Philip R. Lane
Member of the Executive Board

Data analysis and monetary policy during the pandemic

Central Bank of Ireland webinar "The importance of data: statistics during the pandemic and beyond"

7 October 2021

- Official statistics (monthly, quarterly, annual)
- Comprehensive national accounting framework (flows; balance sheets)
- Granular data (administrative, regulatory, surveys, commercial)
- Globalisation of firms; financial complexity; cross-border linkages
- ***High-frequency shocks and policy surveillance***
- [European Statistical Forum, 26 April 2021]

High-frequency data: policy making

- Signal to noise ratio: often unfavorable, but pandemic an exception

- Financial market data: always available

- Macroeconomic variables: intra-quarter turning points; early warning indicators

- Representativeness of indicators: scope; stability

- Supplementary role; not a replacement for official statistics

EA stringency of
containment measures
(index 0 to 100)
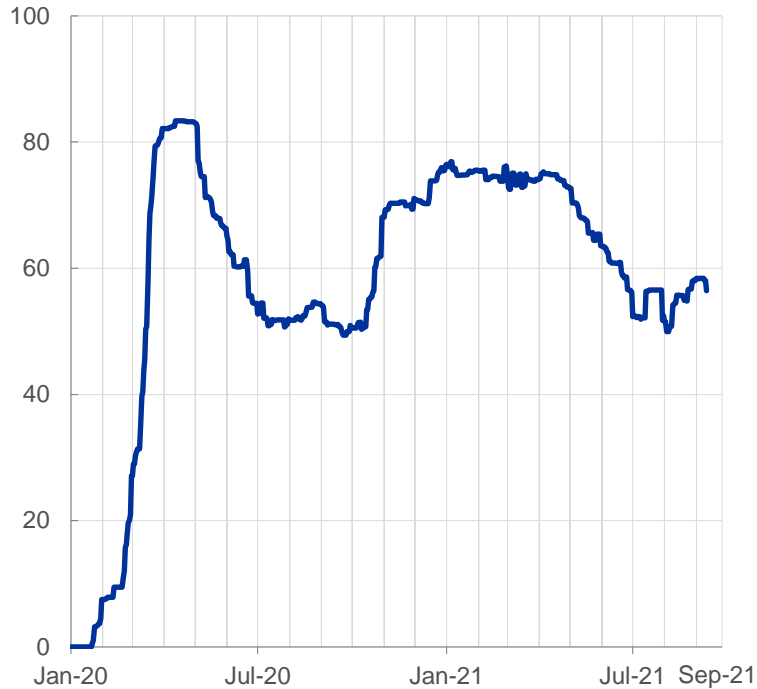
Source: University of Oxford, Government Response Tracker, ECB calculations.
Notes: The euro area stringency index is calculated as the weighted average of the
stringency index for the 19 euro area countries. Latest observation: 24 September 2021.

EA mobility indicators
(percentage change on baseline,
7-day moving average)

Source: Google Mobility report, ECB calculations. Notes: The mobility indicator is the
aggregation of the mobility indicators for retail and recreation, workplaces and transit
stations. The euro area indicator is calculated as the weighted average for the 19 euro
area countries. Latest observation: 28 September 2021.
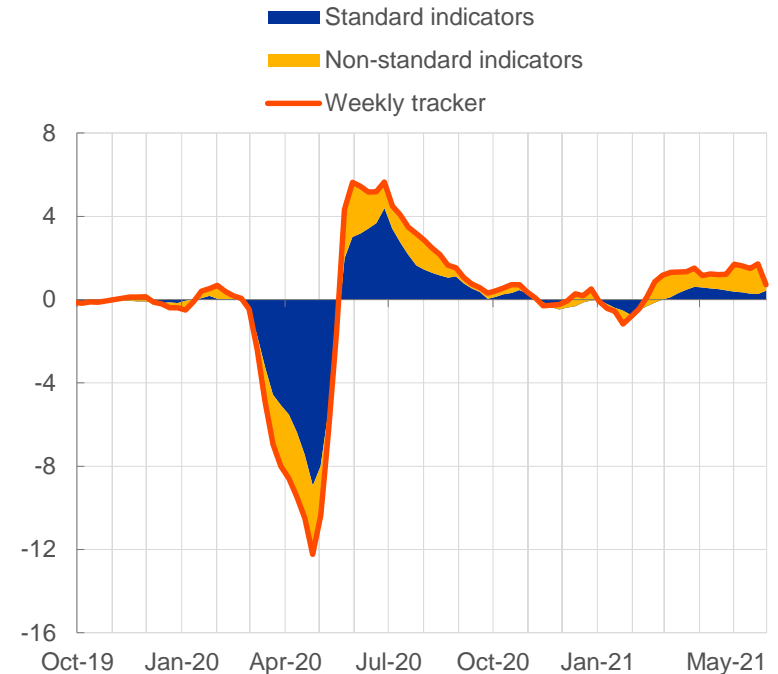
Weekly economic activity tracker

Weekly economic activity tracker
(index, 100=December 2019)

— Weekly economic activity tracker
— GDP
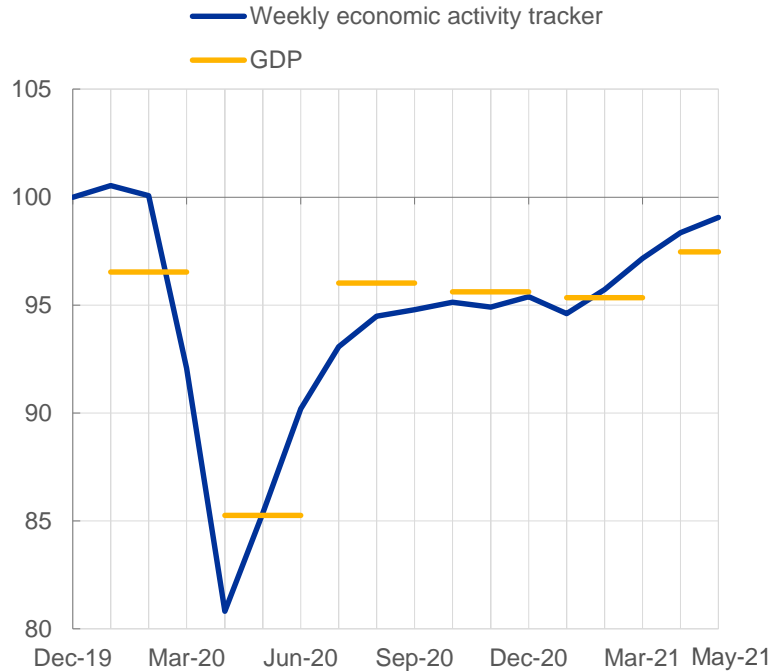
Weekly economic activity tracker
(month-on-month percentages; contributions)

■ Standard indicators
■ Non-standard indicators
— Weekly tracker

Source: Eurostat, ECB staff calculations.
Notes: The weekly economic activity tracker combines weekly and monthly indicators using principal components. The weekly frequency indicators are electricity consumption, German HGV toll mileage index, Google searches (restaurants, jobs, travel, hotels) and financial indicators (CISS, EURO STOXX, VSTOXX). The monthly frequency indicators are airport cargo and employment for the four largest euro area countries, euro area industrial production, industrial orders, car registrations, retail sales (volume), intra and extra euro area exports of goods (value), PMI composite output and economic sentiment indicator. The contributions are not computed in real time, therefore the role of non-traditional indicators in 2020 could be underestimated. Latest Observation: 29 May 2021.

Card spending in Ireland
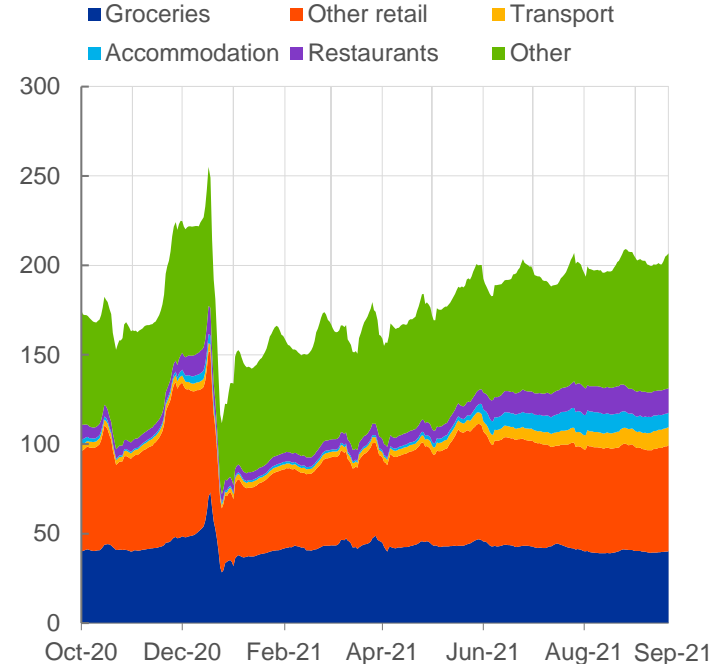
Daily card spending
(7-day moving average; index, 100=1 Mar. 2020)
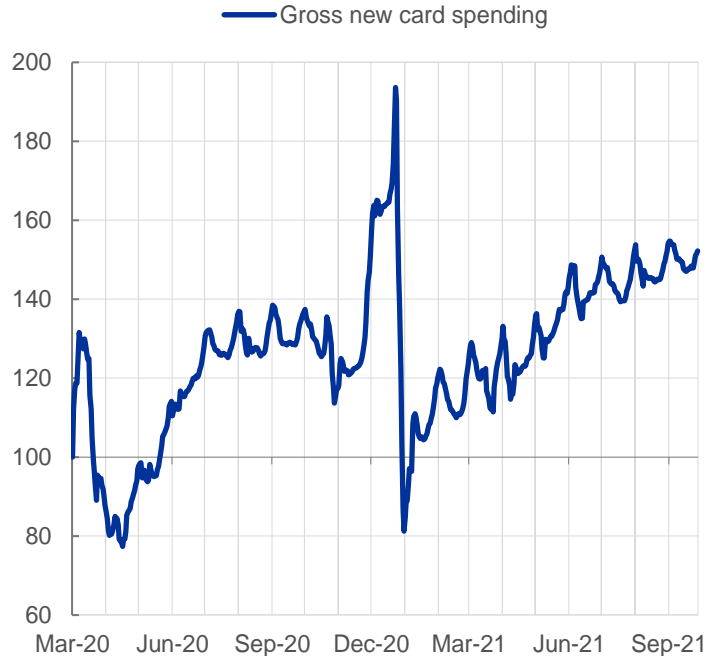
Gross new card spending

Source: Central Bank of Ireland, ECB staff calculations.
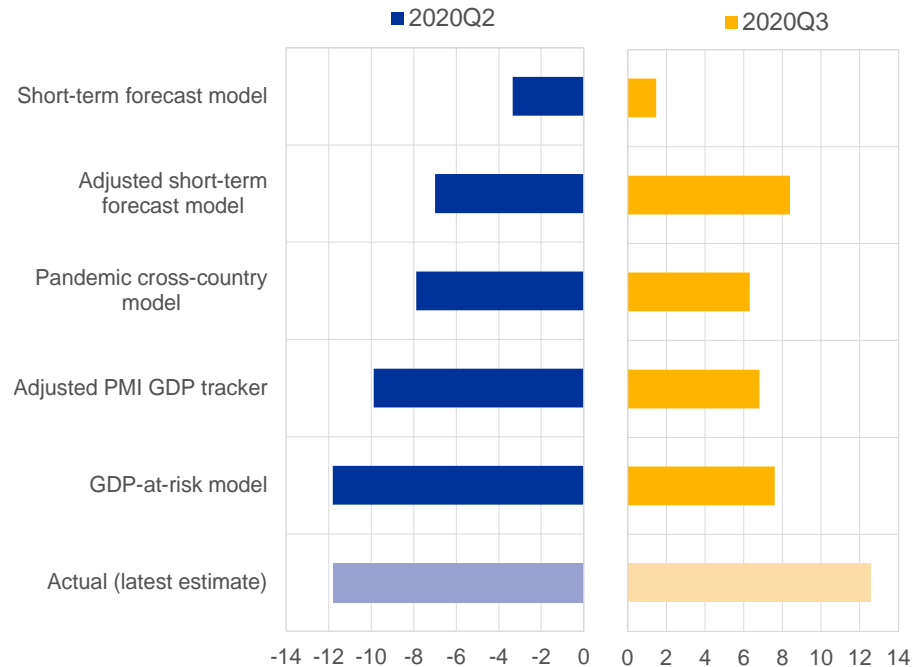Latest observation: 27 September 2021.

