



EUROPEAN CENTRAL BANK

EUROSYSTEM

# Forecasting euro area GDP during the recent crises

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Presentation to OeNB's  
East Jour Fixe workshop

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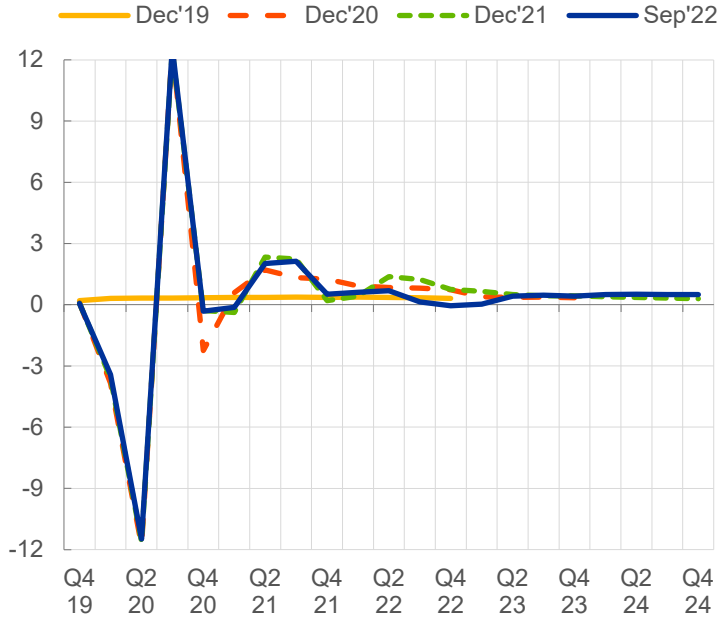


# Outline

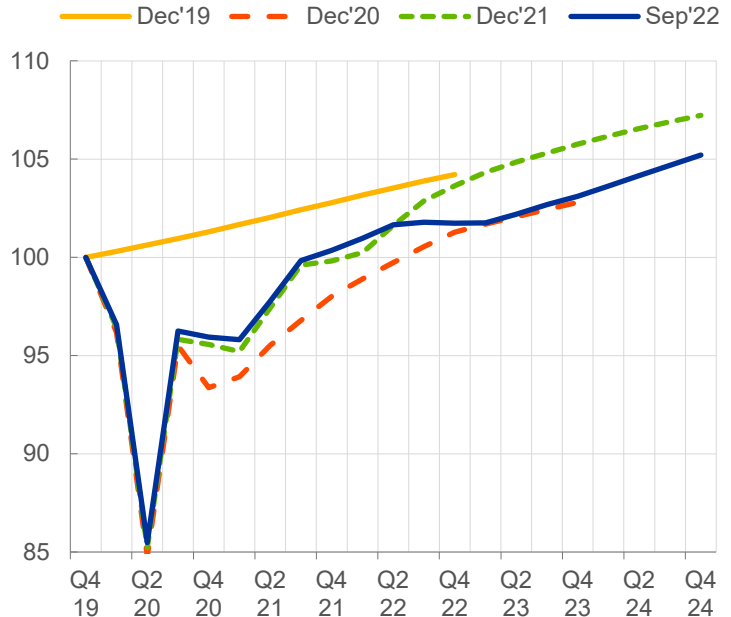
- 1 Recent projections
- 2 Modelling the Covid-19 shock
- 3 Importance of a narrative
- 4 ST models, new tools and indicators
- 5 Downside war-related scenario
- 6 Lessons learnt

