EUROPEAN CENTRAL BANK

EUROSYSTEM

The impact of the COVID-19 shock on the euro area potential output – a sectoral approach

SUERF presentation

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Potential output estimates of the Eurosystem – disclaimer

- "Official" potential output estimates of the ECB are prepared by the Eurosystem and are confidential.
- An unobserved components model that embeds a production function (Tóth, 2021) is used to internally benchmark these official estimates.
- The method presented here is based on a different approach and cannot be regarded as the official potential output estimate of the Eurosystem.

Motivation

- The scarring effects of the COVID-19 shock have been very uncertain, in particular in real time
- Heterogenous impact of the COVID-19 shock and the policy response across sectors
- Sectoral, bottom-up estimates of trend developments are useful to assess
  - the scarring effects of the crisis and to attach a narrative to it;
  - the future path of potential output and the risks around it along different scenarios;
  - the sectoral reallocation needs.
- We develop a novel approach, which is based on a state-of-the-art shock identification method combined with a metric for scaling, to gauge the impact of the pandemic on the potential output of the euro area economy.

Key findings

- Even before the pandemic, growth of trend output was heterogenous across euro area sectors
- In 2020 and 2021, supply shocks played a larger role in sectors which cannot operate without personal contacts and were deemed less essential, but their pass-through to trend output differs across sectors
- We found the risks of scarring to be larger in “trade, transport and accommodation”, “industry”, “construction” and “other services” sectors
- On the aggregate, we estimated downside risks to available real-time potential growth projections and upside risks to the losses
- The policy response was very important

Methodology - baseline

Period	Total factor productivity	Labour	Capital
1996-2019	Hodrick-Prescott filter		Sectoral data, not filtered
2020-2021	BVAR and sectoral trend elasticity in baseline		Panel estimation using sectoral value added data, different scenarios depending on the degree of depreciation
2022-2025	Gradual convergence to the counterfactual growth		

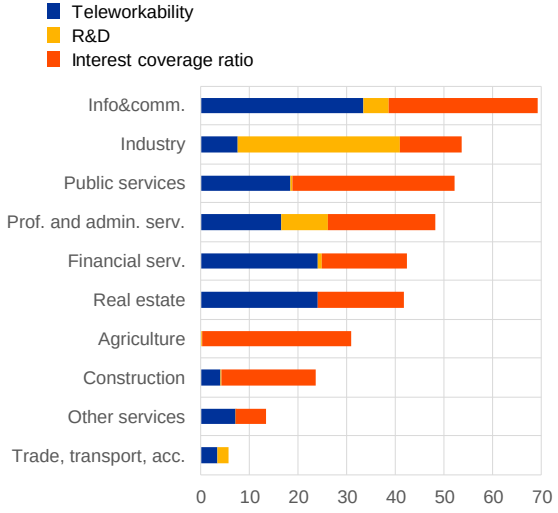
- For 2020-2021, it was challenging to separate trend and cycle:
  - Data issues on the sectoral level
  - Statistical filters have difficulties in particular at the end of the sample
  - There were changes in economic relationships, which also affected the link between the supply shock and potential output

- Our approach:
  - First, we use a Bayesian Vector Autoregressive (BVAR) model to decompose the change in sectoral value added in 2020 and 2021 to developments related to supply and demand
  - In the second step, we derive a metric for the elasticity of sectoral trends to the supply shock and use that to assess trend developments in 2020-2021

Methodology – robustness checks

	Scenarios
1	Cross-checking exercise with the sectoral resilience index (SRI)
2	Decompose trend labour to trend average hours worked and trend employment
3	Test assumptions on the supply-demand conditions
4	NGEU scenario
5	Capital contribution robustness checks