Breakdown of card spending
(millions of euros; 7-day moving average)

Groceries · Other retail · Transport · Accommodation · Restaurants · Other

Source: Central Bank of Ireland, ECB staff calculations.
Latest observation: 27 September 2021.

Forecasts of euro area real GDP growth using non-standard models
(quarter-on-quarter growth rate in percentages)

■ 2020Q2   ■ 2020Q3

Categories (top to bottom): Short-term forecast model; Adjusted short-term forecast model; Pandemic cross-country model; Adjusted PMI GDP tracker; GDP-at-risk model; Actual (latest estimate)

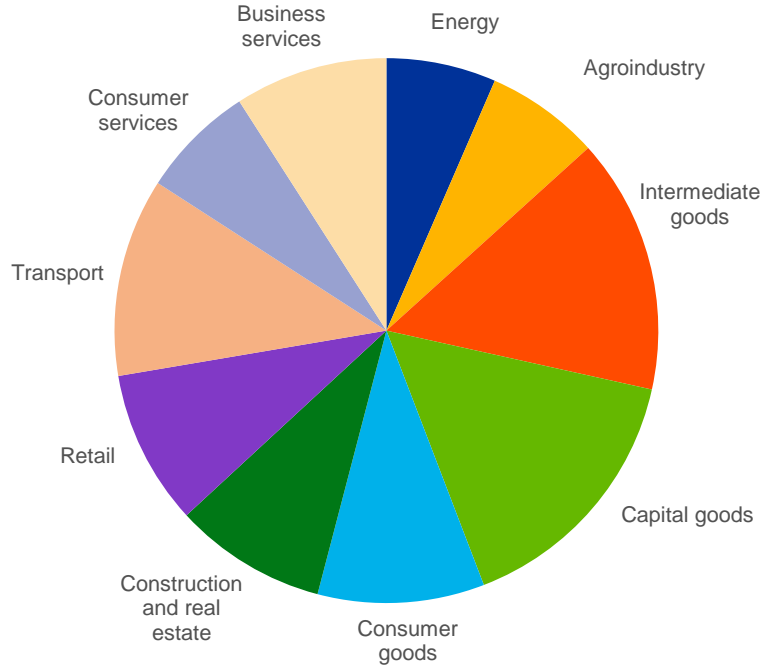X-axis: -14 -12 -10 -8 -6 -4 -2 0   0 2 4 6 8 10 12 14

Source: Eurostat, Hale et al. (2020), IHS Markit, ECB staff calculations.
Notes: The adjusted short-term forecast model includes information from weekly credit card payments and other standard indicators which were available 15 days before the release of the preliminary flash estimate of GDP. The adjusted PMI GDP tracker refers to a non-linear PMI composite output-based rule, which takes into account both the quarterly change in this index and previous GDP growth. The GDP-at-risk model uses the 5% left tail of the conditional distribution for the second quarter of 2020 and, given the expected sharp rebound, the 1% right tail of the conditional distribution for the third quarter of 2020. All of the reported real GDP forecasts are real-time estimates.
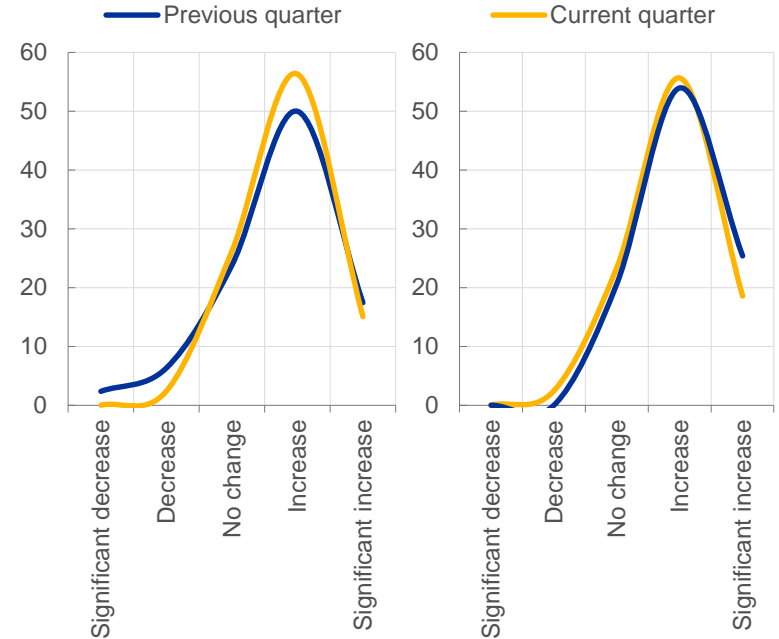
The ECB dialogue with non-financial companies

Distribution of participating companies across broad economic sectors
(share of total companies)

Source: ECB Corporate Telephone Survey (CTS) – January 2021.
Notes: The chart shows the distribution across sectors of companies contacted during 2020. The allocation refers to the organisation of the survey and not to the sectors for statistical classification purposes. Many companies operate in more than one sector (e.g. consumer goods manufacturers may also have retail outlets).

Summary of views on developments in and the outlook for activity and prices
(percentage of respondents; lhs: activity; rhs: prices)
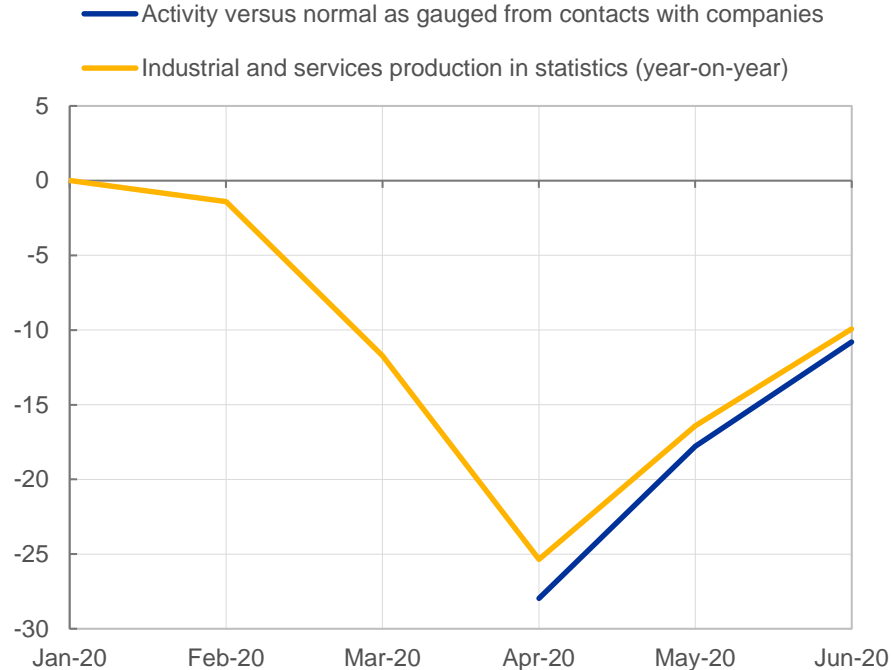

Source: ECB Corporate Telephone Survey (CTS) – July 2021.
Notes: The scores for the previous quarter reflect the ECB staff assessment of what contacts said about developments in activity (sales, production and orders) and prices in the second quarter of 2021. The scores for the current quarter reflect the assessment of what contacts said about the outlook for activity and prices in the third quarter of 2021.

These contacts normally used to gather anecdotal evidence helped gauge the initial impact on activity at the height of the pandemic
(percentages; year-on-year growth rate)

— Activity versus normal as gauged from contacts with companies

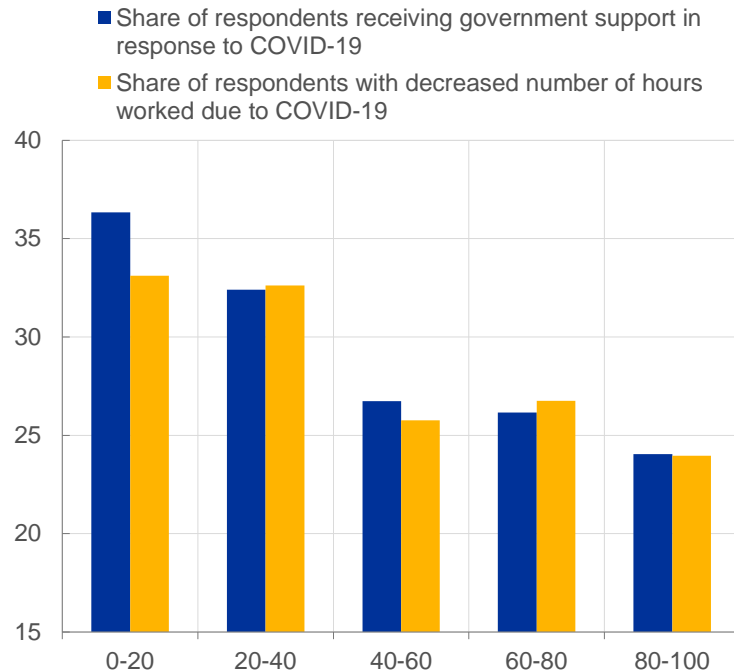— Industrial and services production in statistics (year-on-year)

Sources: ECB contacts with non-financial companies, Eurostat, ECB staff calculations.
The blue line reports a weighted average of what companies said about where activity in their firm/sector stood compared with a "normal" level, weighted by the share of the corresponding sector in euro area gross value added. The yellow line shows the year-on-year change in production of the corresponding sectors as released by Eurostat. Latest observation: June 2020.

Lower hours worked and government support
(x-axis: income percentiles; y-axis: percentage of respondents)

■ Share of respondents receiving government support in response to COVID-19

■ Share of respondents with decreased number of hours worked due to COVID-19
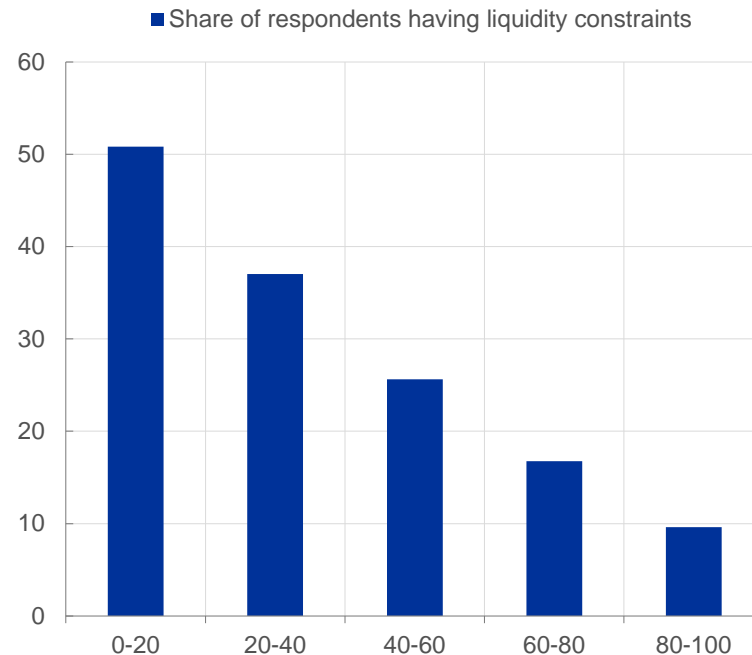

Source: ECB Consumer Expectations Survey (CES) – June 2020 wave.
Notes: All reported numbers are aggregated using individual household weights.

