

Dimecres, 2 desembre 2020 (18.00 h.,

'Zoom')

Aula d'Extensió Universitària – XVIè curs

2020-21
Conferència
(‘webinar’)

Perspectives econòmiques a tancament d'exercici 2020 i escenaris 2021

L'any que vam viure perillosament

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Enginyers

Industrials de Catalunya



Aula d'Extensió Universitària

dels Enginyers Industrials de
Catalunya

XVIè Curs 2020-21

Primer Trimestre

Organitzada per la Comissió de Jubilats i
Prejubilats dels Enginyers Industrials de
Catalunya i dirigida als enginyers col·legiats,
familiars i amics.

Enginyers
Industrials de Catalunya

Acte inaugural:

Dia: 30 de setembre

"Reconstrucció econòmica", Conferència inaugural a càrrec de
Javier Faus, President del Cercle d'Economia

Octubre:

Dia: 7 d'octubre

"El futur del 5G a Espanya" a càrrec de Federico Ruiz, Director
del Observatorio Nacional del 5G

Dia: 14 d'octubre

"Parents del ximpanzé i cosins del Neandertal" a càrrec de
Tomás Marqués, Director de l'Institut de Biologia Evolutiva

Dia: 21 d'octubre

"Viaje al país de los blancos" a càrrec de Ousman Oumar,
President de la Fundació NASCO Feeding Minds

Dia: 28 d'octubre

"A l'entorn del 175 Aniversari del naixement de Guimerà: símbol,
far, miratge" a càrrec de Neus Oliveras, Catedràtica de Llengua i
Literatura

Novembre:

Dia: 4 de novembre

"Europa en un món imprevisible" a càrrec de Carles Casajuana,
ex Ambaixador al Regne Unit

Dia: 11 de novembre

"Òpera com Art Total" a càrrec de Marc Sala, Tenor i divulgador
musical

Dia: 18 de novembre

"Indústria auxiliar de l'automòbil a Catalunya: present i futur" a
càrrec de Josep M^a Vall, President del Clúster d'Automoció

Dia: 25 de novembre

"Dones i homes: diferències entre iguals" a càrrec de Ramón
Nogués, Catedràtic emèrit de Biologia de la UAB

Desembre:

Dia: 2 de desembre

"Perspectives econòmiques pel 2021" a càrrec de Xavier Mena,
Professor d'Economia a ESADE i Catedràtic d'Economia a la
URL

Dia: 9 de desembre

"Què se'ns ha perdut allà a l'espai?" a càrrec de Joan de
Dalmau, President d'International Space University

Dia: 16 de desembre

"Ensenyances de la COVID 19 sobre la biodiversitat" a càrrec de
Joan Domènec Ros, President de l'Institut d'Estudis Catalans

Totes les conferències es realitzaran de forma telemàtica,
els dimecres, a les 18 h.

Drets d'inscripció

Per al primer trimestre:

Col·legiats/associats: 25 euros

Inscripció general: 35 euros

Per a una conferència:

5 euros

Inscripcions: a l'agenda de la web dels EIC:

<https://www.eic.cat/agenda>

- Per a tot el trimestre: anar a l'entrada de
l'agenda del 30/9/2020
- Per cada conferència: a la data puntual
(cal fer-ho abans de les 19 h del dilluns
anterior).

El link per connectar-se s'enviarà per mail a
tots els inscrits, el dia abans de la conferència.

Per a més informació i canvis d'última hora:

<http://aulesenginyers.blogspot.com>



Generalitat de Catalunya
Departament d'Empresa
i Coneixement
Direcció General d'Universitats



**Ajuntament de
Barcelona**



**UNIVERSITAT POLITÈCNICA
DE CATALUNYA
BARCELONATECH**



AFOPA



Perspectives econòmiques a tancament d'exercici 2020 i escenaris 2021

L'any que vam viure perillosament

- 1. Covid-19: Un cigne negre**
- 2. Eclosió sense precedents**
- 3. Política de salut pública vs. política econòmica**
- 4. Escenaris 'd. C.' (després del coronavirus)**
- 5. Economia espanyola i catalana**

COVID-19: UN CIGNE NEGRE

Baixa probabilitat - Alt impacte



DAVOS 2020 GLOBAL RISKS: INFECTIOUS DISEASES

Likelihood and Impact. World Economic Forum (WEF)

The Global Risks Report 2020

WORLD
ECONOMIC
FORUM

Insight Report | 15th Edition

In partnership with Marsh & McLennan and Zurich Insurance Group



COVID-19: 'WORLD ON THE EDGE'

El món davant el penya-segat

A silhouette of a person standing on the edge of a cliff, looking down. The background is a solid red color. The cliff edge is a jagged black line on the left side of the image.

**World on
the edge**

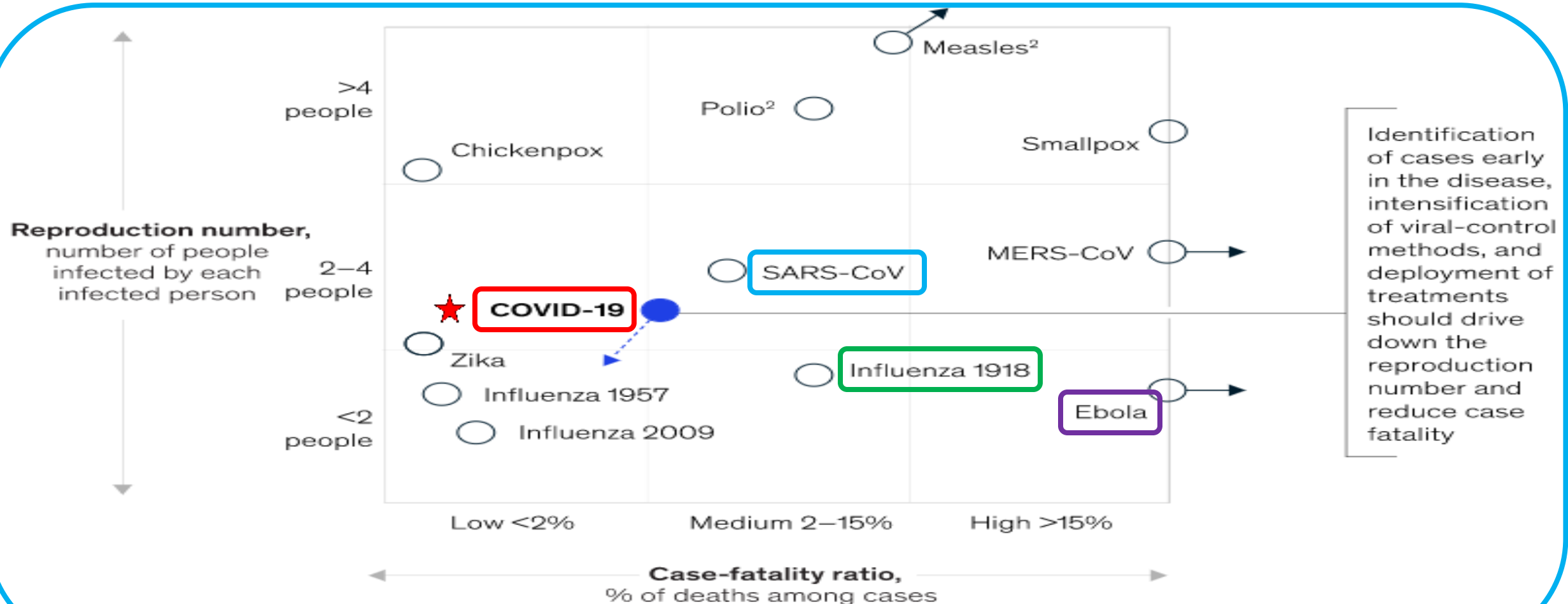
COVID-19: PER QUÈ NO ENS VAM ADONAR?

