effects of business to business e-commerce adoption on competitive advantage of small and medium-sized manufacturing enterprises", *Economics and Sociology*, Vol. 12, No. 1, pp. 80- 99. doi:10.14254/2071-789X.2019/12-1/4
- Huszka, P., Karácsony, P., Juhász T. (2022), "The coronavirus's effect on the decisions and habits of food purchases in Hungary", *Journal of International Studies*, Vol. 15, No. 1, pp. 149-167. doi: 10.14254/2071-8330.2022/15-1/10.
- Javorcik, B. (2020), "Global supply chains will not be the same in the post-COVID-19 world" in Baldwin, R. E., Evenett, S. J. (eds.) *COVID-19 and Trade Policy: Why Turning Inward Won't Work*. CEPR Press, pp. 111-116 https://voxeu.org/system/files/epublication/Covid-19_and_Trade_Policy.pdf
- Kataryniuk, I., del Rio, A., Sanchez Carretero, C. (2021), "Euro area manufacturing bottlenecks, Banco de Espana", *Economic Bulletin 3. Quarterly report on the Spanish economy*. <https://www.bde.es/f/webbde/SES/Secciones/Publicaciones/InformesBoletinesRevistas/BoletinEconomico/Informe%20trimestral/21/Recuadros/Files/be2103-it-Box3.pdf>
- Leduc, S., Liu, Z. (2016), "Uncertainty shocks are aggregate demand shocks", *Journal of Monetary Economics*, Vol. 82, pp. 20-35.
- OECD (2020), "COVID-19 and global value chains: Policy options to build more resilient production networks", *OECD Policy Responses to Coronavirus*, 3 June. <https://www.oecd.org/coronavirus/policy-responses/covid-19-and-global-value-chains-policy-options-to-build-more-resilient-production-networks-04934ef4/>
- Roshchuk, I., Oliinyk, O., Mishchuk, H., Bilan, Y. (2022), "IT Products, E-Commerce, and Growth: Analysis of Links in Emerging Market", *Transformations in Business & Economics*, Vol. 21, No. 1, pp. 209-227.
- Setyaningsih, S., Kelle, P. (2021), "Barrier factors of supply chain management implementation in small and medium-sized enterprises: Evidence from Hungary and Indonesia", *Economics and Sociology*, Vol. 14, No. 4, pp. 73-88. doi:10.14254/2071- 789X.2021/14-4/