Liquidity-constrained households
(x-axis: income percentiles; y-axis: percentage of respondents)

■ Share of respondents having liquidity constraints

Source: ECB Consumer Expectations Survey (CES) – June 2020 wave.
Notes: All reported numbers are aggregated using individual household size weights.

Saving and spending intentions

Household deposits, loans and currency
(change on December 2019; percentage point of disposable income)

Legend:
- Currency in circulation
- Loans to households (inverted sign)
- Household deposits
- Saving rate
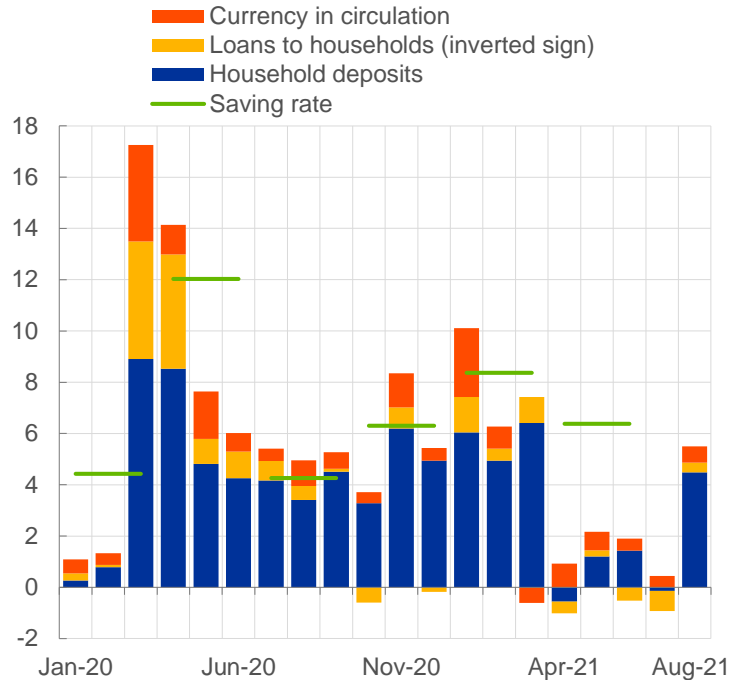
Source: ECB.
Notes: Loans to households are reported with an inverted sign. As no breakdown by holding sector is available, the contribution of currency flows should be considered as an upper bound.
Latest observation: August 2021.

How will *accumulated* net savings be allocated in the next 12 months?
(per cent of net savings)

Legend:
- Full sample
- COVID-19-related motivations
- Other motivations
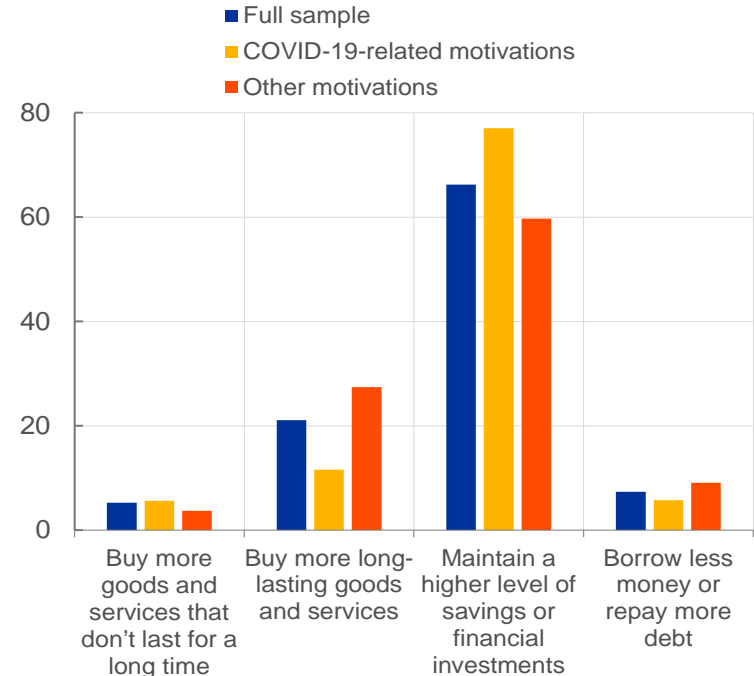
Source: ECB Pilot Consumer Expectations Survey – March 2021 wave.
Notes: Net savings refer to the amounts of deposits and financial assets accumulated since January 2020 by savers minus dissavers.

The frontier: an example from the United States

Employment
(index, 100=Jan. 2020)

- Total employment
- Employment low wage earners
- Employment high wage earners
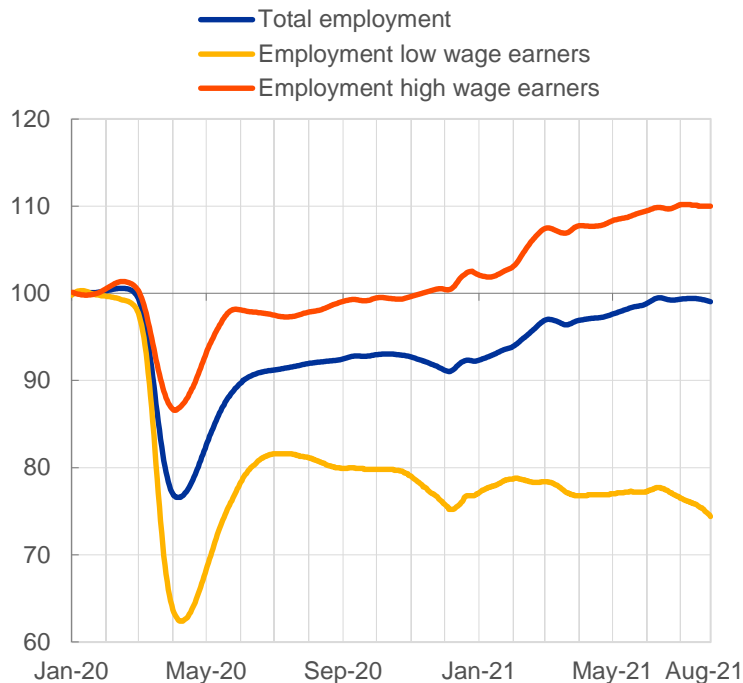
Source: Opportunity Insights.
Notes: Change in employment, indexed to 4 - 31 January 2020, not seasonally adjusted. Low and high wage earners are defined as the first and fourth earnings quartiles. The series is based on data from Earnin, Intuit, Kronos, and Paychex.
Latest observation: 10 August 2021.

Consumer spending
(index, 100=Jan. 2020)

- Spending low income households
- Spending high income households
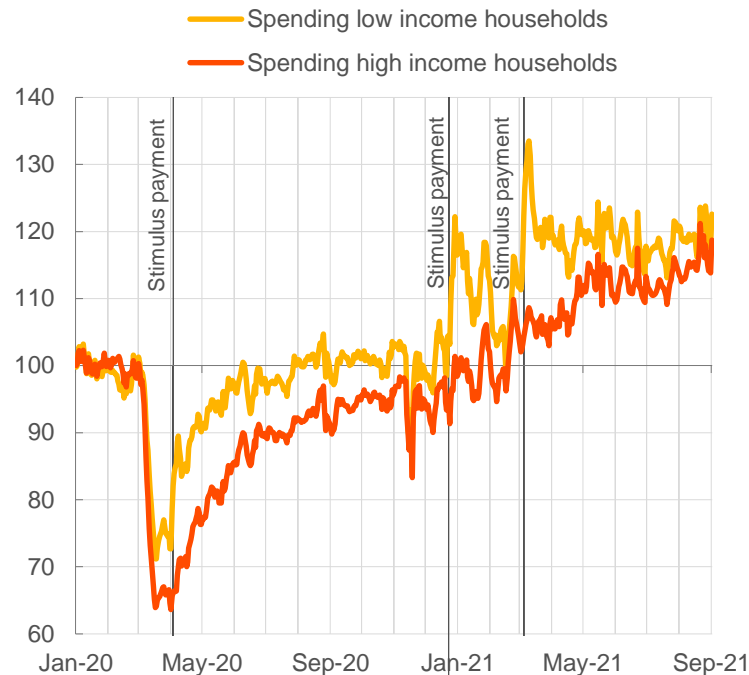
Source: Opportunity Insights.
Notes: Change in average consumer credit and debit card spending, indexed to 4-31 January 2020, and seasonally adjusted. Low and high income households are defined as first and fourth income quartiles. Vertical lines refer to the start of the three stimulus payments to households (15 April 2020, 4 January 2021, 17 March 2021). The series is based on data from Affinity Solutions. Latest observation: 13 September 2021.

www.ecb.europa.eu ©

Global trade
(indices, 2019Q4 = 100)
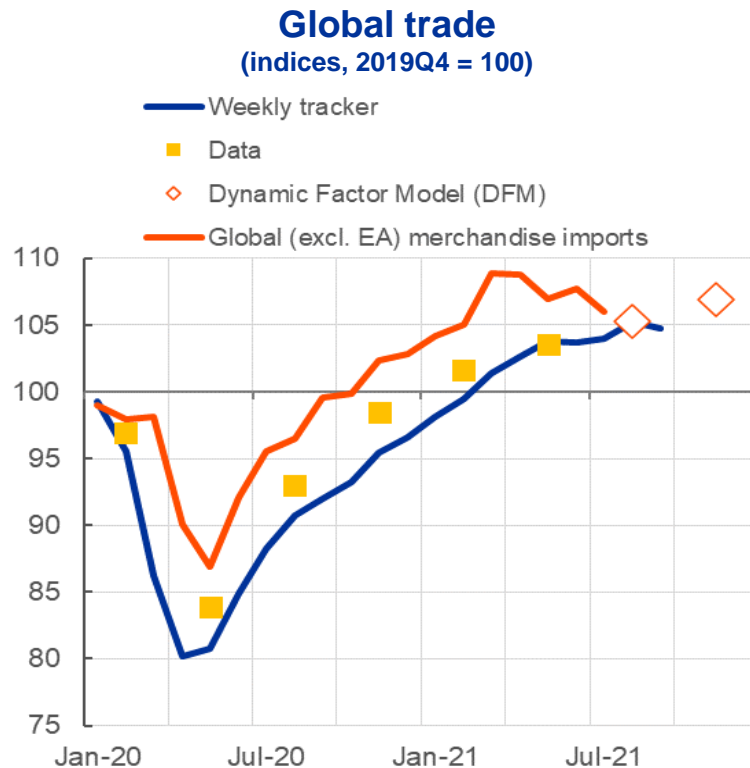
Sources: CPB and ECB staff calculations.
Notes: The tracker is based on the first principal component of weekly and monthly variables that have been chosen based on their correlation with global trade excl. the euro area.
Dynamic Factor Model (DFM) refers to a quarterly forecast from a dynamic factor model that combines monthly trade indicators with a reduced version of the tracker above.
Latest observations: July 2021 (CPB), September 2021 (tracker), 2020Q2 (data), diamonds refer to forecasts for Q3 and Q4 2021.