Wuhan (Hubei, P.R. China) - Llombardia (Itàlia)



COVID-19: HUMAN VIRUSES COMPARED

Reproduction (number of people infected by each infected) and Fatality (% of deaths among cases)



Fatality rate = (Death / Cases). Measuring fatality rate is much more difficult and imprecise because the majority of tests are done on sick patients. This implies that the **measured fatality rates are likely to overstate grossly the actual fatality rate, especially in the light of the large number of suspected asymptomatic.**

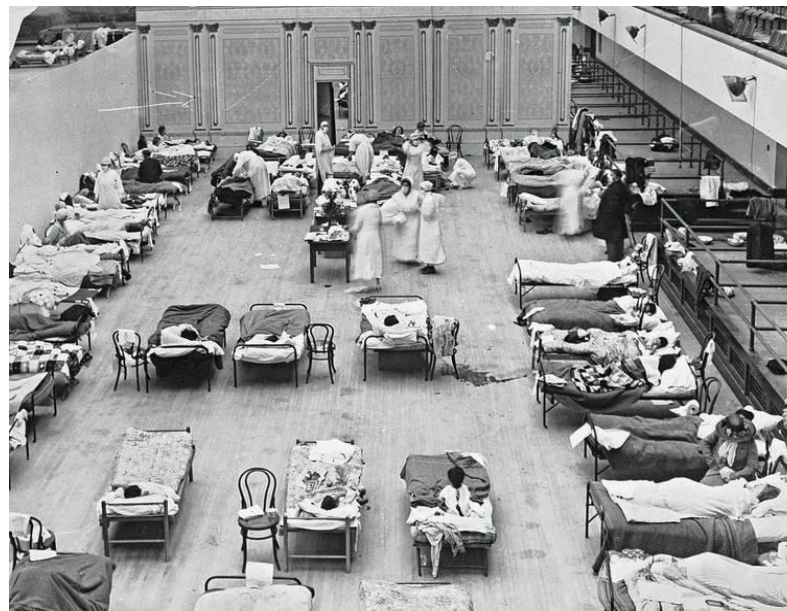
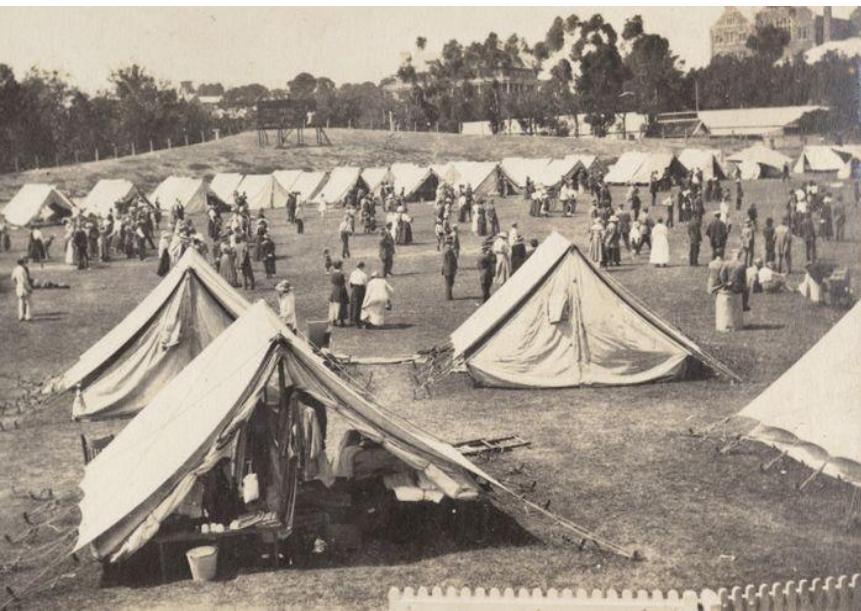
COVID-19: THE 1918 FLU

1918-1919



COVID-19: THE 1918 FLU

Hospitals de campanya



COVID-19: THE 1918 FLU

Regles de comportement social

SAVE YOURSELF

FROM INFLUENZA AND

PNEUMONIA
BAD COLDS
MEASLES

TUBERCULOSIS
DIPHTHERIA
SCARLET FEVER

WHOOPIING COUGH
MENINGITIS
MUMPS

FOLLOW TWO SIMPLE RULES

RULE 1

Whenever you cough or sneeze, bow your head or put a handkerchief over your mouth and nose.

RULE 2

Don't put in your mouth fingers, pencils, or anything else that does not belong there, nor use a common drinking cup.



The Germs of these Diseases are spread through the secretions of the mouth and nose of sick people and carriers.

Furnished by THE VIRGINIA STATE BOARD OF HEALTH

PLEASE POST: Council of National Defense, C. R. Kelley, Federal Field Secretary

INFLUENZA

FREQUENTLY COMPLICATED WITH

PNEUMONIA

IS PREVALENT AT THIS TIME THROUGHOUT AMERICA.

THIS THEATRE IS CO-OPERATING WITH THE DEPARTMENT OF HEALTH.

YOU MUST DO THE SAME

IF YOU HAVE A COLD AND ARE COUGHING AND SNEEZING. DO NOT ENTER THIS THEATRE

GO HOME AND GO TO BED UNTIL YOU ARE WELL

Coughing, Sneezing or Spitting Will Not Be Permitted In The Theatre. In case you must cough or sneeze, do so in your own handkerchief, and if the Coughing or Sneezing Persists, Leave The Theatre At Once.

This Theatre has agreed to cooperate with the Department Of Health in disseminating the truth about Influenza, and thus serve a great educational purpose.

HELP US TO KEEP CHICAGO THE HEALTHIEST CITY IN THE WORLD

JOHN DILL ROBERTSON
COMMISSIONER OF HEALTH

TREASURY DEPARTMENT
UNITED STATES PUBLIC HEALTH SERVICE

INFLUENZA

Spread by Droplets sprayed from Nose and Throat

Cover each COUGH and SNEEZE with handkerchief.

Spread by contact.

AVOID CROWDS.

If possible, WALK TO WORK.

Do not spit on floor or sidewalk.

Do not use common drinking cups and common towels.

Avoid excessive fatigue.

If taken ill, go to bed and send for a doctor.

The above applies also to colds, bronchitis, pneumonia, and tuberculosis.

THE PITTSBURG PRESS

THURSDAY EVENING, NOVEMBER 21, 1918



Three times when washing your hands is of special importance

HAVE you considered why it is that your hands look dirty, when you've just washed them? It is because casual washing, washing in a perfunctory way, doesn't really cleanse the skin.

Your skin is very much like a sponge. It is full of tiny open "mouths." Five million of them on your body! Twenty-seven hundred in every square inch of skin on your palm!

Through these openings, the skin throws off excess oils and perspiration acids—a whole quart every twenty-four hours. This waste matter accumulates on the skin. It gathers up dirt and impurities which the skin absorbs as eagerly as a sponge takes up water.

At once you see

why health authorities urge the value of washing the hands properly to keep healthy.

There are three times when this is of special importance:

Before eating—
When you come home from work—
Whenever you come in from the street

How the new idea of antiseptic cleanliness has worked out

Why not a soap that would carry an antiseptic right down into the "mouths" in the skin? Years ago the greatest of all soap makers saw this need and asked themselves this question. They put their every resource to work.

They chose for their soap the antiseptic that has been

recognized for generations as the greatest aid to the health of the skin.

It is this antiseptic in Lifebuoy that makes it so cleansing—so purifying. It leaves the skin more than clean—antiseptically clean—keeps it radiant with health.

The odor tells you why

The "health" odor in Lifebuoy is found in no other soap. It is not a perfume—not the odor of medicine—but a pure, hygienic odor that tells you instantly why the soap benefits your skin. Stimulating, invigorating, refreshing! One whiff of Lifebuoy and you realize why it cleanses so thoroughly, and protects.