# Real GDP growth and levels across projection rounds

## Real GDP growth (q-o-q % change)



## Real GDP (chain linked volumes, 2019Q4=100)



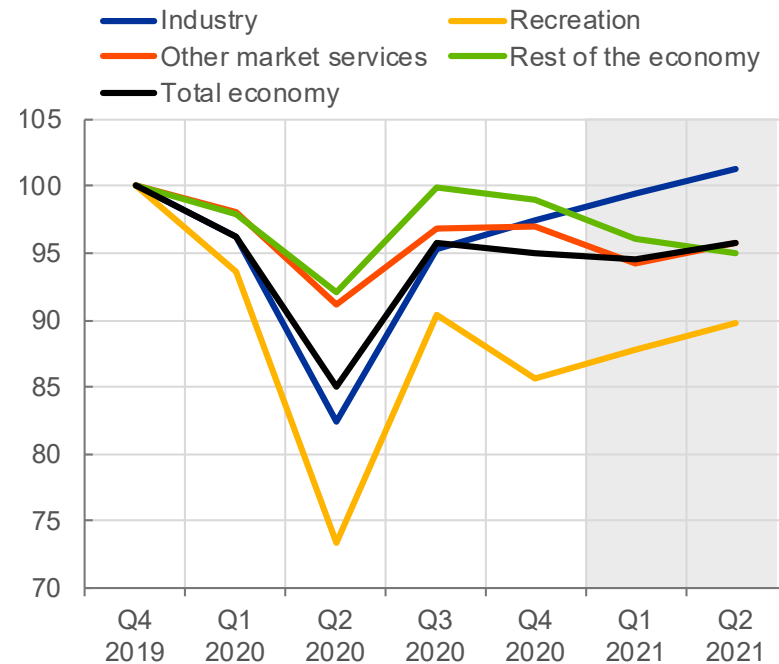
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# Economic impact of the pandemic

- Containment of Covid-19 pandemic had dramatic economic impact
- Largest impact on *recreational (contact-intensive) services* (in all countries)
- Considerable heterogeneity across EA economies
- Economic *impact of containment changed over time*

## Sector breakdown of real GDP in the euro area (index, Q4 2019 = 100)



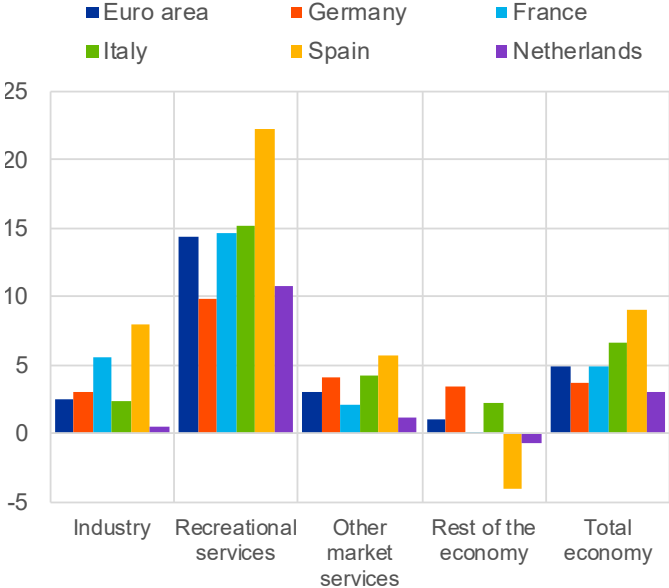
Source: Battistini and Stoevsky, 2021, Box 4, Economic Bulletin, Issue 2, ECB.  
Notes: The model-implied sector developments are based on the March 2021 projections for real GDP and foreign demand in the first and second quarters of 2021.

# Evolving analytical framework; key questions

- How large is the direct impact of Covid-19 containment across sectors and countries?
- Did this impact change over time and what are the implications going forward?

## Economic losses

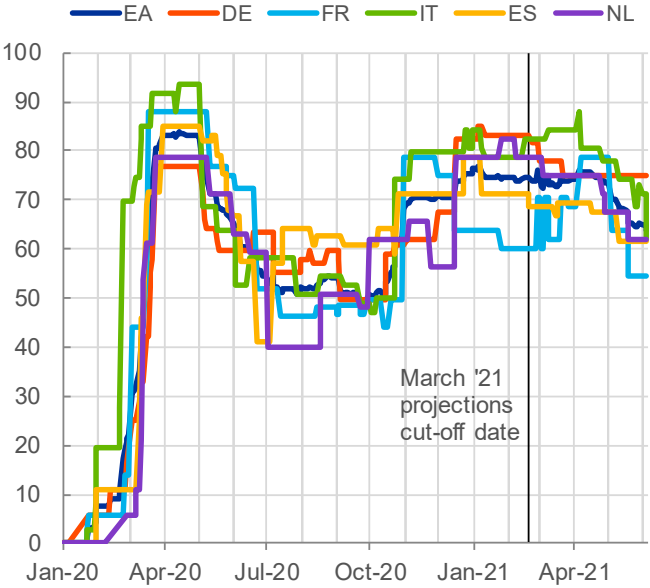
(loss in real GVA in Q4 2020 as % of the GVA level in Q4 2019)