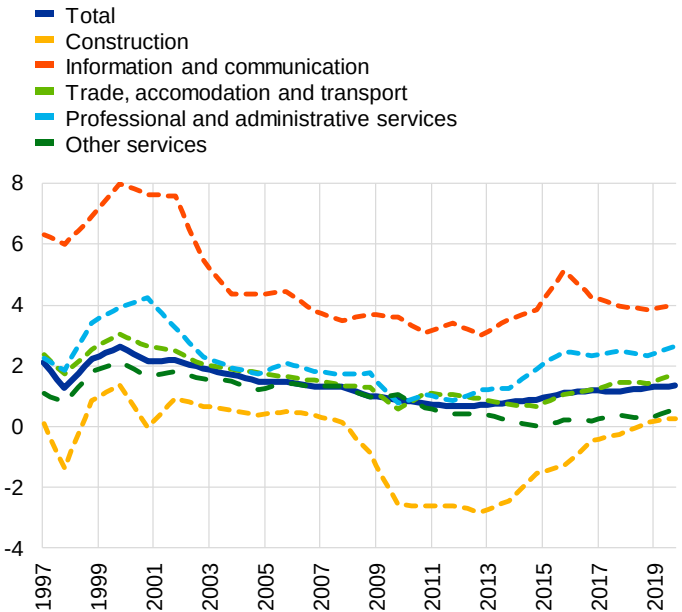
- Sectoral resilience index:
  - Components:
    - Share of teleworkable jobs in employment
    - R&D expenditure
    - Interest coverage ratio
  - Used to adjust:
    - the share of the supply side shock that is passed on to potential output in 2020-2021
    - the persistence of the shock beyond these two years



Source: Eurostat, OECD

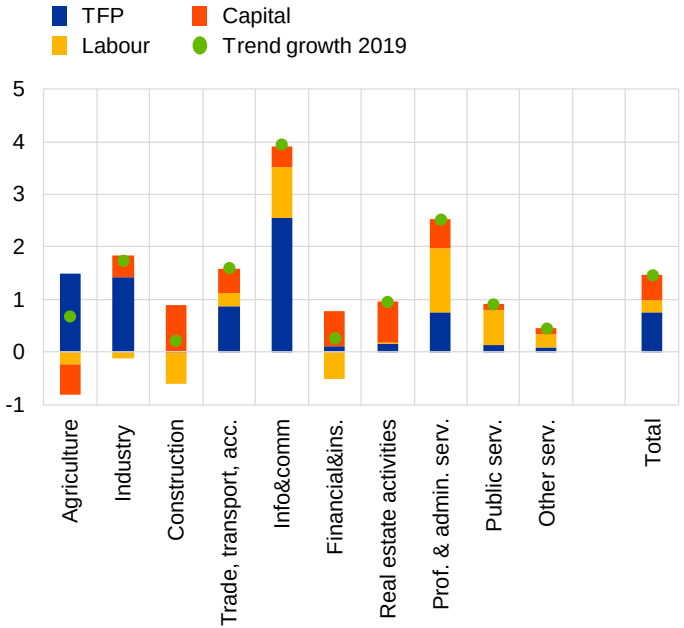
Past trend growth by sectors

Trend growth in selected euro area sectors
(annual percentage change)