Get a cake of Lifebuoy at any grocery, drug or department store. Use it whenever you wash. Start today and watch your skin improve.

Lever Bros. Co., Cambridge, Mass.

THE HEALTH SOAP



COVID-19: THE 1918 FLU

Protecció personal

BE SAFE
FROM THE
INFLUENZA
WEAR A NOSE AND MOUTH PROTECTOR

35c

Influenza is killing thousands every day all over the continent. Once the deadly germs take hold your life is in danger. Doctors, Boards of Health, Medical Men say positively—Prevent It.

WEAR A NOSE PROTECTOR
EASILY ADJUSTED NO DISCOMFORT

If you don't wear one now—it is a positive prevention.

(From Vancouver Daily Province, November 5, 1918.)

SAYS THAT "FLU" IS NOT ABATING

Acting Mayor Kirk called the Press here on the 5th inst. to advise him that people in Vancouver are not taking a sufficient enough view of the "flu" epidemic.

Medical Council and other authorities connected with the epidemic are warning that wearing a mask will keep the epidemic and other diseases, the Mayor, says, is the only way to keep the epidemic in check with us.

I do not wish to quote anyone else.



"Flu" Mask



Should be worn as protection against influenza, coughs and colds, as illustrated (4th Floor), at.....

18c

LIBERTY, THURSDAY, OCTOBER 24, 1918



Cartoon from the 26 October 1918 issue of the *Calgary Herald* satirizing the Department of Health's order forcing all citizens to wear masks when outside their homes.

How to Make Mask for Prevention of Influenza



Instructions as to the making and use of masks have been sent out by the provincial board of health. These are to be used when taking care of influenza patients, and beginning on Thursday morning on all trains and street cars in the province. Here is the method of making the mask, published in The Bulletin some days ago and here repeated by request.

To Make a Mask—Take a piece of ordinary cheesecloth, 8x16 inches. Next fold this to make it 8x4 inches. Tie cord about 10 inches long at each corner. Apply over mouth and nose as shown in the picture.

To be worn in the sick room when taking care of the patient and on street cars and railway trains.

Keep the nose and mouth covered while coughing or sneezing.

A mask should not be worn more than two hours.

COVID-19: THE 1918 FLU

Tancament d'activitats i confinament

Help Bar Deadly Influenza From Seattle

By DR. J. D. TUTTLE, State Health Commissioner

Don't get into crowds, don't cough or sneeze without using a handkerchief, get plenty of fresh air, and when the symptoms of a cold appear isolate yourself as far as possible from others.

By SURGEON GENERAL RUPERT BLUE, U. S. Public Health Service

First there is a chill, then fever, headache, backache, reddening of the eyes, aches all over the body and general prostration. Persons so attacked should go to bed at once and call a physician.

CHURCHES, SCHOOLS, SHOWS CLOSED

EPIDEMIC PUTS BAN ON ALL PUBLIC ASSEMBLIES

AMERICANS AND FRENCH SMASH FOE

Associated Press Summary.

Seaside, Oct. 12.—The National Zeitung announces that Germany's reply to President Wilson's war was presented to the Swiss minister at Berlin this morning.

AUSTRIA-HUNGARY AND TURKEY ARE READY.

London, Oct. 12.—Austria-Hungary and Turkey are expected to immediately announce acceptance of President Wilson's armistice terms, according to the Exchange Telegraph dispatch from Berlin.

GERMAN PAPERS DIFFER OVER U. S. TERMS.

Amsterdam, Oct. 12.—Some German newspapers assert the reply to President Wilson accedes fully to his demands.

SEATTLE TO MAKE FIGHT ON DISEASE

Mayor and City Health Officer Will Permit None but Gatherings in Open Air.

POLICE ORDERED TO CLOSE PUBLIC PLACES

The influenza order was issued.

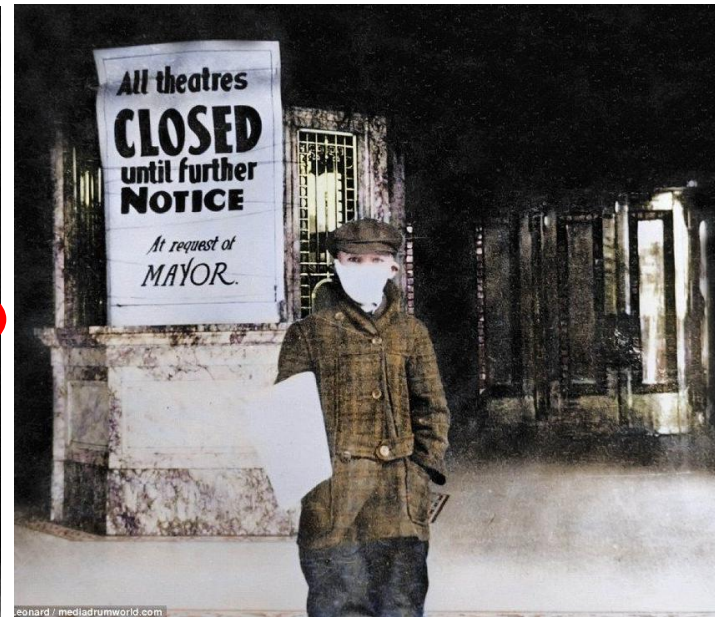
We can't draw on your imagination for expenses to Berlin! Put over that 4th Liberty Loan

MR. LOVERING'S COMMENT

Seattle is strong. Big Liberty Loan.

THE SEATTLE DAILY TIMES

SEATTLE, WASHINGTON, SATURDAY EVENING, OCT. 12, 1918.



BEMIDJI DAILY PIONEER

Be a Booster for the Fourth Liberty Loan Bond Sale; Help Your Country Win the War

VOLUME XX, NO. 236 BEMIDJI, MINN., SATURDAY EVENING, OCT. 12, 1918 FORTY-FIVE CENTS A MONTH

PUBLIC PLACES ARE ORDERED CLOSED

GERMANY'S REPLY HANDED TO SWISS MINISTER; KAISER'S ALLIES WOULD QUIT

(By United Press)

Basle, Switzerland, Oct. 12.—The National Zeitung announces that Germany's reply to President Wilson's war was presented to the Swiss minister at Berlin this morning.

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CANADIAN CAVALRY ROUND UP HUNS

MAYOR ISSUES ORDER TO PREVENT SPREAD OF INFLUENZA PLAGUE

Schools, Churches, Motion Picture Theaters and All Places of Public Gathering Comes Under Ban; Closing Period Indefinite

At 1:30 o'clock this afternoon, Mayor Charles W. Vanderstuij, notified the Pioneer to announce to the city of Bemidji that from today, and continuing for an indefinite period, Bemidji must "close up" as a precautionary measure against the spread of the epidemic of Spanish influenza.

The mandate means:

All the schools of the city will be dismissed during the period deemed necessary.

All motion picture theatres in the city are to close and remain so until allowed to reopen.

With the fighting on the western front becoming more open, casualty is being engaged in greater numbers. Canadian cavalry made a spirited dash into enemy territory and routed thousands of prisoners. This official photograph shows the Hunnes coming into the infantry line after being driven by the Canadians.

VOL. XV. NO. 49. BROOKLINE, MASS., SAT.

INFLUENZA TOLL INCREASES AS EPIDEMIC CONTINUES TO SPREAD

25 More Residents Fall Victims of Malady With More Than 150 New Cases This Week.

Schools and Churches Closed, All Meetings Suspended and No Public Funeral Without Permit.