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High-frequency labour market indicators: hiring rate and job postings

LinkedIn hiring rate (standardised)
(%-deviations from sample mean)
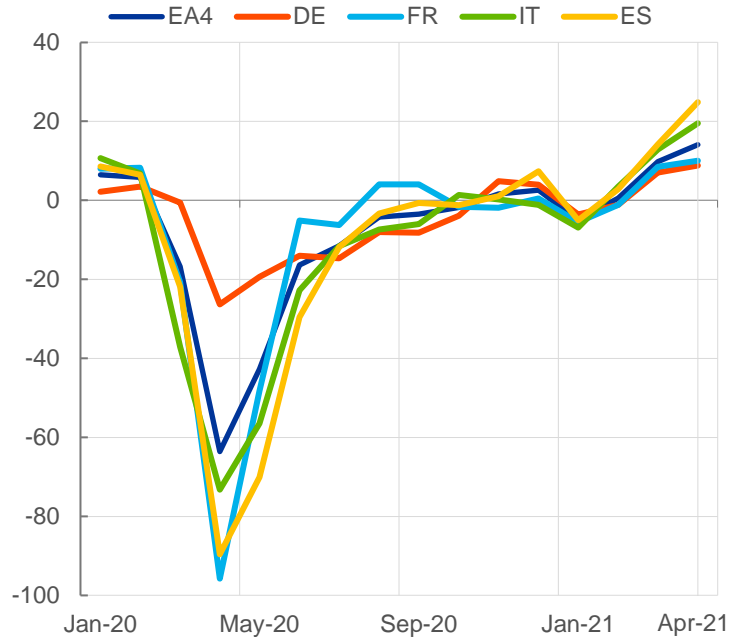
Indeed job postings
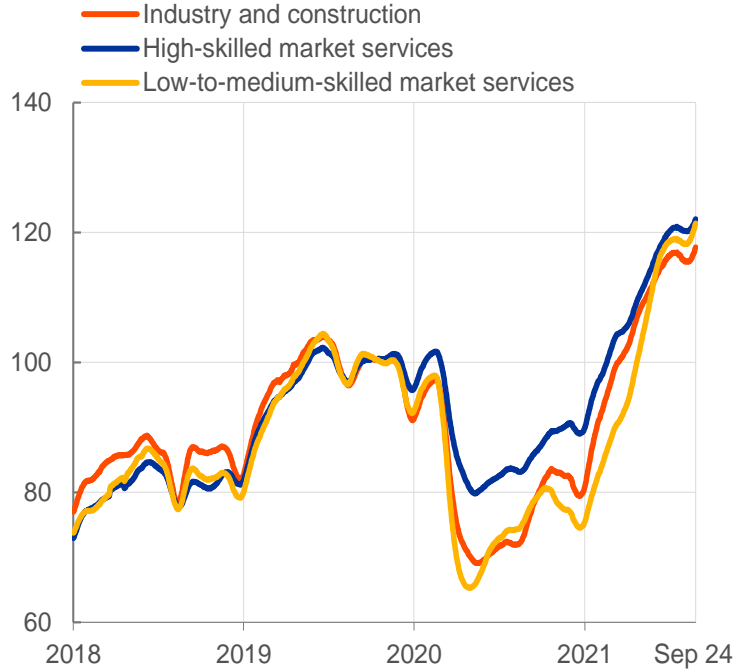### (year-on-year growth rates, percentages)
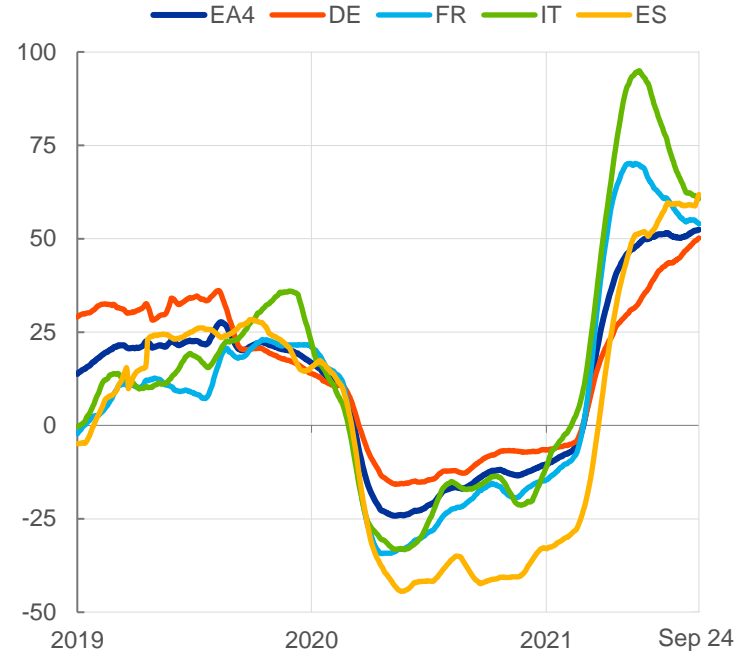
Sources: LinkedIn, Indeed and ECB calculations.
Notes: The methodology behind the high-frequency indicators on new hires and job postings is documented in the box entitled "High-frequency data developments in the euro area labour market", Economic Bulletin, Issue 5, ECB, 2020 and in the box entitled "Monitoring labour market developments during the pandemic", which is published as Box 1 in the article entitled "Using machine learning and big data to analyse the business cycle", Economic Bulletin, Issue 5, ECB, 2021. Latest observation: April 2021 for the LinkedIn hiring rate and September 24, 2021 for the Indeed job postings.

Job postings by sector
(30-day moving average, 2019H2=100)

— Industry and construction
— High-skilled market services
— Low-to-medium-skilled market services
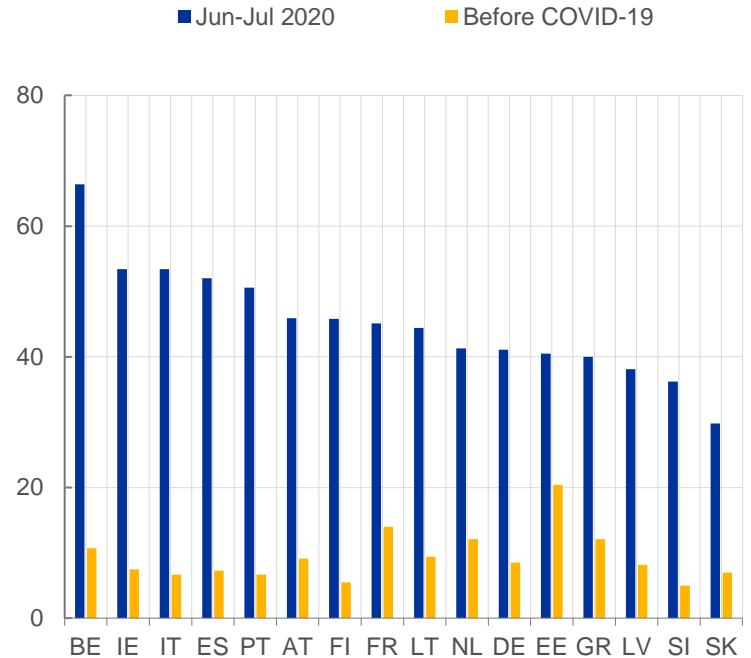

Sources: Indeed and ECB calculations.
Notes: Aggregation of Indeed occupation data to high and low-to-medium skilled follows ISCO-88.
Data are available for 8 euro area countries: DE, FR, IT, ES, NL, BE, AT and IE.
Latest observation: 24 September, 2021.
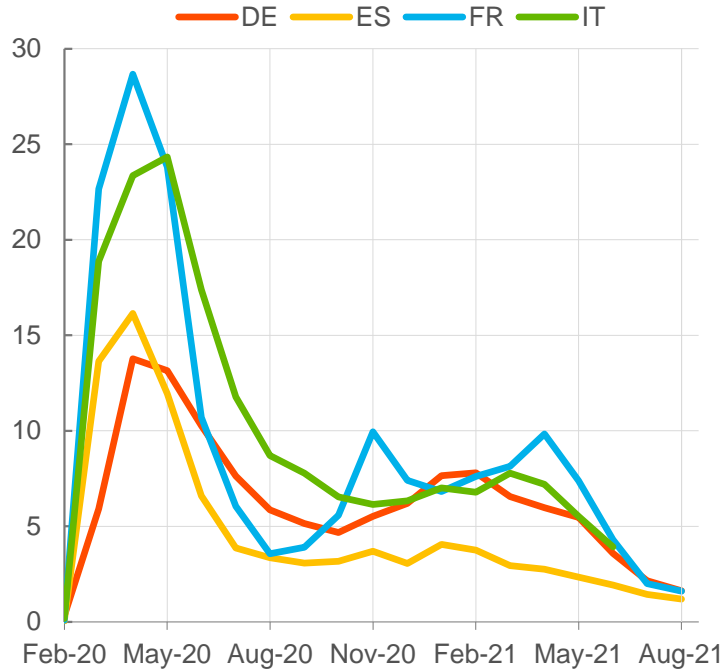
Working from home
(% of employment)

■ Jun-Jul 2020   ■ Before COVID-19

Source: Eurofound (2020), Living, working and COVID-19 dataset, Dublin,
http://eurofound.link/covid19data.

Role of job retention schemes and the "shadow" unemployment rate

Job retention schemes
(percentage of the labour force)

— DE — ES — FR — IT
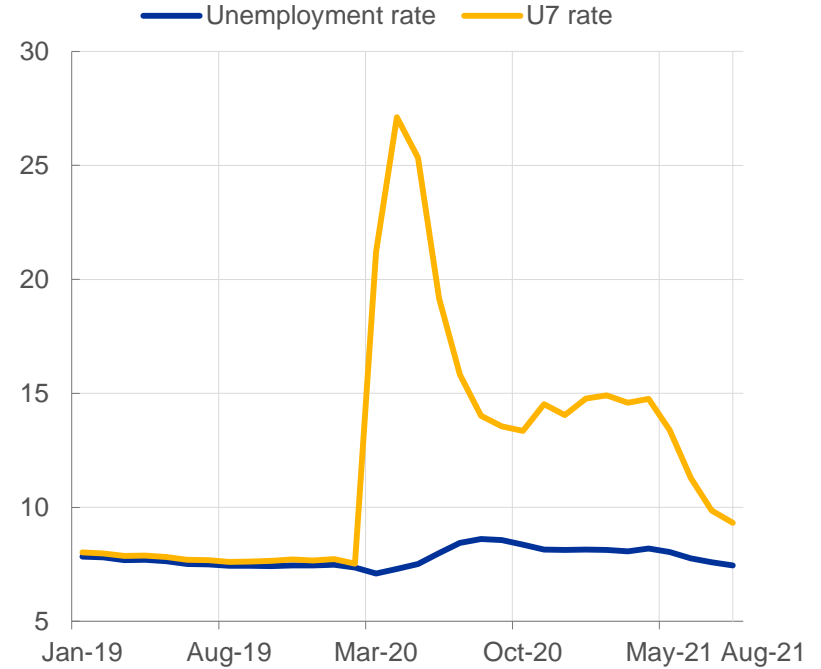

Sources: ECB calculations based on data from Eurostat, Institute for Employment Research (Institut für Arbeitsmarkt- und Berufsforschung – IAB), ifo Institute, Ministère du Travail, de l'Emploi et de l'Insertion, Instituto Nazionale Previdenza Sociale (INPS), and Ministerio de Inclusión, Seguridad Social y Migraciones. Latest observations: August 2021 for Germany, France and Spain, and June 2021 for Italy.