Source: Eurostat, ECB Staff calculations

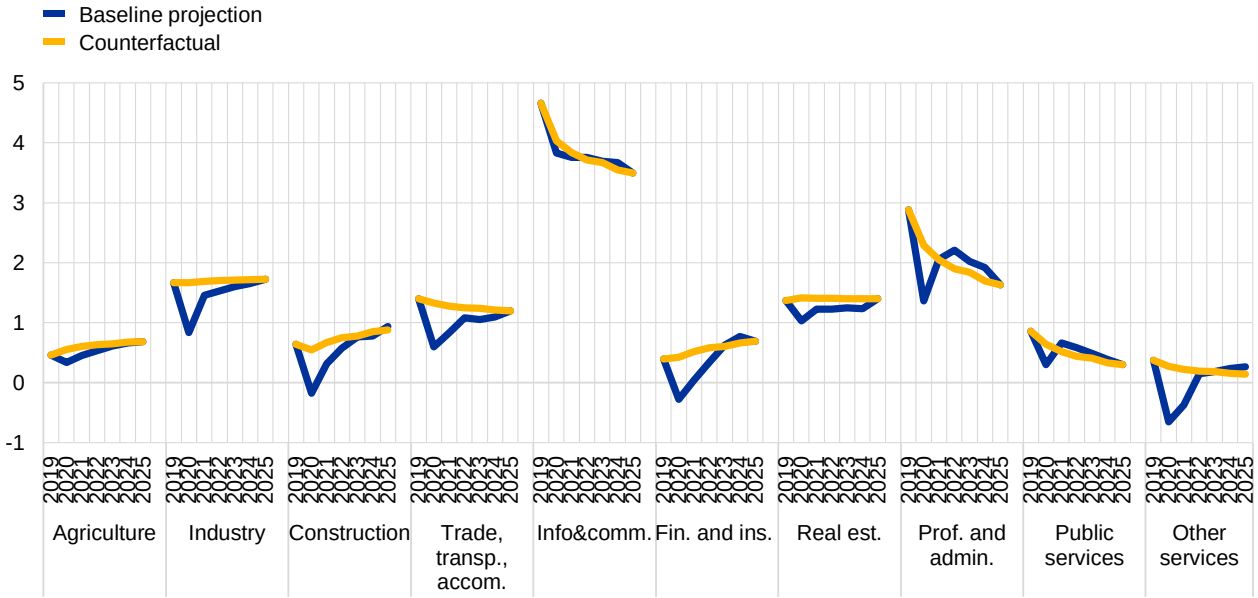
Contribution to trend growth in 2019
(annual percentage change)



Source: Eurostat, ECB Staff calculations

Results: sectoral developments

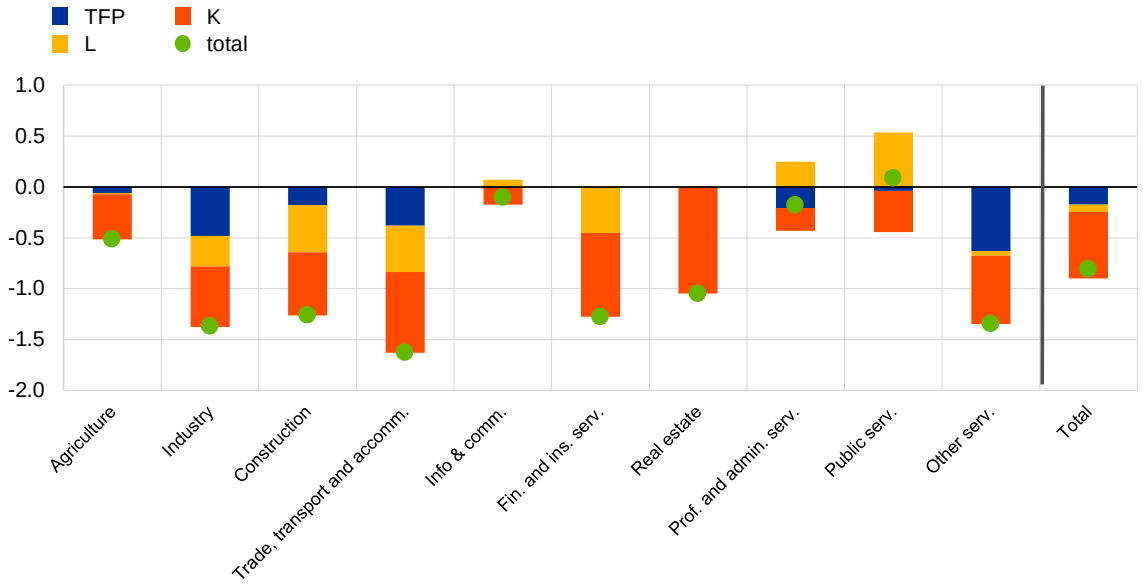
Estimated sectoral trend growth rates
(annual percentage changes)