Sources: Battistini and Stoevsky, 2021, Box 4, Economic Bulletin, Issue 2, ECB, Eurostat.  
 Note: Industry includes the NACE Rev.2 classification sectors B, C, D, E and F; Recreational services includes G, H, I, R, S, T and U; Other market services includes J, K, L, M and N; Rest of the economy includes A, O, P and Q; Total economy refers to real GDP.

## Oxford Stringency Index across countries

(max=100)



Sources: Hale et al. (2020), ECB staff calculations.  
 Latest observations: 4 June.

# One of the tools: pandemic cross-sector VAR model

- Real gross value added (**GVA**) for **11 sectors** (representing the total economy):
  - **Industry**: Other industry (NACE Rev.2: B, D and E), Manufacturing (C), Construction (F)
  - **Recreational services**: Trade, transp., accom., food (G, H and I), Arts and entertainment (R, S, T, U)
  - **Other market services**: Information and communication (J), Finance and insurance (K), Real estate (L), Professional and technical (M and N)
  - **Rest of the economy**: Agriculture (A), Public administration (O, P and Q)
- Oxford Stringency Index (**OSI**) and foreign demand (**WDR**)
- **Data** for the euro area, Germany, France, Italy, Spain and the Netherlands for 95Q1-20Q4
- **Cross-sector VAR model**, estimated separately for each country:

$$Y_t = A + B Y_{t-1} - C_t \Delta s_t + D W_t + u_t$$
$$C_t = C_{t-1} + e_t$$

where:

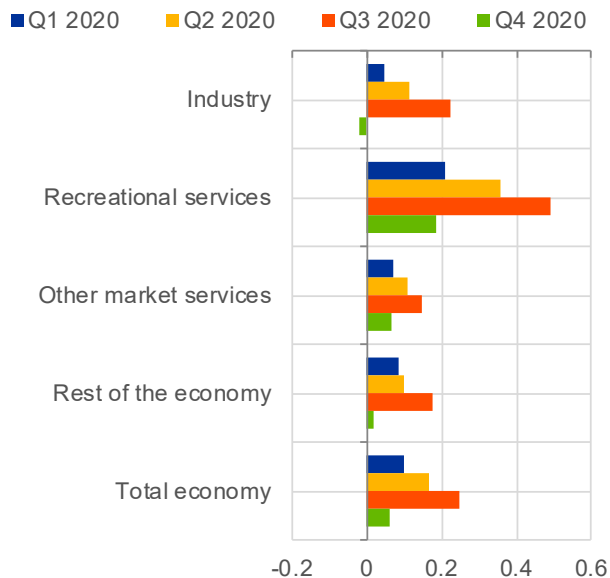
- $Y_t$  are q-o-q growth of **real sectoral GVA**,  $W_{it}$  is the exogenous q-o-q growth of **WDR**,
- $s_t$  is the exogenous **OSI**,
- $u_t$  and  $e_t$  are **residuals**,  $A$ ,  $B$  and  $D$  are the reduced-form **VAR and WDR coefficients**,
- $C_t$  are **constant/time-varying sector-, country-specific elasticities** (*economic impact*)