"Shadow" unemployment rate – the U7
(percentage of the labour force)

— Unemployment rate — U7 rate

Sources: ECB calculations based on data from Eurostat, Institute for Employment Research (Institut für Arbeitsmarkt- und Berufsforschung – IAB), ifo Institute, Ministère du Travail, de l'Emploi et de l'Insertion, Instituto Nazionale Previdenza Sociale (INPS), and Ministerio de Inclusión, Seguridad Social y Migraciones. Latest observation: August 2021.
Notes: The job retention schemes data in Italy correspond to June 2021. The U7-series is calculated by augmenting the standard unemployment rate with the number of workers in job retention schemes.
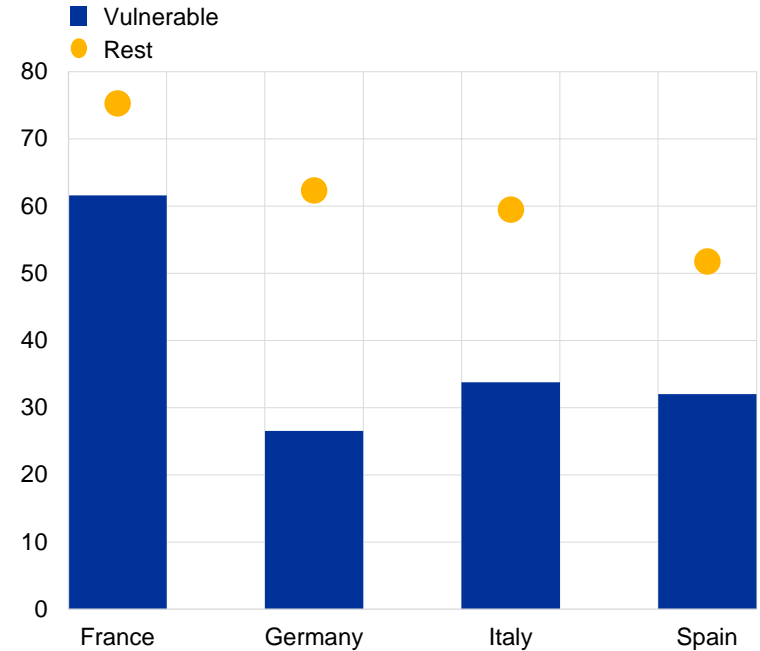
Corporate vulnerabilities and productivity developments

Estimated share of vulnerable firms
(percentages)

Legend: DE, FR, IT, ES
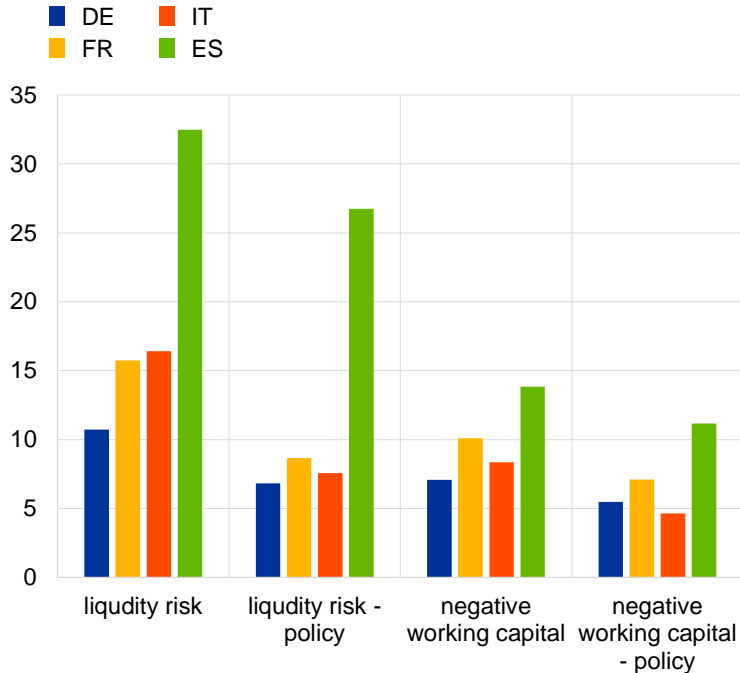
Firms' labour productivity
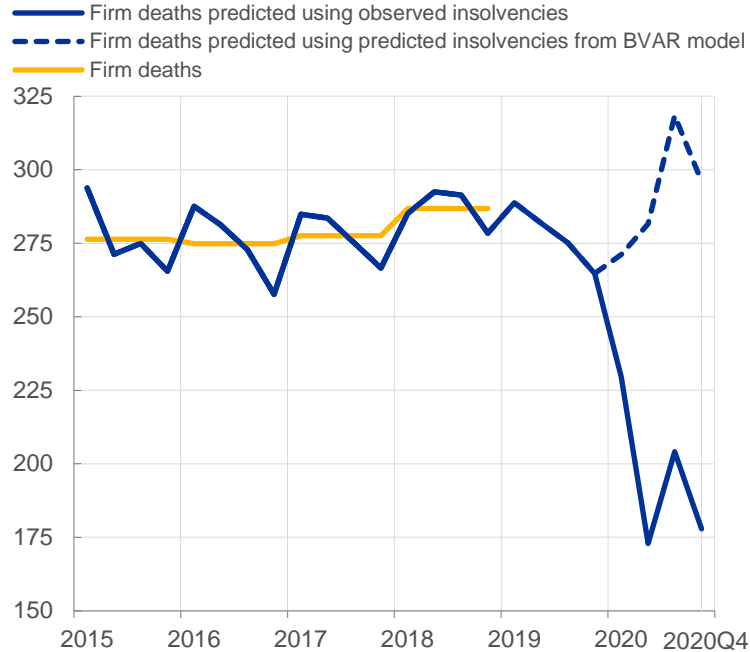### (thousands of euros)

Legend: Vulnerable, Rest

Sources: Orbis-iBACH, Eurostat and ECB calculations.
Notes: Predictions for 2021 based on latest available Orbis-iBACH data until 2018, combined with simulations for liquidity that are derived from sector-value added predictions. Policy includes job retention schemes, government liquidity support, loan and interest moratoria. On the right-hand side, productivity is defined at the firm-level as real value added per employee. The figure reflects the ECB December projections and refer to the peak of the crisis, which is Q4 2021 or Q1 2022 depending on the country. Vulnerable firms are defined as those with negative working capital and at the top 25% of the leverage distribution within their country-sector.
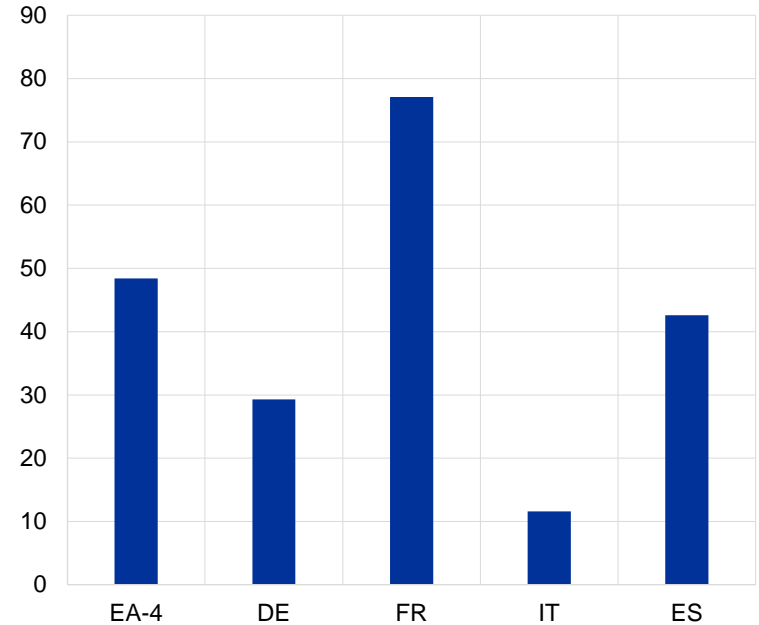
Assessing corporate vulnerabilities and insolvency gaps

Firm deaths – past and predicted
(number of firms in thousands)

- Firm deaths predicted using observed insolvencies
- Firm deaths predicted using predicted insolvencies from BVAR model
- Firm deaths

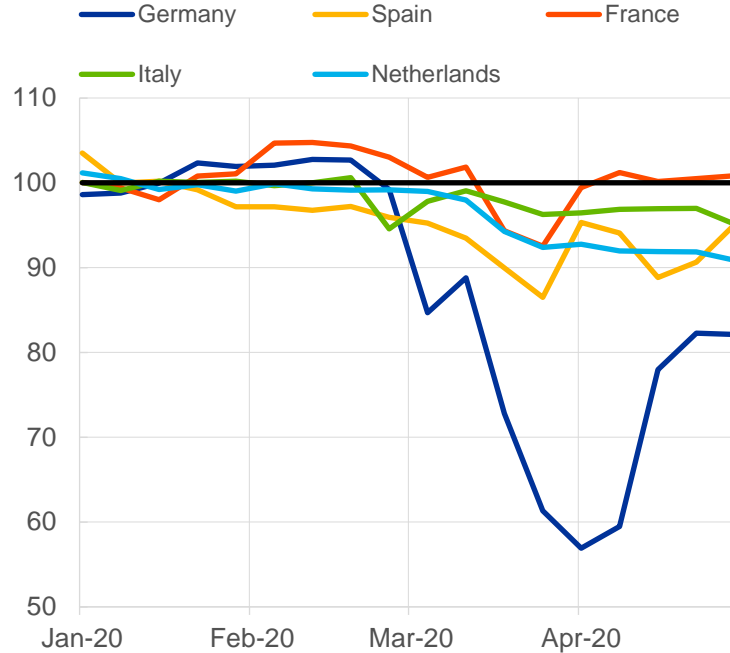

Estimated insolvency gaps in 2020
(percentages)

Sources: Haver, Cerved, Eurostat, ECB staff calculations.
Notes: (LHS) Quarterly data. The paths of firm deaths beyond 2018 is based on the number of observed and predicted insolvencies using the 2018 weighted average share across the four largest EA countries. (RHS) Annual data, seasonally adjusted numbers. Insolvency forecast for 2020 conditional on the observed paths of GDP and unemployment. The gaps are computed as the percent distance between the predicted annual number of insolvencies and the annual observed insolvencies. Predictions based on country-level BVARs for unemployment rate, insolvencies, and the logarithm of real GDP.

Using micro-data to assess impact of lockdowns on product availability and sales

Number of distinct products available online
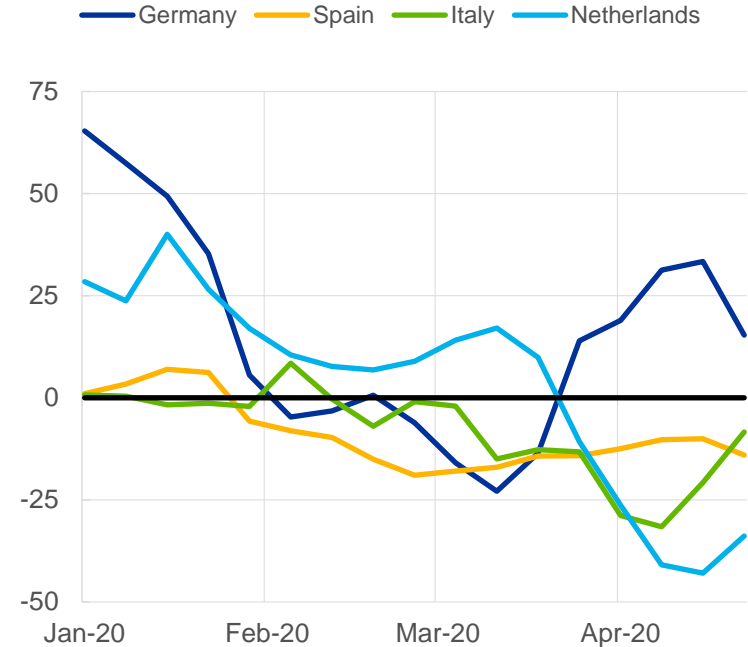### (index, January 2020 = 100)

Germany — Spain — France — Italy — Netherlands

Annual percentage change in the share of products offered at a discount
(annual percentage change)