Source: ECB Staff calculations

Results: sectoral developments

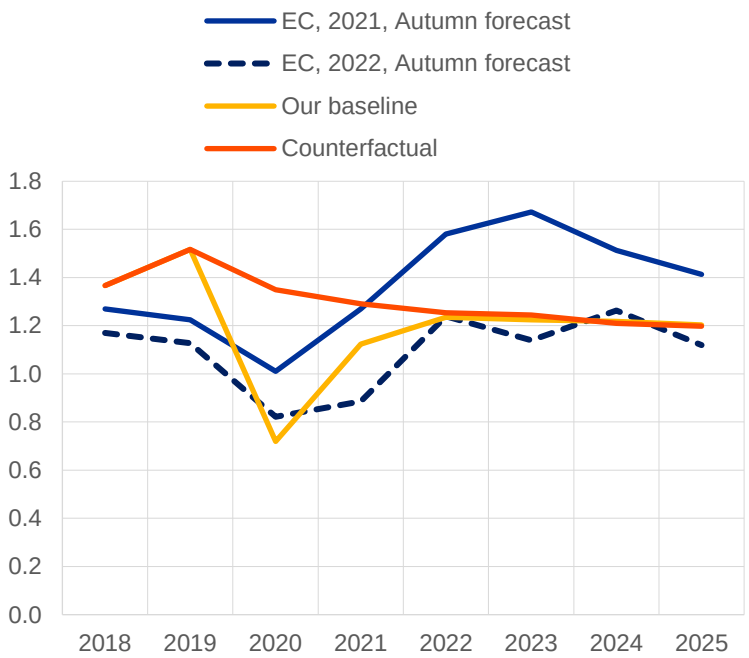
Sectoral losses in 2025
(percentage point)



Source: ECB Staff calculations

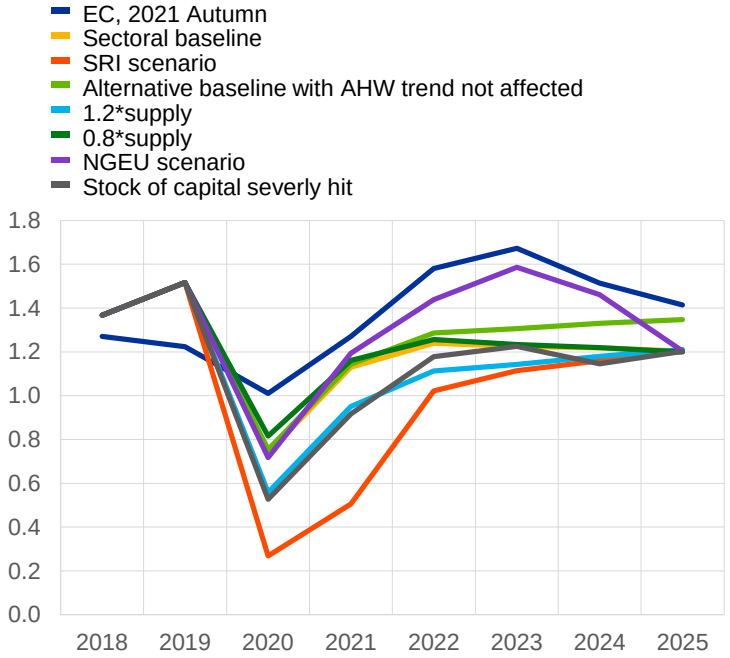
Results: aggregate developments

Aggregate potential growth
(annual percentage change)