SHORTAGE OF NURSES AND DOCTORS DEVELOPS

DRAFT MACHINE IS BROUGHT TO HALT BY GRIP EPIDEMIC

Sudden Orders Result In Indefinite Suspension Of Activities For Inducting First Of Late Registrants

FIXING OF ORDER NUMBERS ALSO DELAYED

Pursuant to orders received from state officials yesterday, local draft machinery is taken at a standstill and

Surrender of Herald

The surrender-heralded in Brock by ringing the alarm bells and and siren whistles. The d fully five minu public demonst equaled here. Residents wep: cause of the out quickly spread women and "Wait until Ge has been the e all sides durin

ALL TRAINS FROM EAST WILL BE INSPECTED TO PREVENT "FLU" SPREAD

In spite of the extraordinary precautions taken by city and provincial health authorities, the number of cases of Spanish influenza has increased rapidly in Winnipeg within the last 24 hours.

Since 3 o'clock Tuesday afternoon, three persons have died and 48 new cases of the disease have been reported to the city health department.

DON'T BE A GRUMBLER

Don't grumble because you can't see a movie or play a game of billiards—or because the schools and churches closed.

The health of the city is more important than all else. An ounce of prevention now is worth a thousand cures. In Boston, influenza has taken a toll of thousands. We do not want to court that situation here.

COVID-19: THE 1918 FLU

Dèficit de personal sanitari

100 More Volunteer Nurses Wanted TODAY

The demand for emergency nurses in Bloomington is far greater than the supply.

One hundred more men and women with or without experience are needed to care for influenza cases day and night.

It is the sacred duty of every man and woman in Bloomington who can give a few hours or a night to offer his or her services at this time.

The time that you give may save a life or give relief to some poor sufferers.

Masks are furnished free to all nurses at Red Cross headquarters in the Library building.

Phone 410 or Call at Headquarters,
Influenza Committee Red Cross,
Library Building.

The Wisconsin State Journal
VOL. 131, NO. 165. 79th Year. MADISON, WIS., SATURDAY AFTERNOON, OCTOBER 12, 1918. Latest Edition. PRICE TWO CENTS

CITY APPEALS FOR VOLUNTEER NURSES FOR "FLU" VICTIMS

Hun Reply En Route To U.S.

FOUR MORE LIVES ADDED TO TOLL HERE

SWISS ENVOY TO TRANSMIT PEACE NOTE
DUAL SURROUNDED; THREE TOWNS FALL
TRANSPORTS COLLIDE; 150 YANKS LOST
ROLL UP EXCESS IN BONDS IS PLEA
MADISON HAS 2,600 SONS IN WORLD WAR
WORSHIP AT HOME. CITY PASTORS URGE

150 Madison Families Need Assistance; Purcell Opens Bureau to Assign Workers to the Homes

MADISON DEATHS DUE TO THE SPANISH-FLU
Six Mary F. Stangor, 19, daughter of home economist at the university and daughter of Wheeler Stangor, Milwaukee, being buried at the Wisconsin

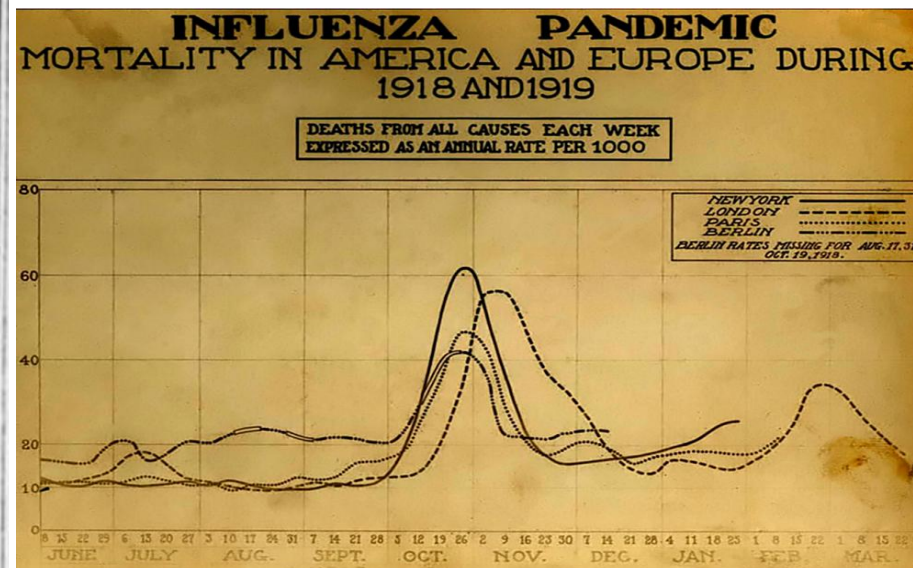
German Paper Differ on Contents; Some Say Kaiser cedes to All Demands By Wilson
The British are showing this flag

Ships Crash During Fierce Storm Off Scottish Coast; Destroyer Rescues Scores
LONDON, Oct. 12.—(AP)—A British destroyer early today rescued the survivors of a German ship which had been wrecked off the coast of Scotland.

County Subscriptions
County subscriptions for the Liberty Loan Bonds... \$10,000
Number of county subscribers... 10,000
Total city subscriptions... \$10,000
Total county subscriptions... \$10,000
Total Wisconsin subscriptions... \$10,000

Thirty-Five Have Paid Supreme Sacrifice For Democracy; Are Mailed of Armies "Over There"

What is required for the part of the epidemic today, combined with the new wave of health authorities to close churches and all other meetings and public assemblies, will mean nothing for people to do anything, unless they are being urged for the epidemic. The epidemic today in Madison's history is expected.



Peak of Influenza Epidemic Said Not Yet Reached

INFLUENZA

EPIDEMIC

Nurses Needed

Nurses, Undergraduate Nurses and Nurses' Aides: Your Services Are Needed.

Telephone or mail, at once.

Your name

Address Phone No.

How soon available?

Would pay be necessary?

Lives May Depend On You.

HOME SERVICE DEPARTMENT

Loveland Chapter A. R. C., 205 State Mercantile Bldg.,
Or Call Loveland 178W.

COVID-19: THE 1918 FLU

Oportunitats de negoci

GET BEHIND THE MAN BEHIND THE GUN!
Buy More Liberty Bonds!



Stop
The Spread of
"FLU"

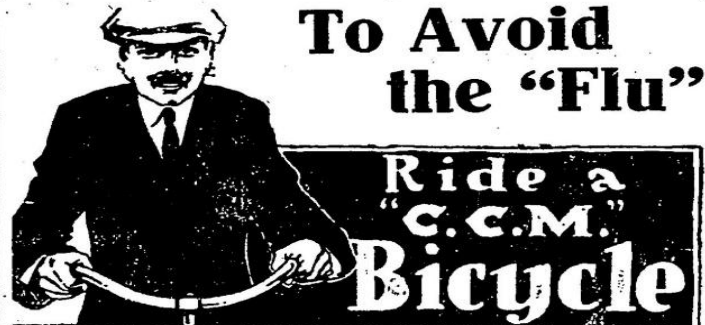
Spend your evenings at home, enjoying the Victrola and the New Records. You can have a real vaudeville at home if you own a Victrola, which is an inexhaustible treasure house of entertainment.

Grand Piano Co.

G. R. Hash, Manager

300 S. Jefferson St., Roanoke, Va.

"VICTROLA SPECIALISTS"



GET away from the stuffy, over-crowded street cars, with their danger of contagion. Ride a bicycle thro' the pure, fresh air.



THIS MARK IS
YOUR PROTECTION
Every "C.C.M." Bicycle
bears this design on the
rear upright bar.



Ride a Bicycle
And Keep Well

As a precaution against the influenza, keep out of the crowds; ride a bicycle to and from your work. Just look at the ruddy-cheeked delivery boys riding to and fro. They demonstrate what a Bicycle will do for YOU. Every man who lives a sedentary life NEEDS a BICYCLE. One will give you fresh air, new blood, a new lease on life. We've a model that will please you and on

Easy Terms That Will Suit You
ROANOKE CYCLE CO.