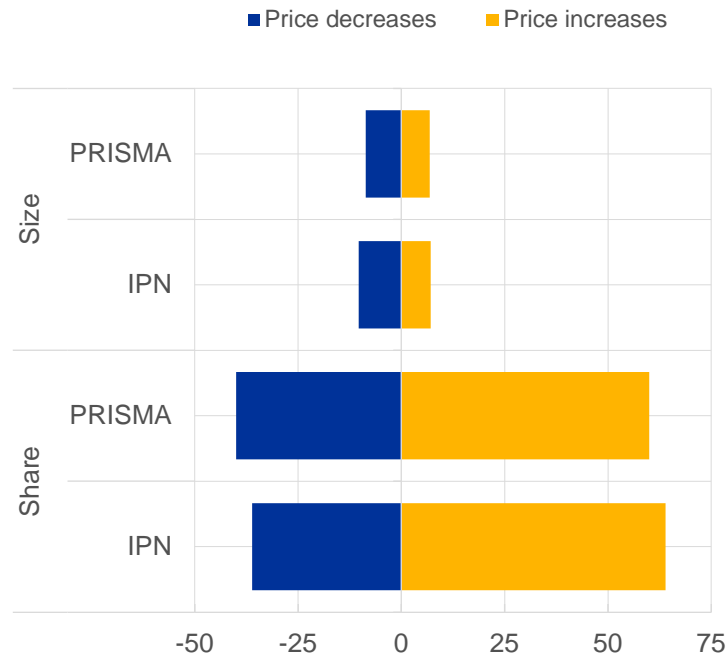Germany — Spain — Italy — Netherlands

Euro area implied duration of price spells based on Inflation Persistence Network (IPN) and PRISMA
(months)
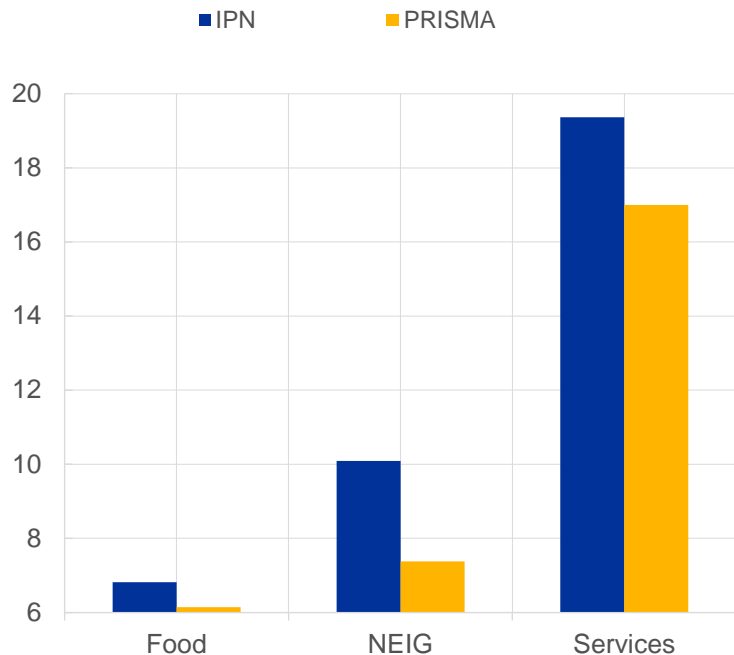
## Share and size of price increases/decreases in the euro area
(percentages)

Source: Consolo, A., G. Koester, C. Nickel, M. Porqueddu and F. Smets (2021) "The need for an inflation buffer in the ECB's price stability objective – the role of nominal rigidities and inflation differentials", ECB Occasional Paper No 279.

Notes:The Eurosystem Inflation Persistence Network (IPN) conducted an in-depth study of inflation persistence and price stickiness in the euro area. See: Altissimo, F., Ehrmann, M. and Smets, F. (2006), "Inflation persistence and price-setting behaviour in the euro area – a summary of the IPN evidence", Occasional Paper Series, No 46, ECB, Frankfurt am Main, June. European Central Bank (2005) "Price-setting behaviour in the euro area", Monthly Bulletin, Frankfurt am Main, November. Within the ESCB PRIce-Setting Microdata Analysis Network (PRISMA) a study analysed price flexibility based on micro data underlying euro area CPIs. See Gautier E., Conflitti, C., Fabo, B., Faber, R., Fadejeva, L., Jouvanceau, V., Menz, J.-O., Messner, T., Petroulas, P., Roldan-Blanco, P., Rumler, F., Santoro, S., Wieland, E. and Zimmer, H. (2021), "New Facts on Consumer Price Rigidity in the Euro Area", ECB Working Paper (forthcoming).

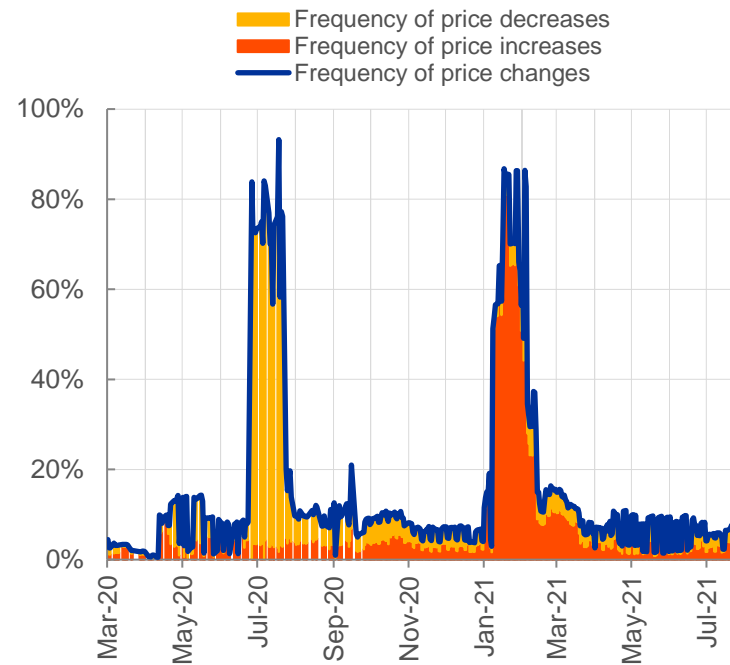# VAT change in Germany: assessing pass-through based on daily web-scraped data

Size of price changes
(monthly percentage change)

Legend: — Month-on-month price change (%)
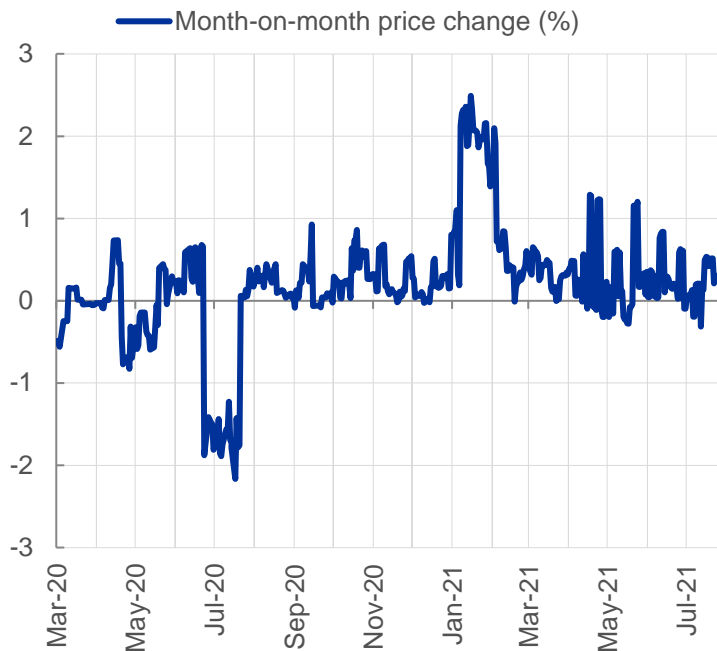
Frequency of price changes
(percentages)

Legend:
- Frequency of price decreases
- Frequency of price increases
- Frequency of price changes

Source: ECB staff calculations.
Notes: Web-scraped data from German online supermarkets, containing information mainly on food, beverages and personal care items. Data is collected daily. The right chart shows the daily unweighted average of 4-week price changes. 4-week price changes are calculated as the percentage change of the price of a product on a given day compared to the price of the same product on the same weekday four weeks before. The left chart shows the daily share of products that experienced a price change compared to four weeks before.
Latest observation: 26 July 2021.

Distribution of the "distance to insolvency" of euro area firms

(x-axis: "distance of insolvency" value – degree of vulnerability, y-axis: density)
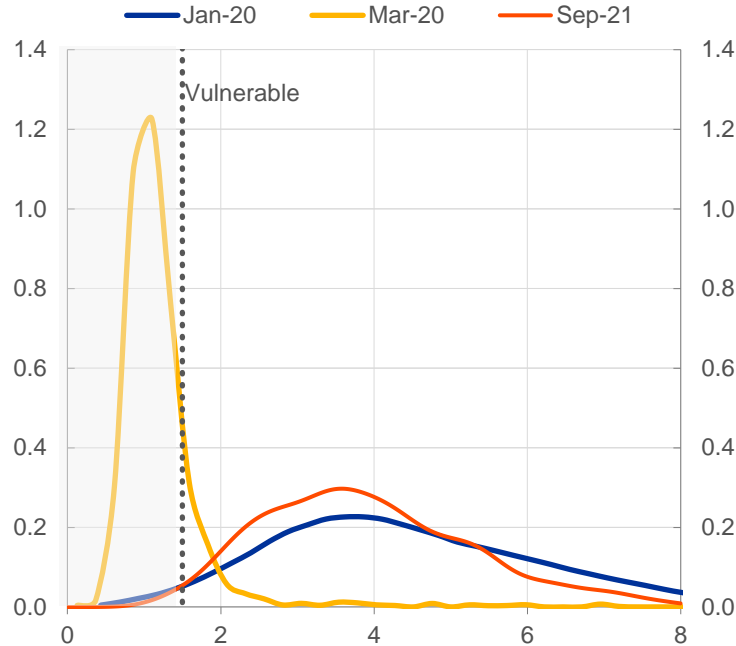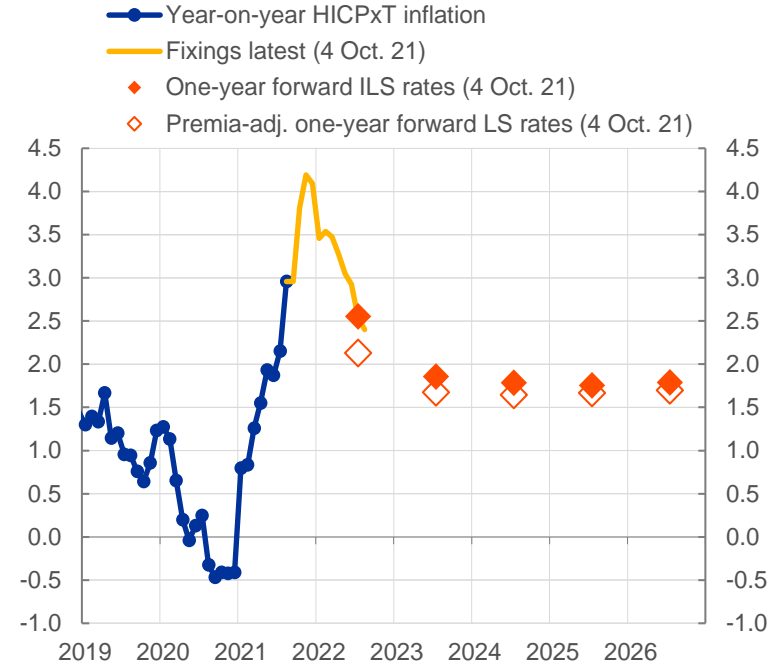

Sources: Refinitiv and ECB calculations.
Notes: The "distance to insolvency" is based on the inverse of the total volatility of the return of a large sample of euro area listed firms. The densities are obtained through a kernel estimator applied to the cross-sectional values of the "distance to insolvency" at the selected dates. The vertical line marks the threshold below which firms are characterised as being vulnerable.
Latest observation: September 2021 (monthly data).

Inflation rates implied by market-based measures of inflation compensation

(percentages per annum)

Sources: Bloomberg, Refinitiv, and ECB calculations.
Notes: HICPxT refers to HICP excluding tobacco. Premia-adjusted forward inflation linked swap (ILS) rates are average estimates based on two affine term structure models following Joslin, Singleton and Zhu (2011), applied to ILS rates (non-adjusted for the indexation lag).
Latest observation: August 2021 for HICPxT.