Source: ECB Staff calculations

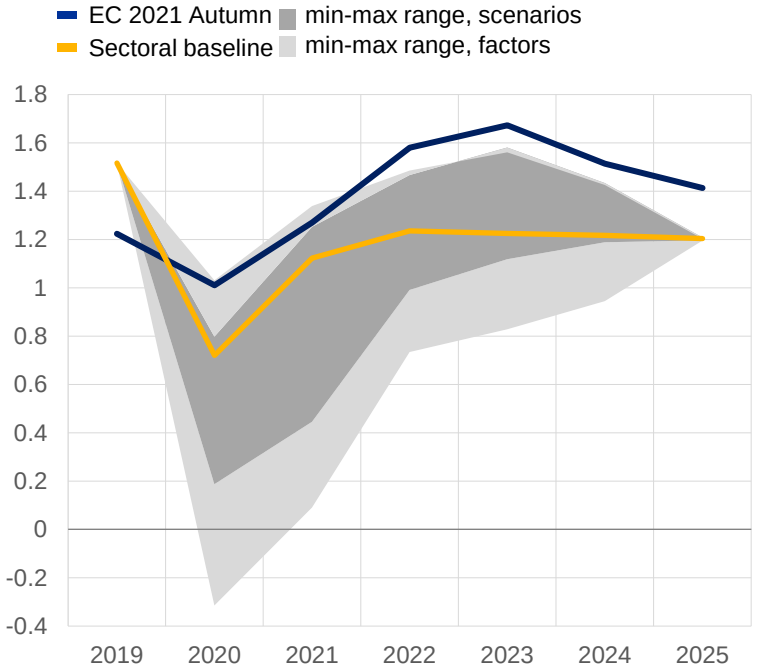
Aggregate potential growth – scenarios
(annual percentage change)



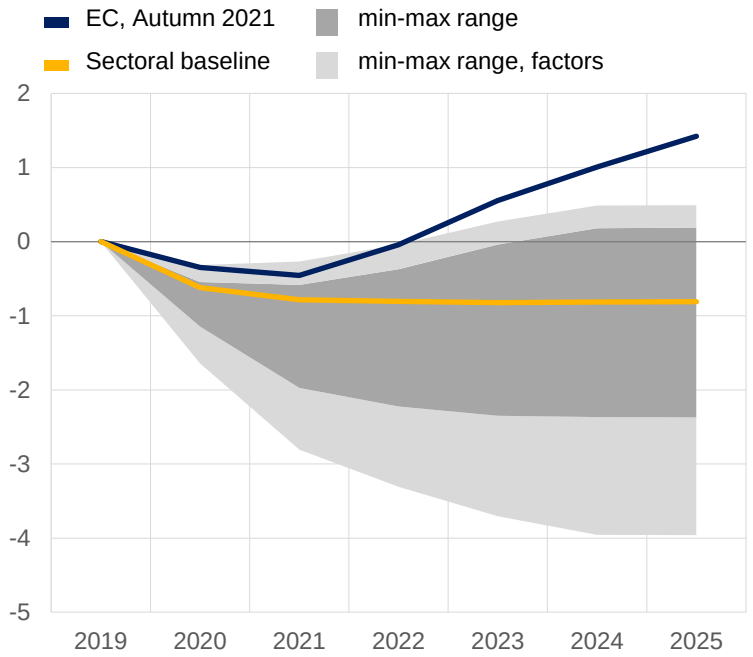
Source: ECB Staff calculations

Results: aggregate developments

Range of potential output growth estimates
(annual percentage change)



Range of the estimated aggregate loss in level
(percentage point)