100-100 1/2 West Campbell Avenue

CONTRA LA
INFLUENZA

ESTERILIZAMOS LA ROPA ANTES
DE TEÑIRLA O LIMPIARLA

TINTORERIA

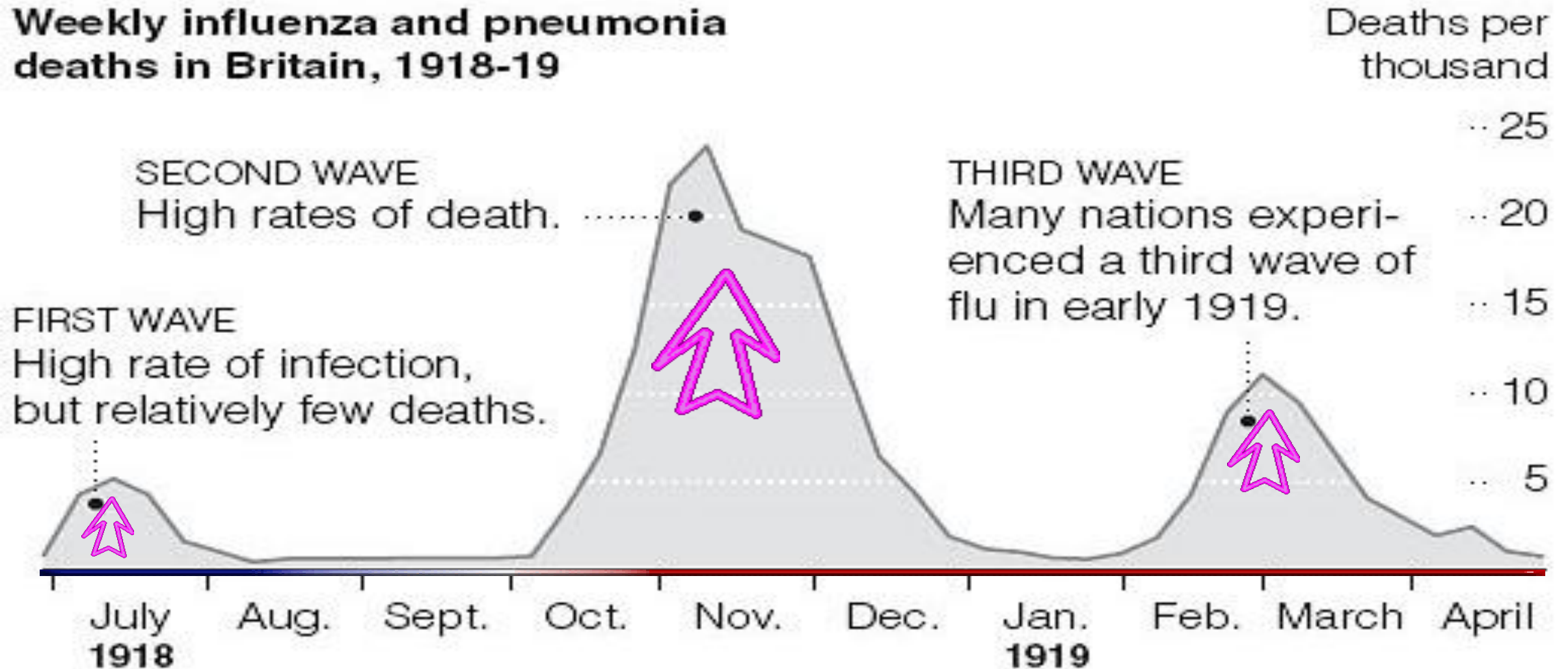
2a. S. Juan de Letrán 30

Talleres: 3a. Hidalgo No .47

COVID-19: THE 1918 FLU

'1918 Influenza: the Mother of All Pandemics': First Wave - Second Wave - Third Wave

Weekly influenza and pneumonia deaths in Britain, 1918-19



Sources: *Emerging Infectious Diseases*; Jeffery K. Taubenberger and David M. Morens

THE NEW YORK TIMES

COVID-19: THE 1918 FLU

'Pandemics Depress the Economy, Public Health Interventions Do Not'

Pandemics Depress the Economy, Public Health Interventions Do Not: Evidence from the 1918 Flu

Sergio Correia, Stephan Luck, and Emil Verner*

*Correia: Federal Reserve Board, sergio.a.correia@frb.gov; Luck: Federal Reserve Bank of New York, stephan.luck@ny.frb.org; Verner: MIT Sloan School of Management, everner@mit.edu.

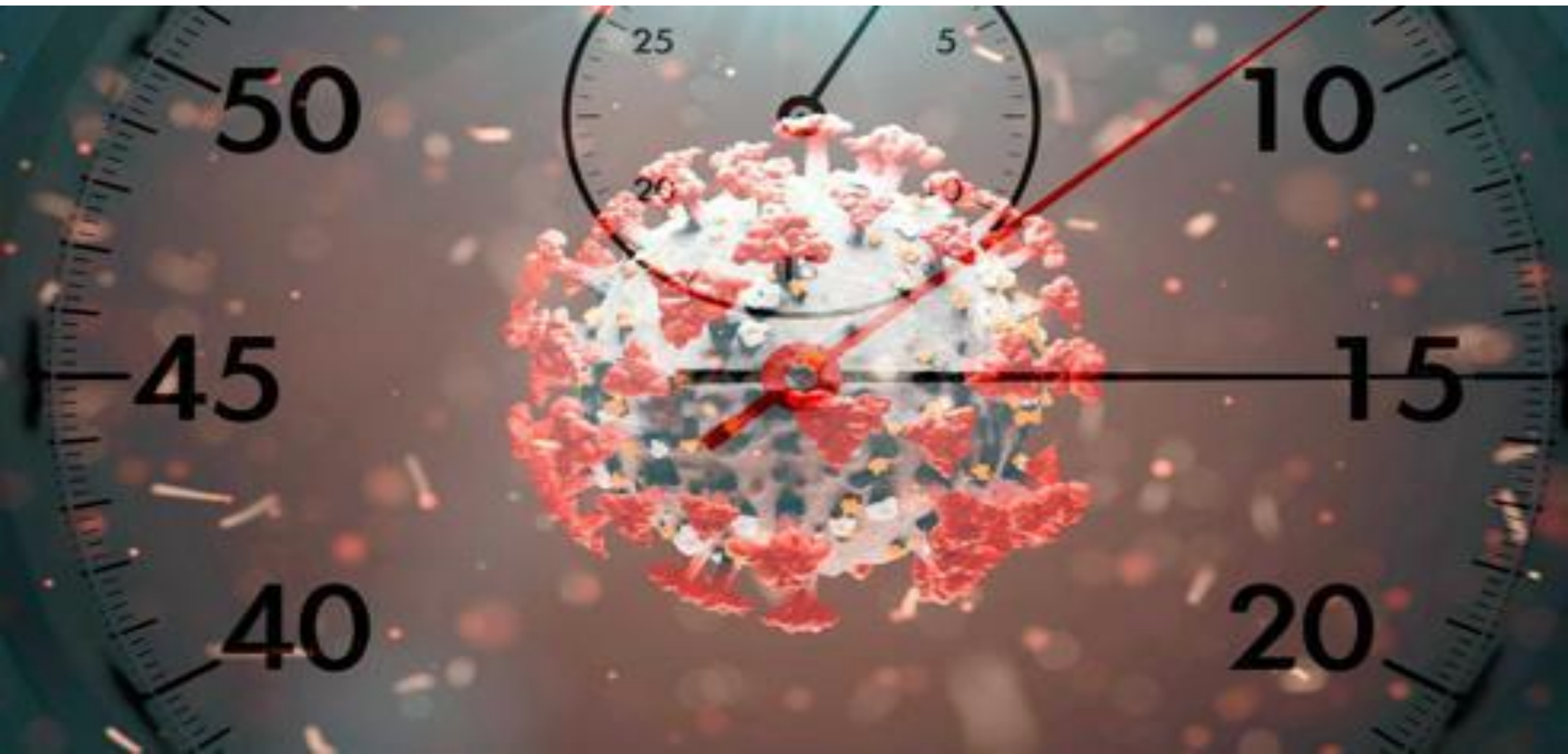
March 26, 2020

Abstract

What are the economic consequences of an influenza pandemic? And given the pandemic, what are the economic costs and benefits of non-pharmaceutical interventions (NPI)? Using geographic variation in mortality during the 1918 Flu Pandemic in the U.S., we find that more exposed areas experience a sharp and persistent decline in economic activity. The estimates imply that the pandemic reduced manufacturing output by 18%. The downturn is driven by both supply and demand-side channels. Further, building on findings from the epidemiology literature establishing that NPIs decrease influenza mortality, we use variation in the timing and intensity of NPIs across U.S. cities to study their economic effects. We find that cities that intervened earlier and more aggressively do not perform worse and, if anything, grow faster after the pandemic is over. Our findings thus indicate that NPIs not only lower mortality; they also mitigate the adverse economic consequences of a pandemic.

