

## THE IMPACT OF SUPPLY AND DEMAND SHOCKS ON RECENT ECONOMIC DEVELOPMENTS AND PRICES

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Throughout 2021 there has been a notable rise in global inflation. It has prompted a growing debate on its determinants, its persistence looking ahead and its implications for economic activity as a whole. Foremost among the drivers behind this inflation increase are various supply and demand shocks.

On one hand, once the phase in which the COVID-19 pandemic had peaked globally – in both health and economic terms – was behind us, the gradual easing of the virus-containment measures and the headway in the vaccination roll-out contributed to a very sharp recovery in demand as from the second half of 2020, which is estimated to have exerted upward pressure on both prices and output. Thus, for instance, the swift reactivation of global trade following the lockdowns in early 2020 in many of the major economies has led to shipping bottlenecks, resulting in significant increases in transport costs and in some commodities prices.

On the other, from the supply side, there has been some disruption in recent quarters to global supply chains.<sup>1</sup> These have particularly affected the cost and availability

of specific intermediate goods, such as semiconductors,<sup>2</sup> which are pivotal to the production of a wide range of final end products. The immediate consequence of these problems has been a considerable lengthening of suppliers' delivery times (see Chart 1) and a rise in manufacturing and import prices. Such increases are also feeding through, albeit still only partially, to consumer prices (see Chart 2, for the euro area). Rising energy commodities prices, exerting notable upward pressure on the prices of some of the most energy-intensive sectors, have also contributed to these dynamics.

The aim of this box is to provide an initial quantitative assessment of the different relative roles these supply and demand factors have played in the recent path of euro area prices and industrial production. To this end, we estimate a Bayesian structural vector autoregression model (SVAR), which exploits monthly information available on the producer price index (PPI) for the manufacturing industry and on the industrial production index (IPI).<sup>3</sup> To identify the nature of the different types of shocks that influence the course of these variables during the period under analysis (from 1995 to September 2021),

Chart 1  
MANUFACTURING PMI: SUPPLIERS' DELIVERY TIMES

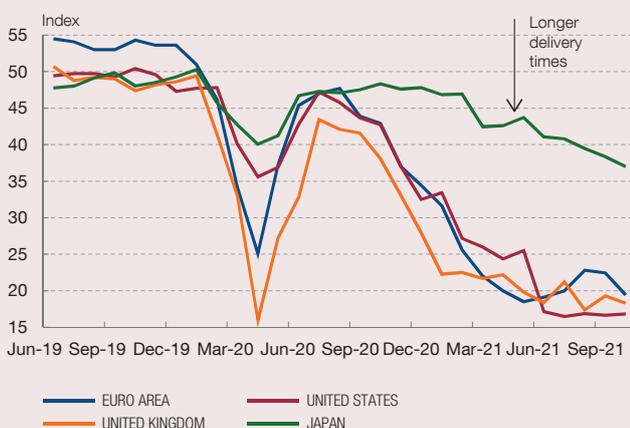


Chart 2  
PRODUCER PRICES, IMPORT PRICES AND CONSUMER PRICES IN THE EURO AREA

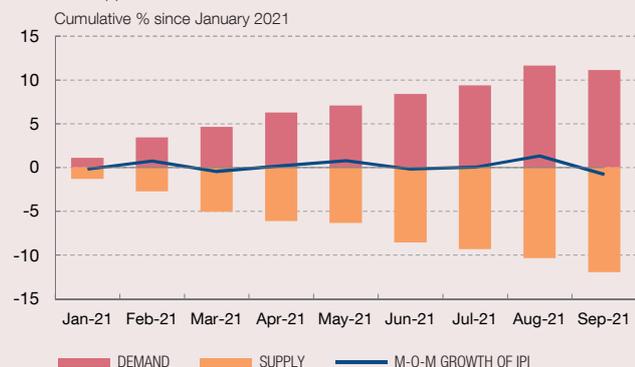


SOURCES: IHS Markit and Eurostat.