# Results: *time variation of sensitivity across sectors and countries*

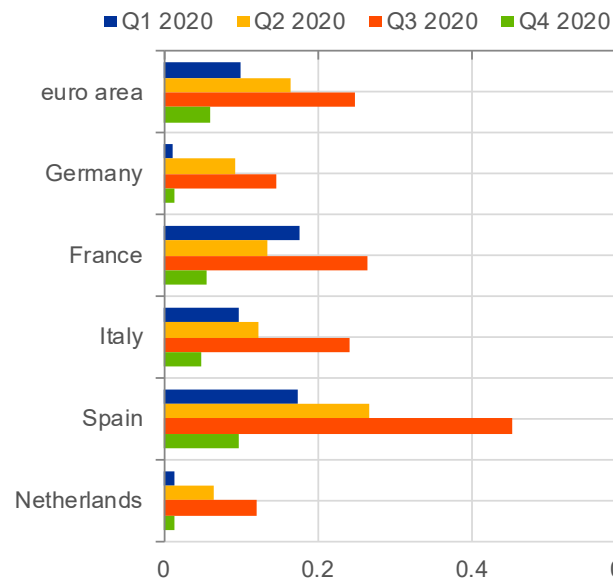
- The estimates pointed to learning effects, reducing the impact of containment
- The overall sensitivity was smaller in Germany and the Netherlands, and higher in Spain

## Sector elasticities in the euro area over time

(impact of a 1-point decrease in OSI on real GVA q-o-q growth, pp)



## Total elasticities across the large euro area countries over time



Sources: Battistini and Stoevsky, 2021, Box 4, Economic Bulletin, Issue 2, ECB.  
Note: Total economy refers to real GDP.

Sources: Battistini and Stoevsky, 2021, Box 4, Economic Bulletin, Issue 2, ECB.



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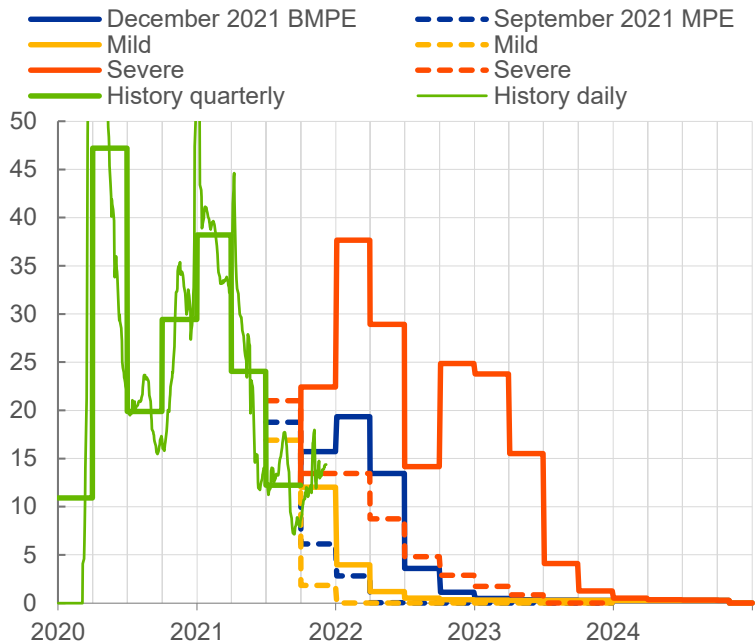
# Pandemic scenario narratives in the December 2021 projections

Scenario	Pandemic	Restrictions	Economic effects	Output profile	Financial amplification
<b>Mild</b>	Fast resolution of the health crisis (also in EMEs) in 2022	Restrictions quickly loosened further and mobility recovering by early-22	Stronger resilience of the economy and pick-up especially in high-contact services; strong positive confidence effects on consumption	Temporary losses, mildly persistent (level and growth)	Negligible
<b>December 2021 BMPE baseline</b>	Continued resolution of the health crisis in 2022 (stable infections and hospitalisations in 22Q1)	Restrictions maintained in 22Q1, thereafter loosening, with mobility recovering from 22Q2	Moderate negative and persistent economic impact going forward; recovery in some sectors; economic effects dissipate in 2022/2023	Temporary losses, mildly persistent (level and growth)	Moderate
<b>Severe</b>	Prolonged health crisis and recurrent waves of infections (with new more infectious variants)	Restrictions tightened in early-22 and mobility recovering only by mid-23	Severely damaging and protracted economic impact especially in high-contact services; limited recovery; very large uncertainty weighs on consumption; scaled-up fiscal support measures (with expert judgment)	Large permanent losses on level and persistent on growth	Severe

# Illustrative mobility (economic losses) and GDP paths

## Restrictions on mobility

(deviations from Jan 2020, %)