Market expectations of high inflation and EURO STOXX 50 correction

Option-implied probabilities of high inflation on average over the next five years
(percentages)

Legend:
- EA: Headline above 3%
- EA: Headline above 4%
- US: Headline above 3%
- US: Headline above 4%
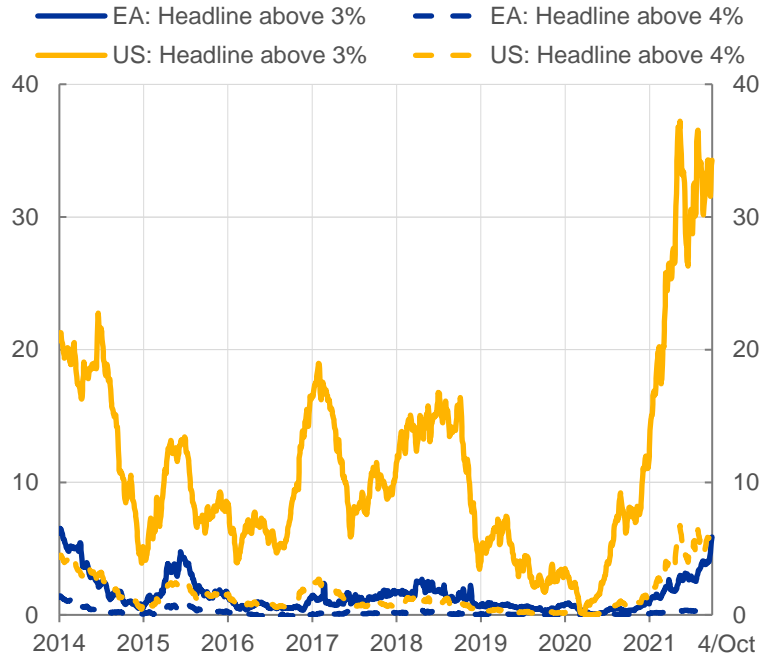
Sources: Bloomberg and ECB calculations.
Notes: Probabilities implied by five-year zero-coupon inflation options, smoothed over five business days. Risk-neutral probabilities may differ significantly from physical, or true, probabilities.
Latest observation: 4 October 2021.

Option-implied risk-neutral probability of large EURO STOXX 50 correction
(percentages)

Legend:
- Risk-neutral probability of price drop in the next three months larger than 20%


Sources: Refinitiv and ECB calculations.
Notes: The probability is derived from the implied risk-neutral distribution of the EURO STOXX 50 priced in option contracts. The methodology for obtaining the distribution follows Shimko (1993). The 3-month horizon is obtained by interpolating between the option contracts available with closest horizons above and below 3 months.
Latest observation: 4 October 2021.

Change in investment decisions of euro area NFCs: all firms

(over the preceding six months; net percentage of respondents)
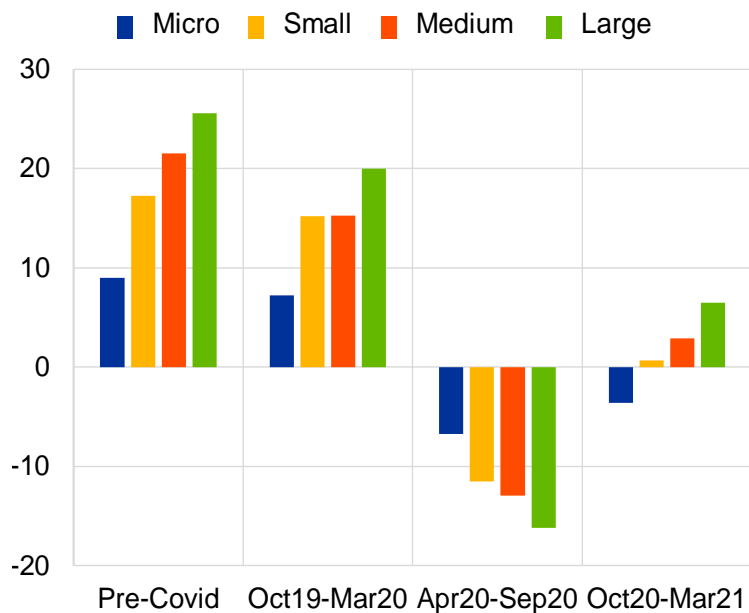
Source: ECB and European Commission survey on the access to finance of enterprises (SAFE).
Note: For the pre-Covid-19 period figures refer to rounds 11 (April-September 2014) to 21 (April-September 2019) of the survey.

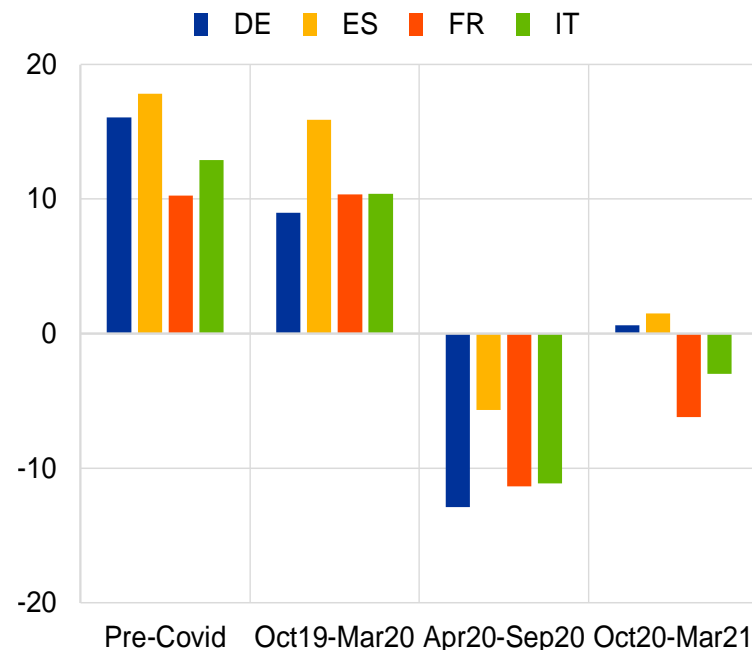## Change in investment decisions of euro area NFCs – firms with up to 250 employees

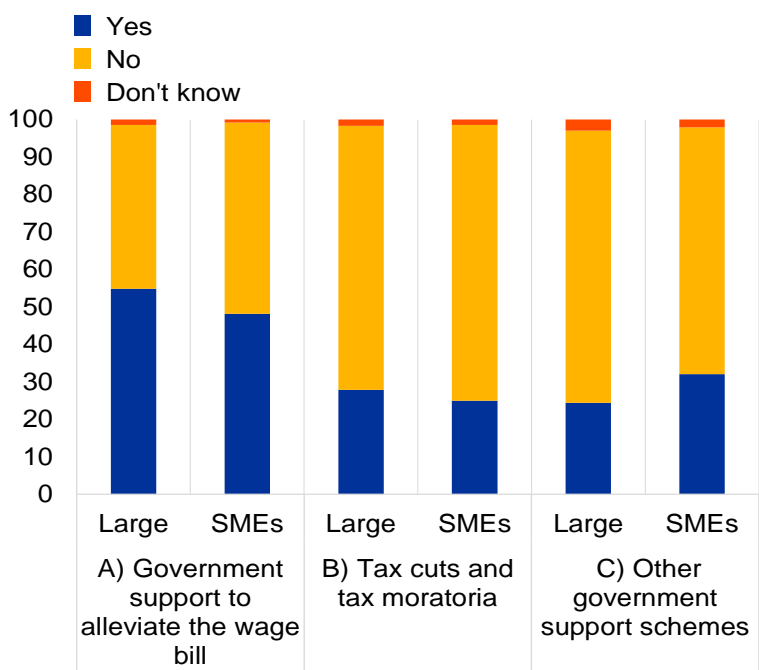(over the preceding six months; net percentage of respondents)

Source: ECB and European Commission survey on the access to finance of enterprises (SAFE).
Note: All firms with up to 250 employees. . For the pre-Covid-19 period figures refer to rounds 11 (April-September 2014) to 21 (April-September 2019) of the survey.

Euro area companies that received government support in response to the pandemic
(percentage of respondents)

Legend:
- Yes
- No
- Don't know

Categories:
- A) Government support to alleviate the wage bill (Large, SMEs)
- B) Tax cuts and tax moratoria (Large, SMEs)
- C) Other government support schemes (Large, SMEs)
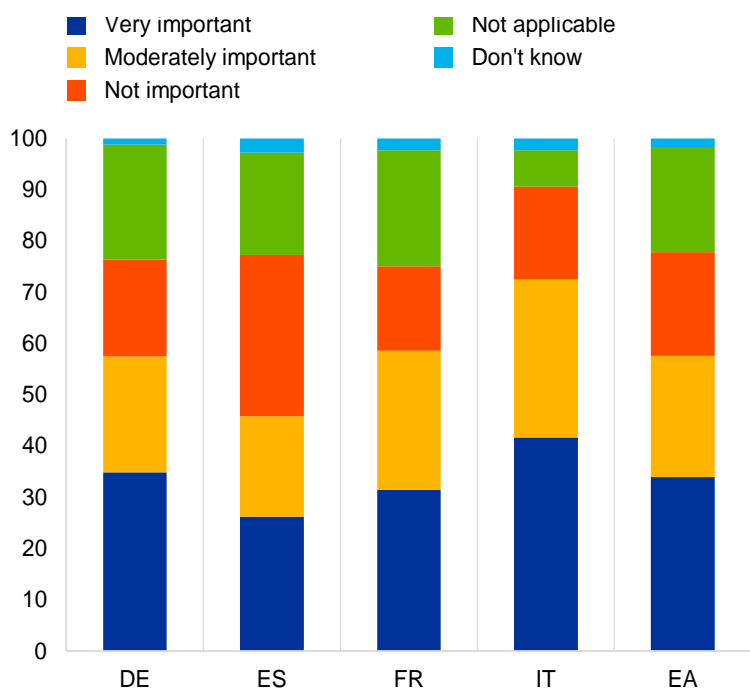
Source: ECB and European Commission survey on the access to finance of enterprises (SAFE).
Note: Results for small and medium-sized enterprises (SMEs).

Importance of government support for Euro area SMEs long-term obligations
(percentage of respondents)

Legend:
- Very important
- Moderately important
- Not important
- Not applicable
- Don't know

Categories: DE, ES, FR, IT, EA

Source: ECB and European Commission survey on the access to finance of enterprises (SAFE)
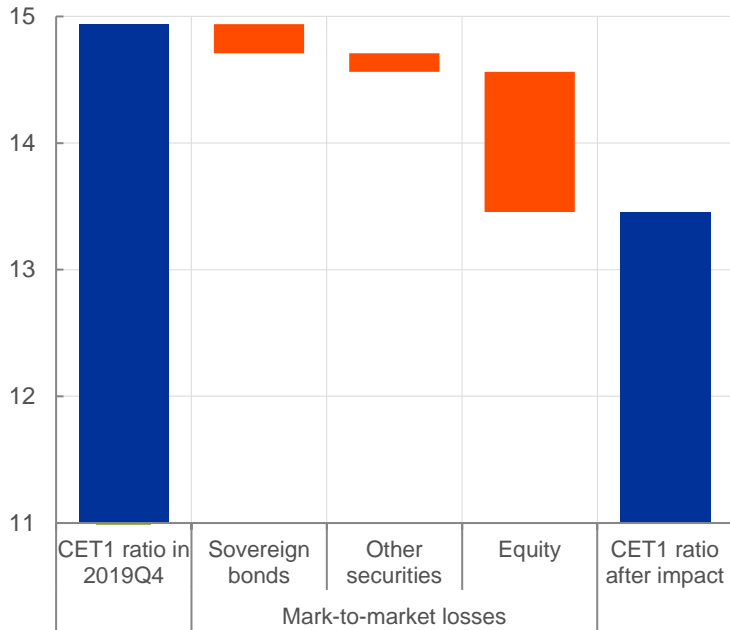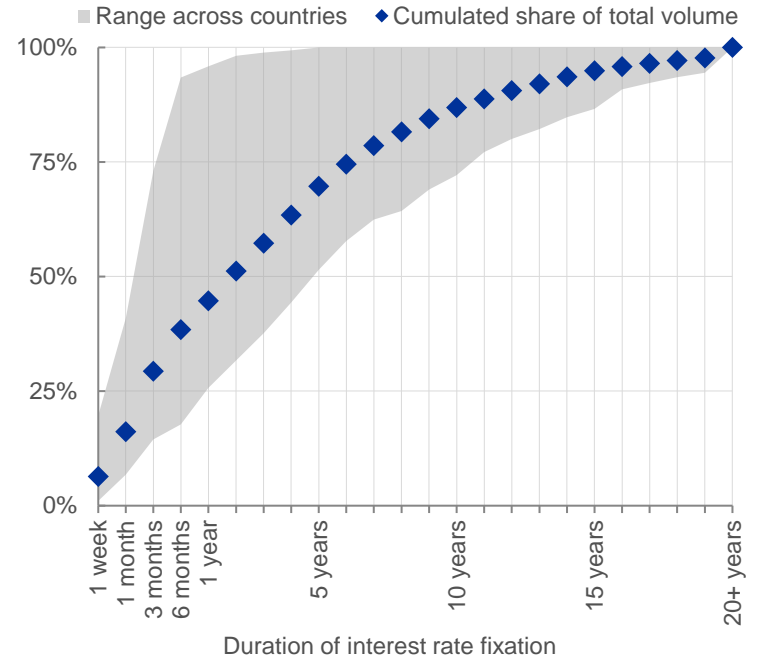Note: Results for small and medium-sized enterprises (SMEs).