COVID-19: ORIGEN I EVOLUCIÓ EPIDEMIOLÒGICA

"La major crisi des de la Segona Guerra Mundial" (Nacions Unides)



COVID-19: ORIGEN I PROPAGACIÓ A XINA

Wuhan (Hubei, Xina) (Nov-Des 2019): Patogen SARS CoV-2 (Covid-19)

■ Cero casos ■ 1 a 50 ■ 51 a 100 ■ 101 a 500 ■ Más de 500

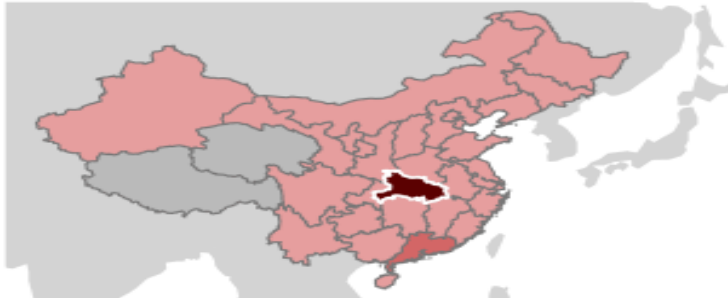
20 de enero: 291 casos



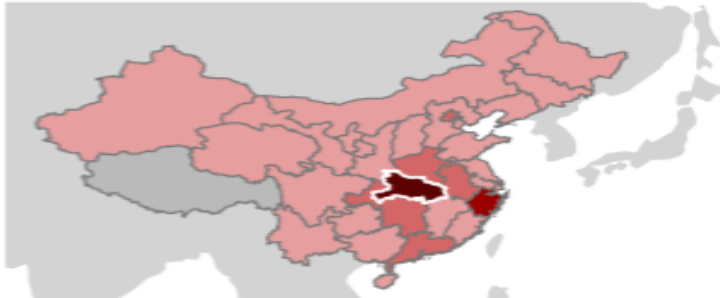
22 de enero: 446 casos



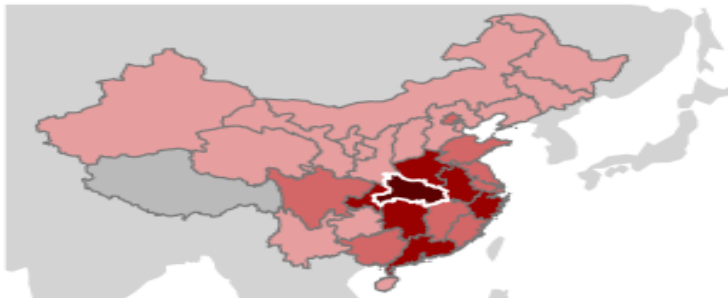
24 de enero: 864 casos



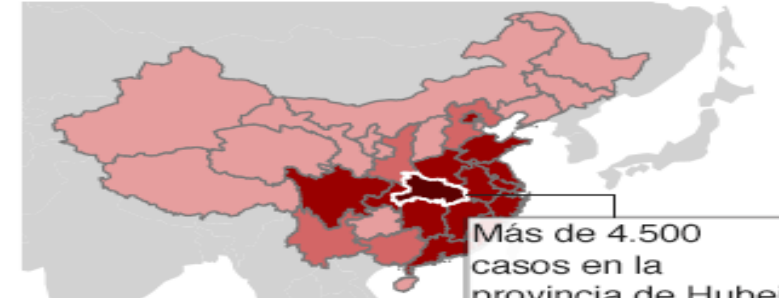
26 de enero: 2.021 casos



28 de enero: 4.524 casos



30 de enero: 7.710 casos



Fuente: Comisión Nacional de la Salud de China, BBC, 30 de enero

BBC



Western Pacific

China



Health topics

Our work

News

Emergencies

[Home](#) / [News](#) / [Detail](#) / WHO Statement regarding cluster of pneumonia cases in Wuhan, China

WHO Statement regarding cluster of pneumonia cases in Wuhan, China

9 January 2020 [Statement](#) | [China](#)

Chinese authorities have made a preliminary determination of a novel (or new) coronavirus, identified in a hospitalized person with pneumonia in Wuhan. Chinese investigators conducted gene sequencing of the virus, using an isolate from one positive patient sample. Preliminary identification of a novel virus in a short period of time is a notable achievement and demonstrates China's increased capacity to manage new outbreaks.

Initial information about the cases of pneumonia in Wuhan provided by Chinese authorities last week – including the occupation, location and symptom profile of the people affected – pointed to a coronavirus (CoV) as a possible



World Health Organization

COVID-19: XINA

'Does China play fair?' (The Economist)



POBLACIÓ MUNDIAL

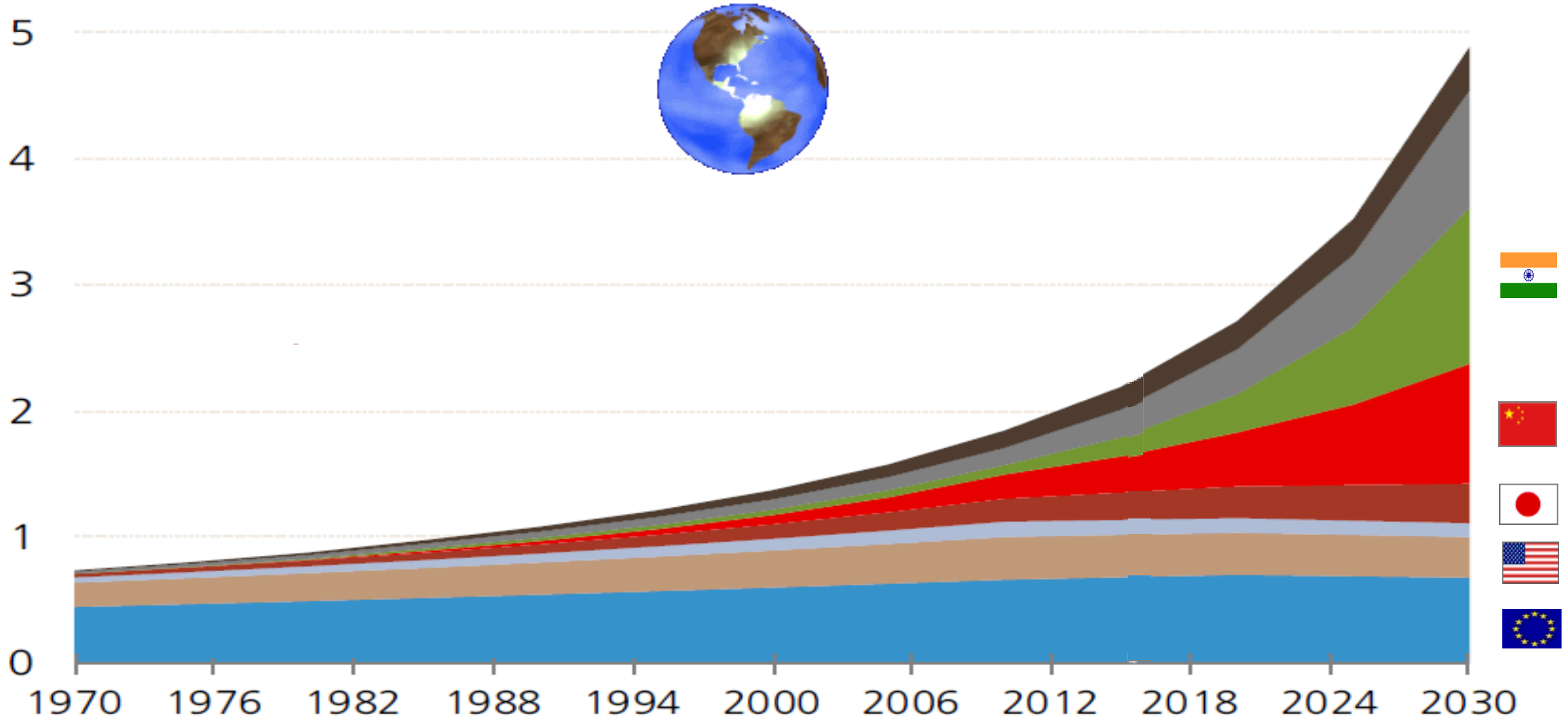
'If the World were 100 people...'