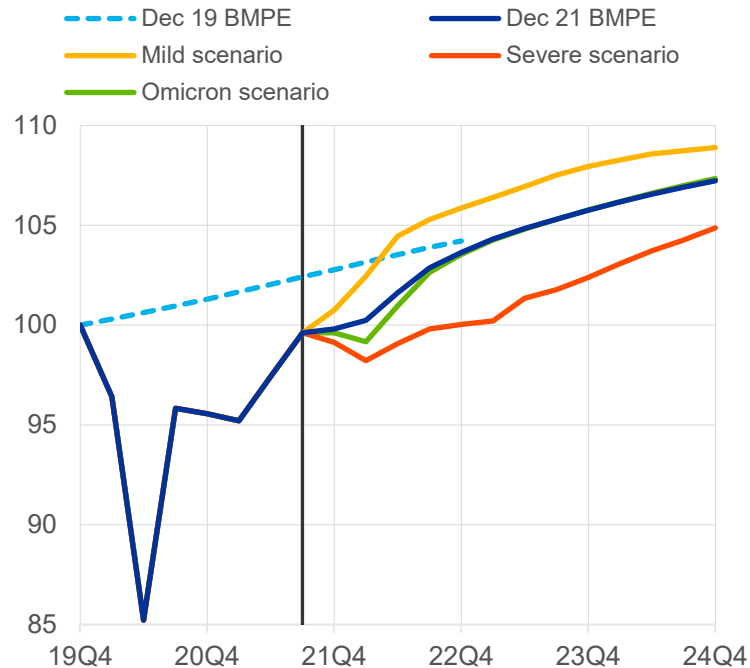


Sources: Google, ECB staff calculations.

Notes: The index refers to the GDP-weighted average of the composite Google Mobility Index (retail & recreation, workplaces, transit stations). Latest observations: 6 December 2021.

## Real GDP

(index, 2019Q4=100)

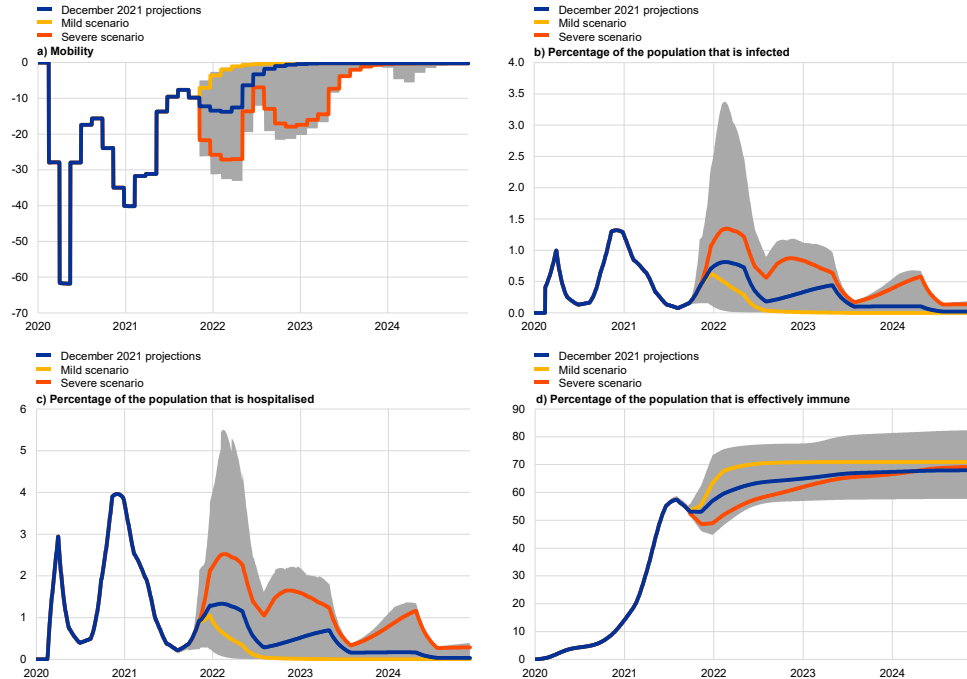


Sources: ECB staff calculations.