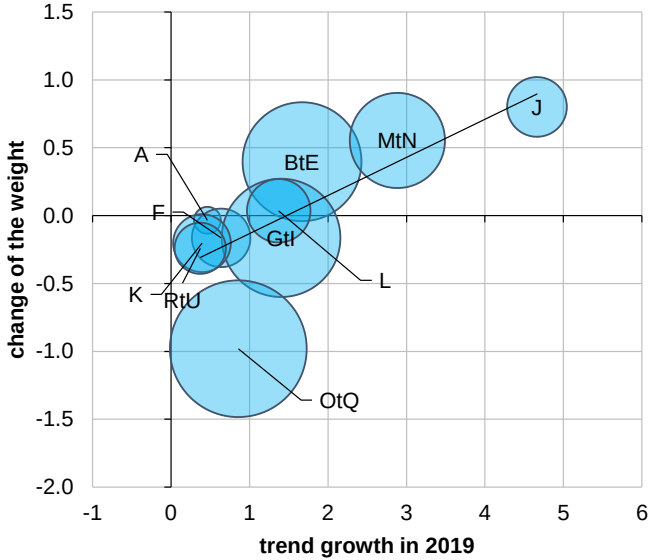


Source: ECB Staff calculations
Notes: the min-max range of factors shows the potential output growth calculated with the minimum/maximum level of the three factors of production across all scenarios.

Results: sectoral reallocation

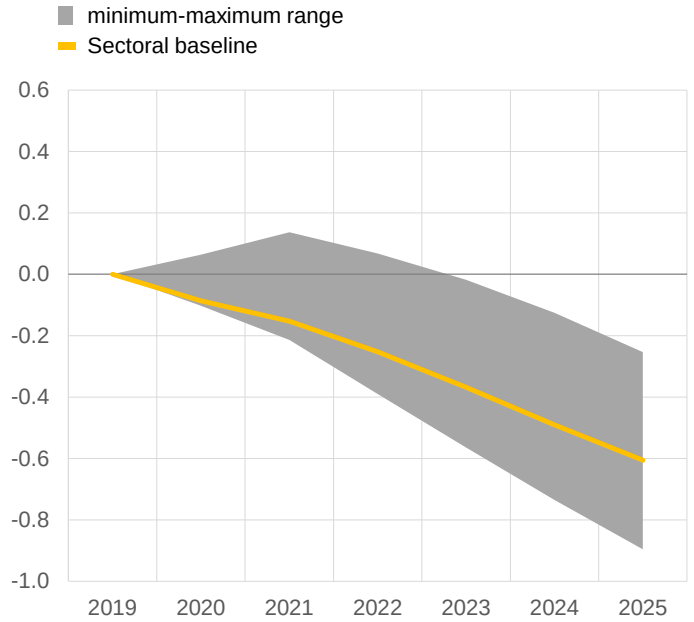
The impact of sectoral reallocation on aggregate potential growth in our baseline scenario

(x axis: percent, y axis: percentage point)



The impact of sectoral reallocation on the level of aggregate potential output

(percent)



Source: ECB Staff calculations

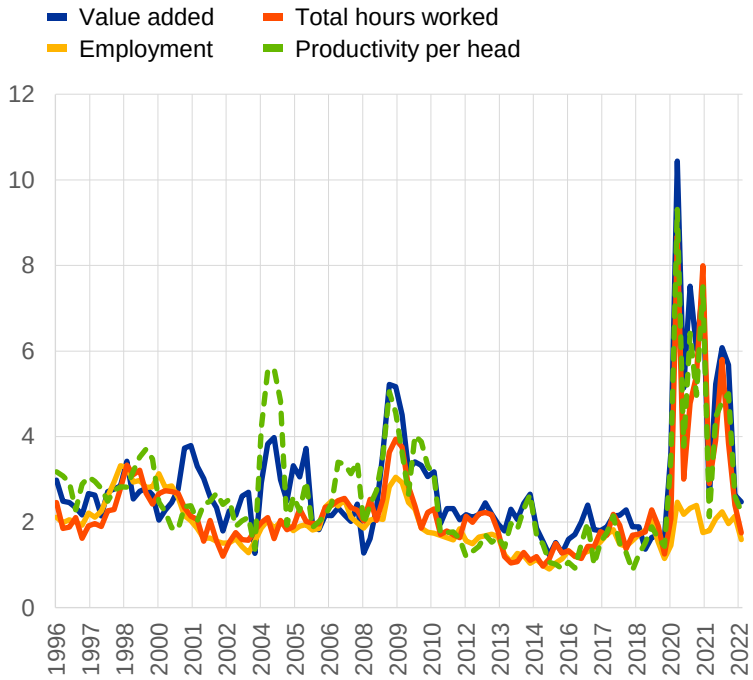
Note: the size of the bubbles represents the sector's value added weight in 2019.
A - Agriculture, forestry and fishing; BtE – Industry (except construction); F - Construction; GtI – Wholesale and retail trade, transport, accommodation; J – Information and communication; K – Financial and insurance services; L – Real estate activities; MtN – Professional, scientific and technical activities; administrative and support service activities; OtQ – Public administration, defence, education, human health and social work activities; RtU - Other services