- 1 See, for example, D. Rees and P. Rungcharoenkitkul (2021), "Bottlenecks: causes and macroeconomic implications", BIS Bulletin No. 48, BIS.
- 2 For a detailed analysis of bottlenecks at the sectoral level for Spain and the euro area, see I. Kataryniuk, A. del Río and C. Sánchez Carretero (2021), "Euro area manufacturing bottlenecks", Box 3, "Quarterly Report on the Spanish Economy", *Economic Bulletin*, 3/2021, Banco de España.
- 3 The SVAR model is estimated in log differences with three-month lags, according to estimated information criteria. For further details on a similar version of the model, see M. Dossche and J. Martínez-Martín (2018), "Understanding the slowdown in growth in 2018", *Economic Bulletin*, 8/2018, ECB.

**THE IMPACT OF SUPPLY AND DEMAND SHOCKS ON RECENT ECONOMIC DEVELOPMENTS AND PRICES (cont'd)**

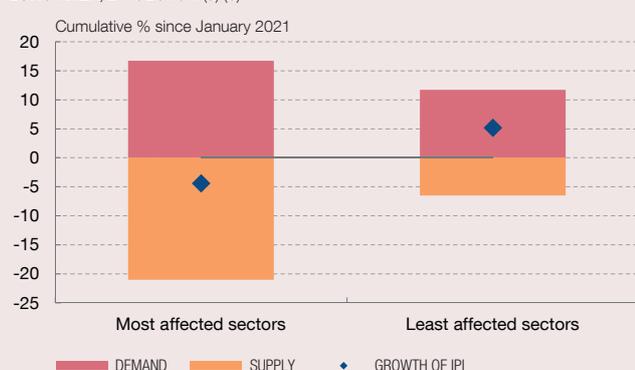
**Chart 3**  
CONTRIBUTION OF SUPPLY AND DEMAND TO THE MANUFACTURING IPI IN THE EURO AREA (a)



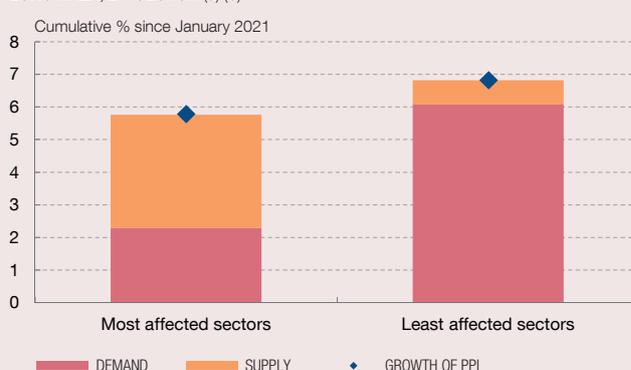
**Chart 4**  
CONTRIBUTION OF SUPPLY AND DEMAND TO THE MANUFACTURING PPI IN THE EURO AREA (a)



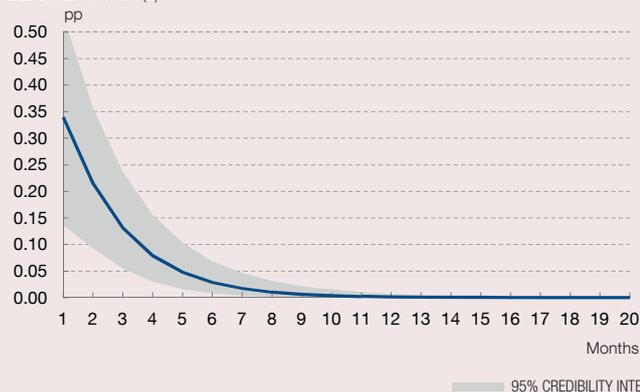
**Chart 5**  
CONTRIBUTION OF SUPPLY AND DEMAND TO THE MANUFACTURING IPI IN THE EURO AREA, BY SECTOR (a) (b)



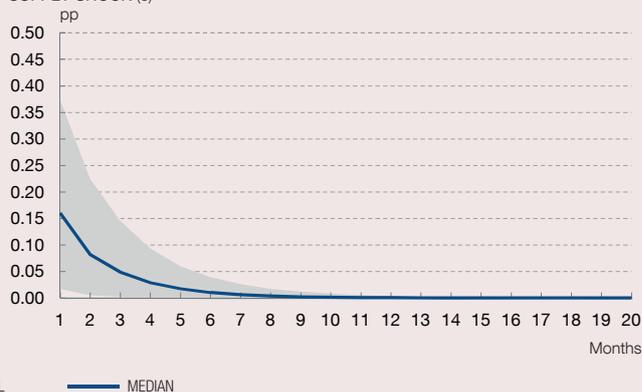
**Chart 6**  
CONTRIBUTION OF SUPPLY AND DEMAND TO THE MANUFACTURING PPI IN THE EURO AREA, BY SECTOR (a) (b)