# Scenarios: pandemic simulations

## Pandemic simulations with ECB-BASIR

(percentage deviations from the first five weeks of 2020 (top left-hand panel); percentages of the population (all other panels))



Sources: Google Mobility reports, the European Centre for Disease Prevention and Control and ECB calculations.

Note: The distribution is obtained by random simulations considering uncertainty about: i.) rate of vaccination  $U\sim[0.8\% - 1.2\%]$ , ii.) efficiency of vaccination  $U\sim[30\%-70\%]$ , efficiency of vaccination (hospitalisations)  $U\sim[65\%-85\%]$  and reinfection uncertainty  $U\sim[0\%-15\%]$ , iii.) increase in infection rate due to a new Delta virus variant  $N\sim(60\%, 10\%std)$ , iv.) SIR parameter uncertainty v.) learning uncertainty  $N\sim(52\%, 10\%std)$  and vi.) historical uncertainty captured in residuals.

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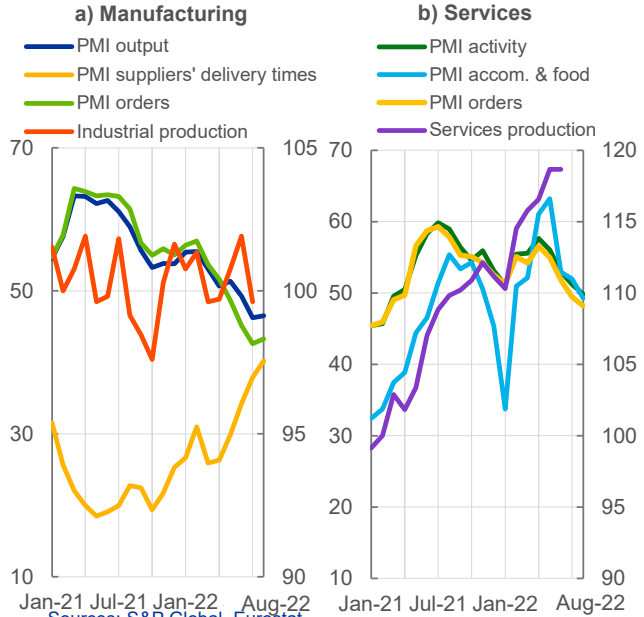
# Short-term indicators

## Latest monthly data

- Services production grew strongly until May
- Strong drop in IP in July
- PMIs imply slowdown in activity growth

### Hard and soft indicators

(diffusion indices, indices Feb 2021 = 100)

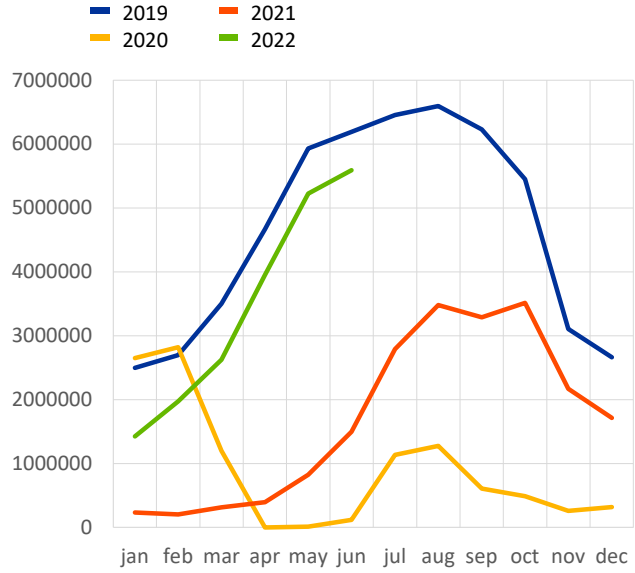


Sources: S&P Global, Eurostat.  
 Notes: services production refers to market services except for trade, finance & insurance  
 Latest observations: August 2022 for PMI, July 2022 for industrial production, June 2022 for services production.