**There are more people living inside
this circle than outside of it.**

CLASSE MITJANA GLOBAL

Milers de milions de persones



UN MÓN GLOBAL INTERCONNECTAT

By land, sea and air



GLOBAL TRANSPORTATION SYSTEM

Global roads - Shipping routes - Air networks



COVID-19: THE SPREAD OF INFECTIOUS DISEASES

Joel Mossong, et al. (2008) PLoS Medicine, Volume 5, Issue 3, e74

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PLOS MEDICINE

Social Contacts and Mixing Patterns Relevant to the Spread of Infectious Diseases

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Abbreviations: BE, Belgium; DE, Germany; FI, Finland; GB, Great Britain; IT, Italy; LU, Luxembourg; NL, The Netherlands; PL, Poland

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ABSTRACT

Background

Mathematical modelling of infectious diseases transmitted by the respiratory or close-contact route (e.g., pandemic influenza) is increasingly being used to determine the impact of possible interventions. Although mixing patterns are known to be crucial determinants for model outcome, researchers often rely on a priori contact assumptions with little or no empirical basis. We conducted a population-based prospective survey of mixing patterns in eight European countries using a common paper-diary methodology.

Methods and Findings

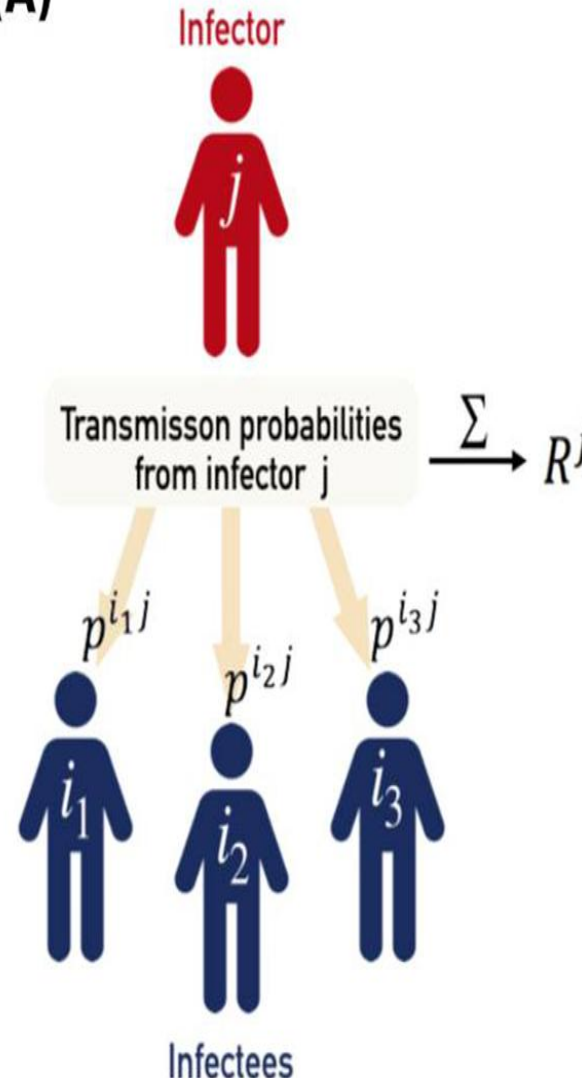
7,290 participants recorded characteristics of 97,904 contacts with different individuals during one day, including age, sex, location, duration, frequency, and occurrence of physical contact. We found that mixing patterns and contact characteristics were remarkably similar across different European countries. Contact patterns were highly assortative with age: schoolchildren and young adults in particular tended to mix with people of the same age. Contacts lasting at least one hour or occurring on a daily basis mostly involved physical contact, while short duration and infrequent contacts tended to be nonphysical. Contacts at home, school, or leisure were more likely to be physical than contacts at the workplace or while travelling. Preliminary modelling indicates that 5- to 19-year-olds are expected to suffer the highest incidence during the initial epidemic phase of an emerging infection transmitted through social contacts measured here when the population is completely susceptible.

Conclusions

To our knowledge, our study provides the first large-scale quantitative approach to contact patterns relevant for infections transmitted by the respiratory or close-contact route, and the results should lead to improved parameterisation of mathematical models used to design control strategies.

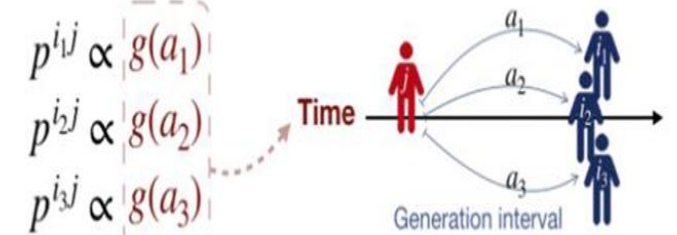
The Editors' Summary of this article follows the references.

(A)

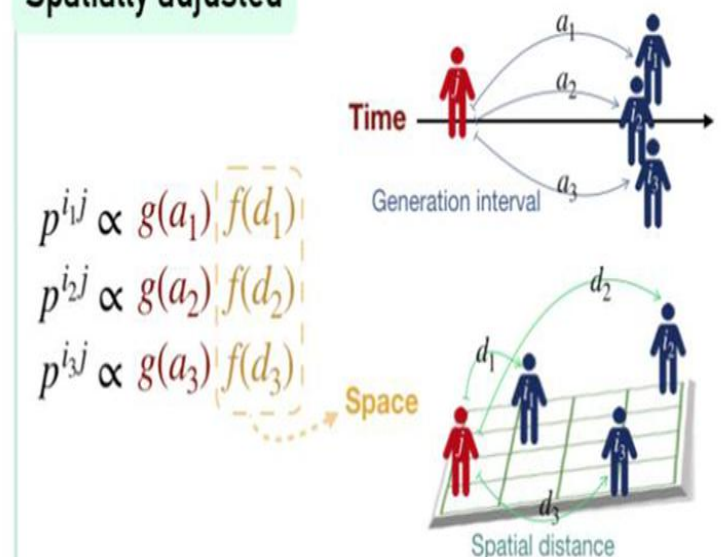


(B)

Non-adjusted



Spatially adjusted



COVID-19: TRANSMISSION OF THE ASYMPTOMATIC

Ruiyun Li *et al.* (2020) Substantial undocumented infection facilitates the rapid dissemination of novel coronavirus (SARS-CoV2), *Science*, 16 March 2020



Science

RESEARCH ARTICLES

Cite as: R. Li *et al.*, *Science*
10.1126/science.abb3221 (2020).