**Chart 7**  
RESPONSE OF PRODUCER PRICES IN THE EURO AREA TO A POSITIVE DEMAND SHOCK (c)



**Chart 8**  
RESPONSE OF PRODUCER PRICES IN THE EURO AREA TO A NEGATIVE SUPPLY SHOCK (c)



**SOURCES:** Eurostat and Banco de España calculations.

- a Banco de España estimates based on a monthly SVAR model in log differences of manufacturing IPI and PPI. IPI and PPI growth is depicted in these charts without constant.
- b The most affected sectors are those where at least 50% of firms reported material and/or equipment shortages, according to the quarterly information from the October 2021 European Commission surveys.
- c Banco de España estimates based on a monthly SVAR model in log differences of manufacturing IPI and PPI. The impulse response functions of two inflationary shocks (a positive demand shock and a negative supply shock) of 1 pp are depicted.

it is assumed that a demand shock leads output and prices to move in the same direction for at least three months, while a supply shock sees output and prices move in the opposite direction over the same period.

Charts 3 and 4 show the cumulative contribution of the different identified supply and demand shocks to the change in the IPI and in the PPI in the euro area as from early 2021.<sup>4</sup> As can be seen in these charts, the recent increase in producer prices in the euro area would seem to be essentially due to demand shocks. These shocks would be associated not only with the recovery in the economy during the period analysed, but also with the new needs that have arisen in the wake of the pandemic for all economic agents, e.g. in terms of digitalisation. The negative supply shocks identified in this analysis are also estimated to have contributed to gradually raising producer prices since early 2021 (and especially more recently), but, above all, they will have been central to preventing industrial production in the euro area from responding to the demand-side pressures observed.<sup>5</sup>

We obtain the foregoing estimates by analysing price and industrial production developments for the manufacturing industry as a whole. However, the size and relative weight of the supply and demand shocks that have recently influenced the behaviour of these variables may possibly have differed greatly across the different sectors in the industry. Indeed, in recent quarters the effects of the shortage of materials and/or equipment on these manufacturing activities have been very uneven. Hence, while in some – car assembly and the manufacture of electrical equipment – over 80% of firms indicate that material or equipment supply difficulties are constraining

capacity, in others – such as food and clothing and apparel – this percentage is under 30%.

To quantitatively assess whether this cross-sector heterogeneity is reflected in a different relative weight of supply and demand shocks in recent euro area price and industrial production developments, we estimate the following model separately for two sectoral aggregates: those sectors in which at least 50% of firms indicate that the shortage of materials and/or equipment is a constraint on production in October 2021 (overall, these sectors account for 65% of the total gross value added (GVA) of manufacturing and the other sectors for the remaining 35%). As Charts 5 and 6 show, the impact of the supply shocks has been particularly significant in the most constrained sectors; the shocks account for over 50% of industrial production dynamics and 60% of the rise in producer prices, far higher percentages than those observed in the remaining sectors (36% and 10%, respectively). In particular, the supply shocks in the automobile sector – in which 87% of firms report materials and/or equipment shortages – account for around three-quarters of the change in its activity and producer prices.

Lastly, the analysis in this box also infers that the responses of producer prices in the euro area to the demand shocks persist, on the basis of past evidence, somewhat longer than those that arise as a result of supply shocks (see Charts 7 and 8). The final impact of these shocks on economic activity as a whole and on consumer prices will depend on the persistence of both the current shocks (over which there is considerable uncertainty) and of the reaction of producer prices to the shocks.

4 The results of the model are robust to the treatment of the pandemic period and do not significantly change when, in line with Serena Ng (2021) ("Modelling macroeconomic variations after Covid-19", Working Papers, No. 29060, NBER), an exogenous control variable that takes into account COVID-19 infections is included.

5 A similar exercise for other advanced economies (United States, United Kingdom and Japan) would suggest supply and demand shocks with a relatively similar pattern to that of the shocks identified for the euro area. That would partly reflect the global nature of the pandemic-induced crisis and of the subsequent recovery.