Conclusions

- We developed a novel approach to estimate potential output as an aggregation of sectoral trends. It is a flexible tool that can incorporate further variables and assumptions.
- Our baseline estimates pointed to downside risks to available real-time potential output growth estimates in 2020 and beyond for the euro area.
- Losses in some services sectors and sectoral reallocation needs may be considerable given (accelerated) structural changes.
- At the same time, upside risks linked to the positive implication for potential growth of a boost in technology adoption ("*accidental digitalisation*").
- The methodology can be used in the future to assess the impact of other sector-specific shocks.

RESERVE SLIDES

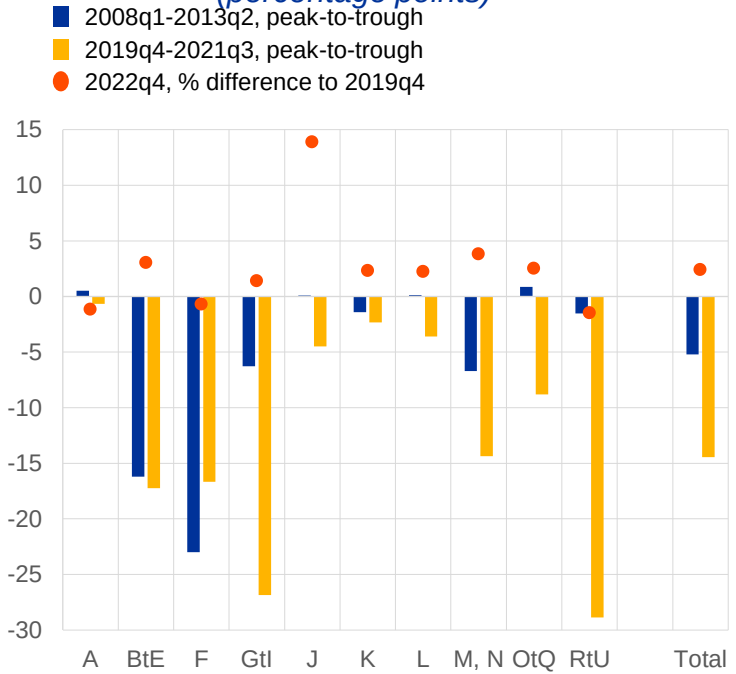
Standard deviation of indicators across euro area sectors



Source: Eurostat, ECB Staff calculations
Notes: standard deviation of annual growth rate of selected indicators by sectors
Last observation: 2022q4.

Peak-to-trough developments in sectoral value added in the euro area

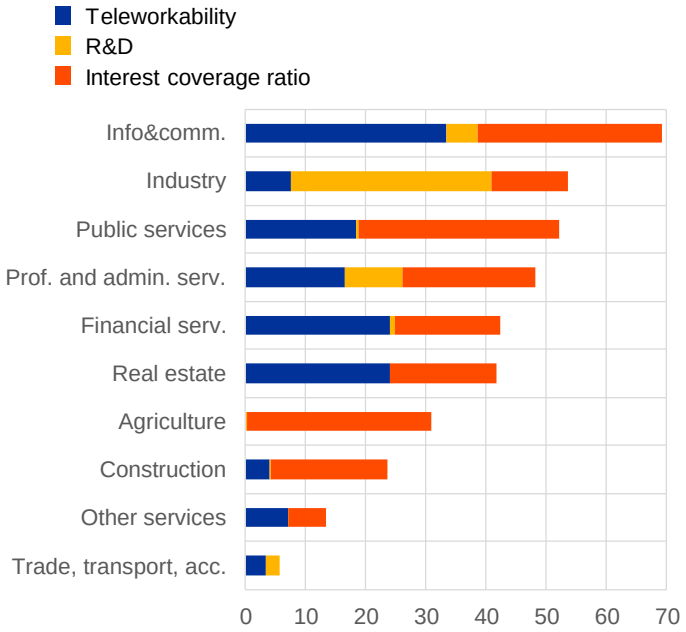
(percentage points)