## Tourism (example of Spain)

- Strong growth in 2022H1 close to pre-Covid patterns
- Reopening effects likely concentrated in H1, little room for further rebound in H2

### International travellers, Spain (persons)



Source: INE  
 Latest data: June 2022

# Assessing the short-term outlook

## Using new tools and indicators

- ST standard and augmented estimates
- PMI GDP trackers
- Growth at risk

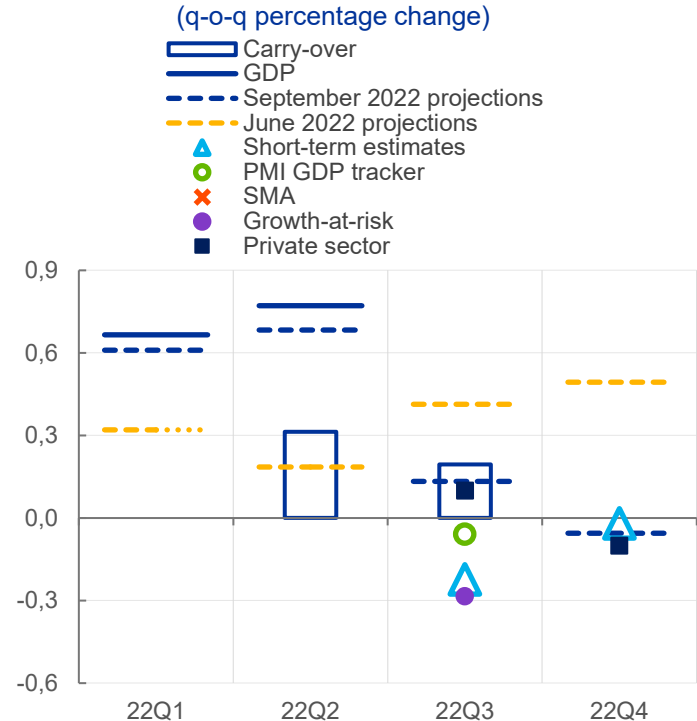
## Comparing to other forecasters

- SPF, SMA, Consensus
- Other institutions: COM, IMF

## Cross-country perspective

- EA narrative and country specificities
- Ultimately, the ECB EA forecast is an aggregation of country forecasts

## GDP short-term estimates



Sources: Eurostat, S&P Global, ECB, projection database and ECB calculations.

Latest observations: short-term estimates: 11 August 2022; Growth-at-risk: 26 August 2022; PMI GDP tracker: 23 August 2022.

# Assessing the implications of special factors

## Pandemic

- Mobility and economic losses/rebound

## Supply bottlenecks

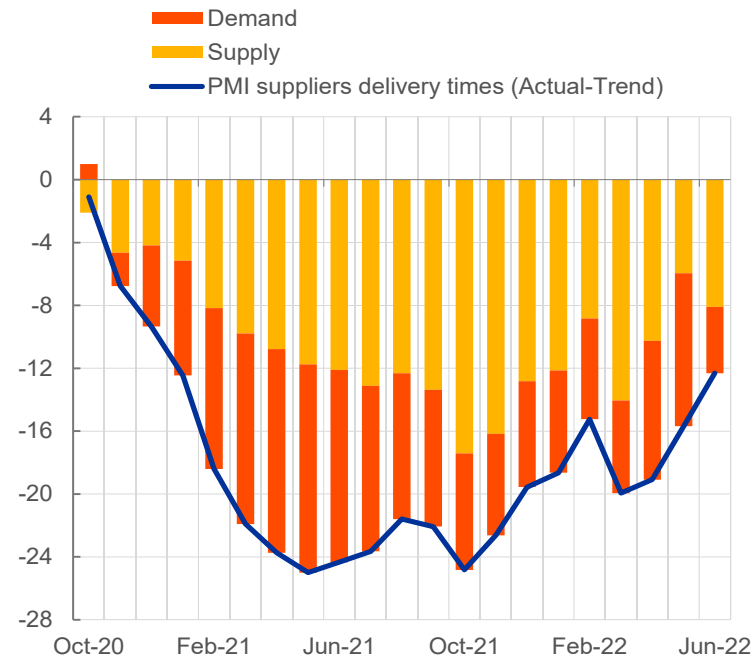
- PMI indicators
- Heatmap

## War and energy crisis

Alternative model results, focused on:

- Impact of uncertainty
- Food and energy prices
- Production disruptions
- Trade
- Financial amplification

## PMI suppliers' delivery times: supply and demand (diffusion index, trend-deviation)



Sources: Eurostat, S&P Global and ECB calculations. Notes: PMI suppliers' delivery times refer to the manufacturing sector. Demand and supply contributions obtained from a SVAR model (De Santis, Economic Bulletin, Issue 8/2021) where shocks are identified using sign and narrative restrictions as in Antolín-Díaz, J. and Rubio-Ramírez, J.F. (2018). Latest observation: June 2022.