Use of granular data to assess risks to monetary policy transmission

Potential impact on CET1 capital ratio under a scenario of sustained mark-to-market losses (percentages)

Cumulated loan volume to NFCs by duration of interest rate fixation in August 2020 (percentages of total loan volume)

Sources: ECB Supervisory Banking Statistics, SHS-G, CSDB, Bloomberg and ECB calculations. Notes: The exercise is based on granular information on SIs' securities portfolios, quantifying the devaluation between end 2019 and March 2020 of securities in accounting portfolios where changes in valuation are reflected in regulatory capital. The assessment can be seen as an upper bound for the actual impact, since it considers only direct hedging through short sales but not the potential use of derivatives. The distribution of price changes across securities has been trimmed at 1%-99% percentiles in order to account for outliers. Latest observation: 2019 Q4 for securities holdings and CET1 ratio; 31 March 2020 for bond prices.
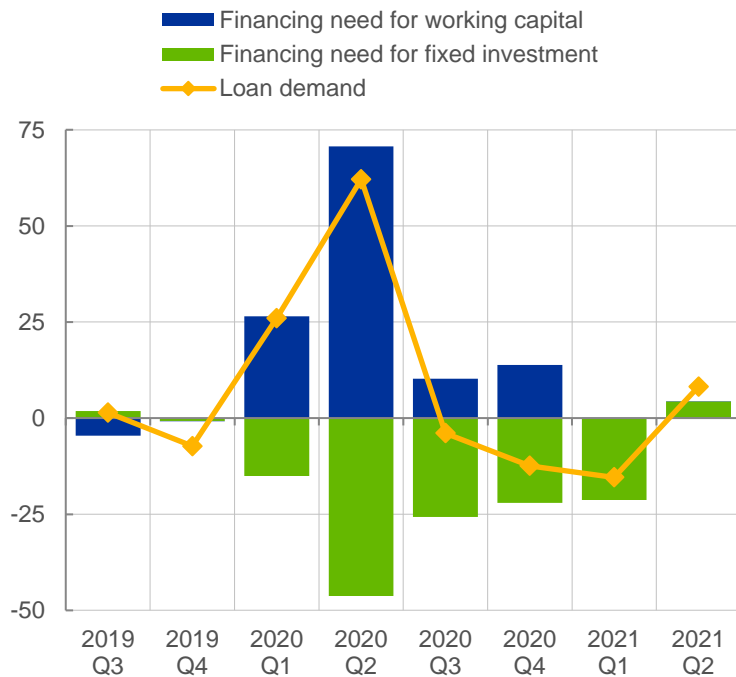
Sources: AnaCredit and ECB calculations.
Notes: Based on a sample of 2,495 banks and 3,688,312 NFCs. Shares of loan volume up to a given duration of interest rate fixation in years, last category (20+) refers to durations above 20 years. Diamonds refer to the euro area, the light grey area reports the min-max range across euro area countries.

Net demand for loans to NFCs by purpose
(net percentages)

- ■ Financing need for working capital
- ■ Financing need for fixed investment
- ◆ Loan demand

Source: Bank Lending Survey (BLS).
Notes: The net percentage refers to the difference between the sum of the percentages for "increased considerably" and "increased somewhat" and the sum of the percentages for "decreased somewhat" and "decreased considerably".
Latest observation: 2021Q2 (July 2021 BLS).
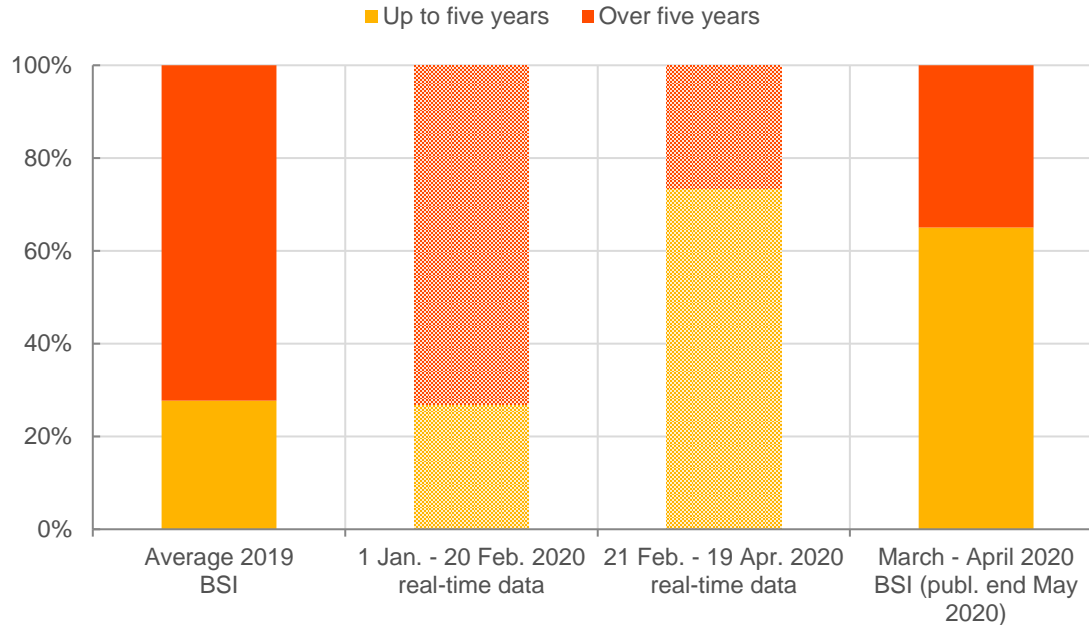
MFI loans to firms
(monthly flows in EUR bn)
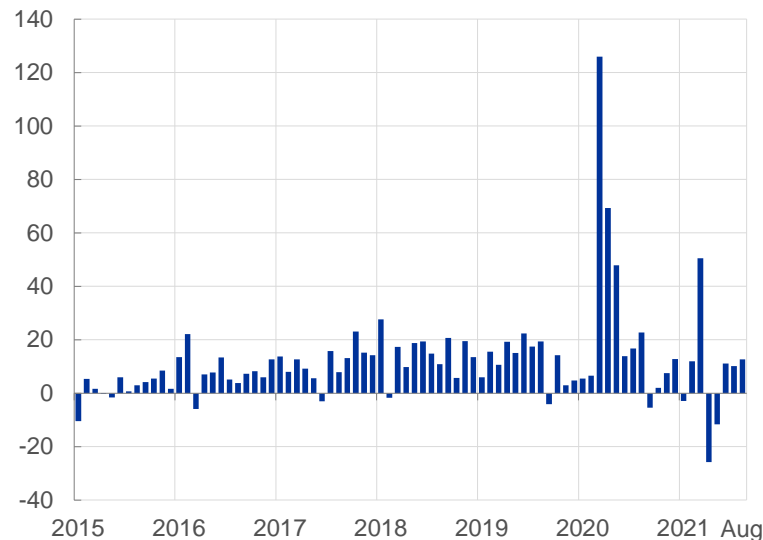
Source: ECB(BSI).
Notes: MFI loans adjusted for seasonality, sales, securitisation and cash pooling activities.
Latest observation: August 2021.

**Bank lending flows to firms by initial maturity**
(percentages)

Sources: ECB(BSI), Bloomberg Syndicated loan issuance data and ECB calculations.
Notes: The BSI data for reference date April 2020 was made available on 29 May 2020.
Latest observation: April 2020 for BSI; 19 April 2020 for Bloomberg (real-time data).

Take-up of and credit standards on loans covered by COVID-19-related public guarantees
(left panel: EUR bn; middle and right panel: net percentages)
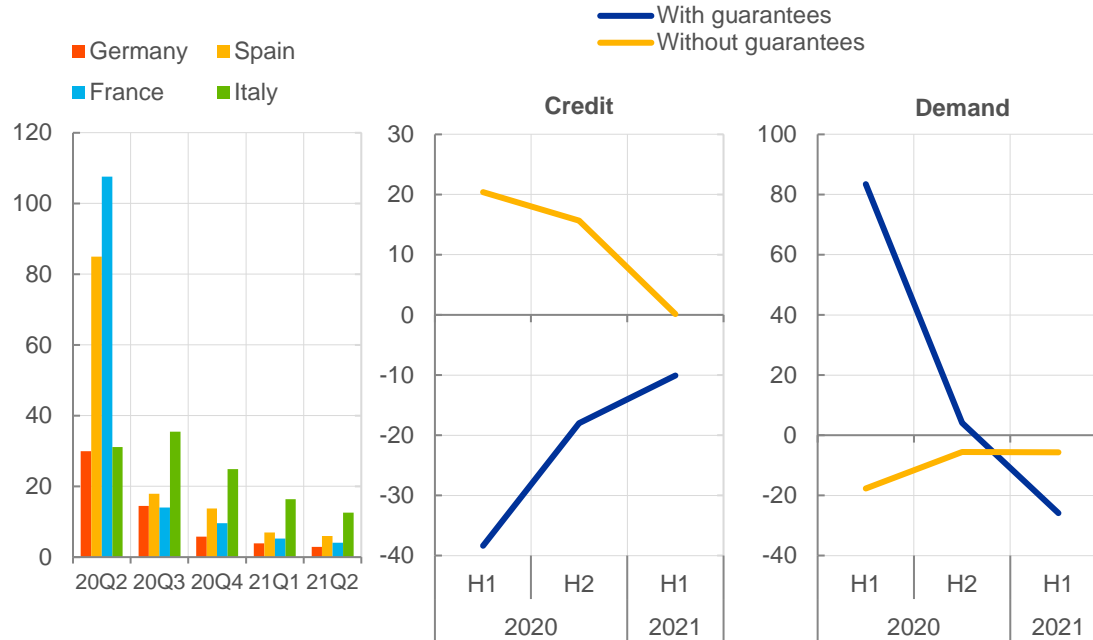
Sources: National authorities and authors' calculations and Bank Lending Survey (BLS). Notes: left panel: The take-up data refer to approved amounts of guaranteed loans. As guaranteed loans can also be granted in the form of revolving credit facilities, the approved amount is higher than the amount actually disbursed. In the absence of a breakdown by firm size for Italy, it is assumed that guaranteed loans to SMEs are those granted via the Fondo di Garanzia, while guaranteed loans to large firms are those granted via SACE (the Italian export credit agency). Middle and right panel: The net percentages of banks for credit standards (demand) are constructed as the difference between the sum of the percentages for "tightened (increased) considerably" and "tightened (increased) somewhat" and the sum of the percentages for "eased (decreased) somewhat" and "eased (decreased) considerably". Latest observation: 2021Q2 for data on guarantee take-up; 2021Q2 for BLS (July 2021 BLS).