Source: Eurostat, ECB Staff calculations
Notes: 2008q1-2013q2: minimum value between 2008q1 and 2013q2, compared to 2007q4; 2019q4-2021q2: minimum value between 2020q1 and 2021q2, compared to 2019q4.

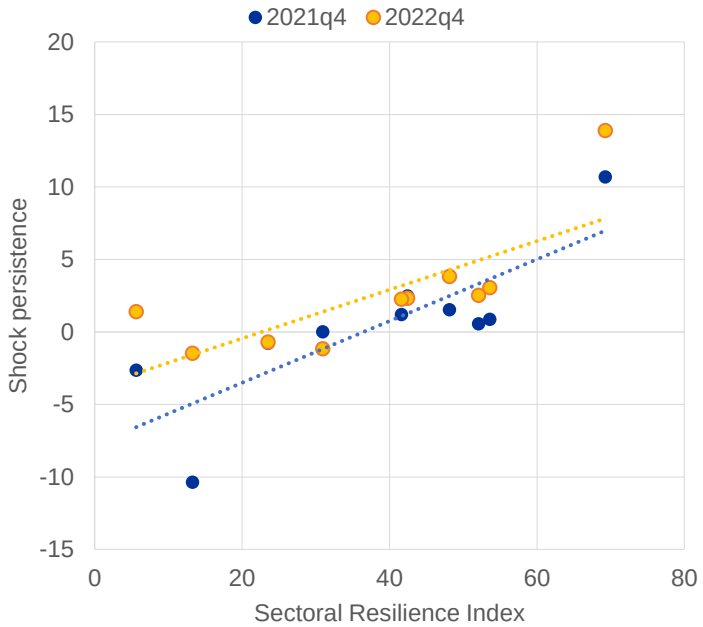
Trend estimation in 2020

Sectoral resilience index



Source: OECD , ECB Staff calculations
Notes: the SRI includes (i) the share of employees in potentially teleworkable jobs; (ii) R&D expenditure and (iii) the percentage of firms whose interest coverage ratio does not fall below unity

The sectoral resilience index (SRI) and the persistence of the shock



Source: OECD, Eurostat and ECB Staff calculations. Notes: shock persistence is calculated as the percentage difference of sectoral value added in 2021q4 from 2019q4.

Data

We analyze 10 sectors.

NACE code	A	BtE	F	GtI	J	K	L	MtN	OtQ	RtU	TOT
Title	Agriculture, forestry and fishing	Industry (except construction)	Construction	Wholesale and retail trade, transport, accomodation	Information and communication	Financial and insurance services	Real estate activities	Professional, scientific and technical activities; administrative and support service activities	Public administration, defence, education, human health and social work activities	Other services	Total

Regressions

- TFP and L estimation, 2020:

$$\bar{x}_t^k = \bar{x}_{t-4}^k + (\bar{x}_{t-4}^k - \bar{x}_{t-8}^k) + (x_t^k - x_{t-4}^k) \times bvar_t^k \times Max((50 - SRI^k), 0)$$

- K, 2020-2023:

$$dlog(GFCF_{t,i}) = \beta_0 + \beta_1 . dlog(VA_{t,i}) - \beta_2 . (log(GFCF_{t-1,i}) - log(VA_{t-1,i})) + \varepsilon_{i,t}$$