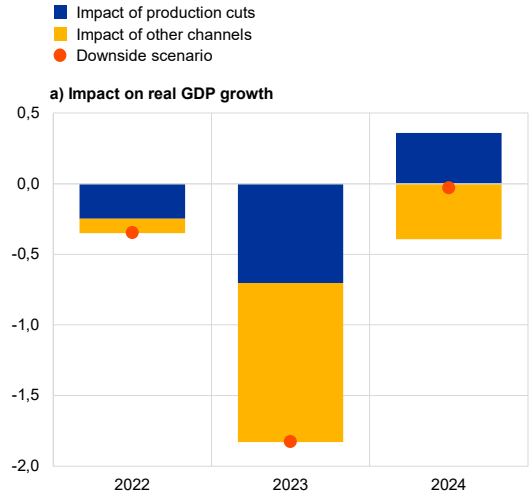
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# Downside scenario

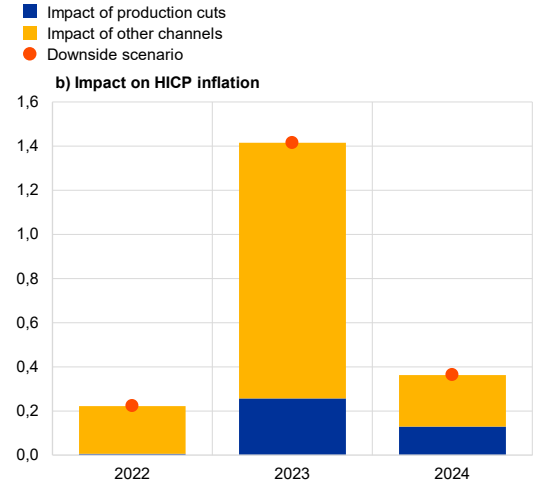
## Euro area GDP growth

(p.p. deviation from baseline growth)



## Euro area HICP inflation

(p.p. deviation from baseline projections)



## September 2022 baseline projections and downside scenario for the euro area

(annual percentage changes, unless otherwise indicated)

	September 2022 baseline projections			Downside scenario		
	2022	2023	2024	2022	2023	2024
Real GDP	3.1	0.9	1.9	2.8	-0.9	1.9
HICP	8.1	5.5	2.3	8.4	6.9	2.7
HICP excluding energy and food	3.9	3.4	2.3	3.9	3.5	2.4

**Source:** ECB simulations using the ECB-BASE with exogenous monetary and fiscal policy.

**Trade:** Combination of shocks affecting Russian GDP, spill-overs to non-EA countries therefore influencing EA foreign demand and competitor's export prices.

**Production disruption:** refers to a combined supply shock together with a demand rationing shock reinterpreting through ECB-BASE the out-of-model results on gas shortages. Energy prices: oil and gas prices. Food prices: agricultural and processed prices.

**Domestic uncertainty:** measured as movements of the CISS indicator. **Financial:** add-ons on NFC and HH lending rates.

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# Lessons learnt from the crises

## Importance of a narrative

- Alternative conditioning assumptions
- ST implications and MT assumptions
- X-country consistency

## Developing / utilising new tools and indicators

- HFI
- Non-linear tools
- Understanding the implications and nature of the shocks: in contrast to more persistent growth surprises in normal times, the pandemic entailed offsetting surprises, validating a level approach to GDP.

## Tackling huge uncertainties

- Projection ranges, scenario analysis
- Communication of conditioning assumptions and narrative

## Overhaul of standard models and procedures

- Introducing expert judgment based on alternative tools
- Exceptional (last-minute) updates