Substantial undocumented infection facilitates the rapid dissemination of novel coronavirus (SARS-CoV2)

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Estimation of the prevalence and contagiousness of undocumented novel coronavirus (SARS-CoV2) infections is critical for understanding the overall prevalence and pandemic potential of this disease. Here we use observations of reported infection within China, in conjunction with mobility data, a networked dynamic metapopulation model and Bayesian inference, to infer critical epidemiological characteristics associated with SARS-CoV2, including the fraction of undocumented infections and their contagiousness. We estimate 86% of all infections were undocumented (95% CI: [82%–90%]) prior to 23 January 2020 travel restrictions. Per person, the transmission rate of undocumented infections was 55% of documented infections ([46%–62%]), yet, due to their greater numbers, undocumented infections were the infection source for 79% of documented cases. These findings explain the rapid geographic spread of SARS-CoV2 and indicate containment of this virus will be particularly challenging.

The novel coronavirus that emerged in Wuhan, China (SARS-CoV2) at the end of 2019 quickly spread to all Chinese provinces and, as of 1 March 2020, to 58 other countries (1, 2). Efforts to contain the virus are ongoing; however, given the many uncertainties regarding pathogen transmissibility and virulence, the effectiveness of these efforts is unknown.

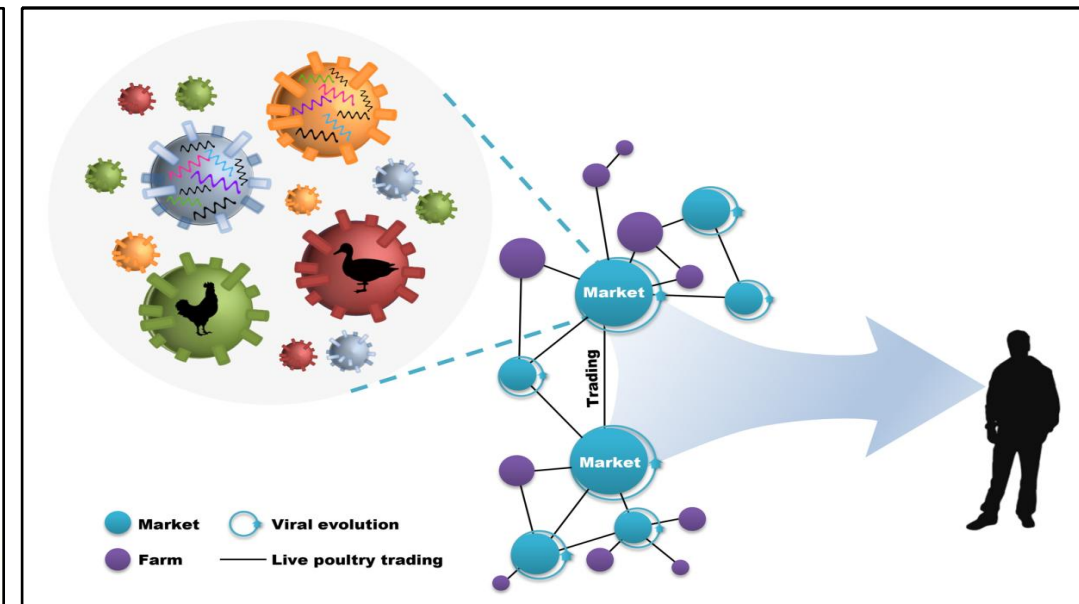
The fraction of undocumented but infectious cases is a critical epidemiological characteristic that modulates the pandemic potential of an emergent respiratory virus (3–6). These undocumented infections often experience mild, limited or no symptoms and hence go unrecognized, and, depending on their contagiousness and numbers, can expose a far greater portion of the population to virus than would otherwise occur. Here, to assess the full epidemic potential of SARS-CoV2, we use a model-inference framework to estimate the contagiousness and proportion of undocumented infections in China during the weeks before and after the shutdown of travel in and out of Wuhan.

We developed a mathematical model that simulates the spatiotemporal dynamics of infections among 375 Chinese cities (see supplementary materials). In the model, we divided infections into two classes: (i) documented infected individuals with symptoms severe enough to be confirmed, i.e., observed infections; and (ii) undocumented infected individuals. These two classes of infection have separate rates of transmission: β , the transmission rate due to documented

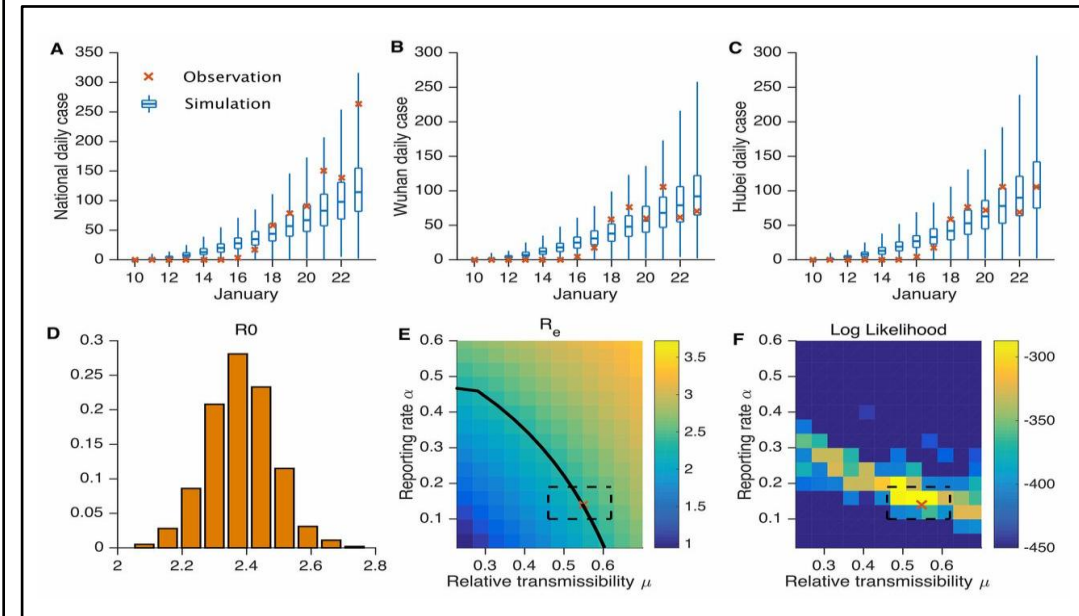
infected individuals; and $\mu\beta$, the transmission rate due to undocumented individuals, which is β reduced by a factor μ .

Spatial spread of SARS-CoV2 across cities is captured by the daily number of people traveling from city j to city i and a multiplicative factor. Specifically, daily numbers of travelers between 375 Chinese cities during the Spring Festival period (“Chunyun”) were derived from human mobility data collected by the Tencent Location-based Service during the 2018 Chunyun period (1 February–12 March 2018) (7). Chunyun is a period of 40 days—15 days before and 25 days after the Lunar New Year—during which there are high rates of travel within China. To estimate human mobility during the 2020 Chunyun period, which began 10 January, we aligned the 2018 Tencent data based on relative timing to the Spring Festival. For example, we used mobility data from 1 February 2018 to represent human movement on 10 January 2020, as these days were similarly distant from the Lunar New Year. During the 2018 Chunyun, a total of 1.73 billion travel events were captured in the Tencent data; whereas 2.97 billion trips are reported (7). To compensate for underreporting and reconcile these two numbers, a travel multiplicative factor, θ , which is greater than 1, is included (see supplementary materials).

To infer SARS-CoV2 transmission dynamics during the early stage of the outbreak, we simulated observations during 10–23 January 2020 (i.e., the period before the initiation of



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(Page numbers not final at time of first release) 1

COVID-19: EVOLUCIÓ EPIDEMIOLÒGICA GLOBAL

"A pandemic is the worldwide spread of a new disease" (WHO definition)



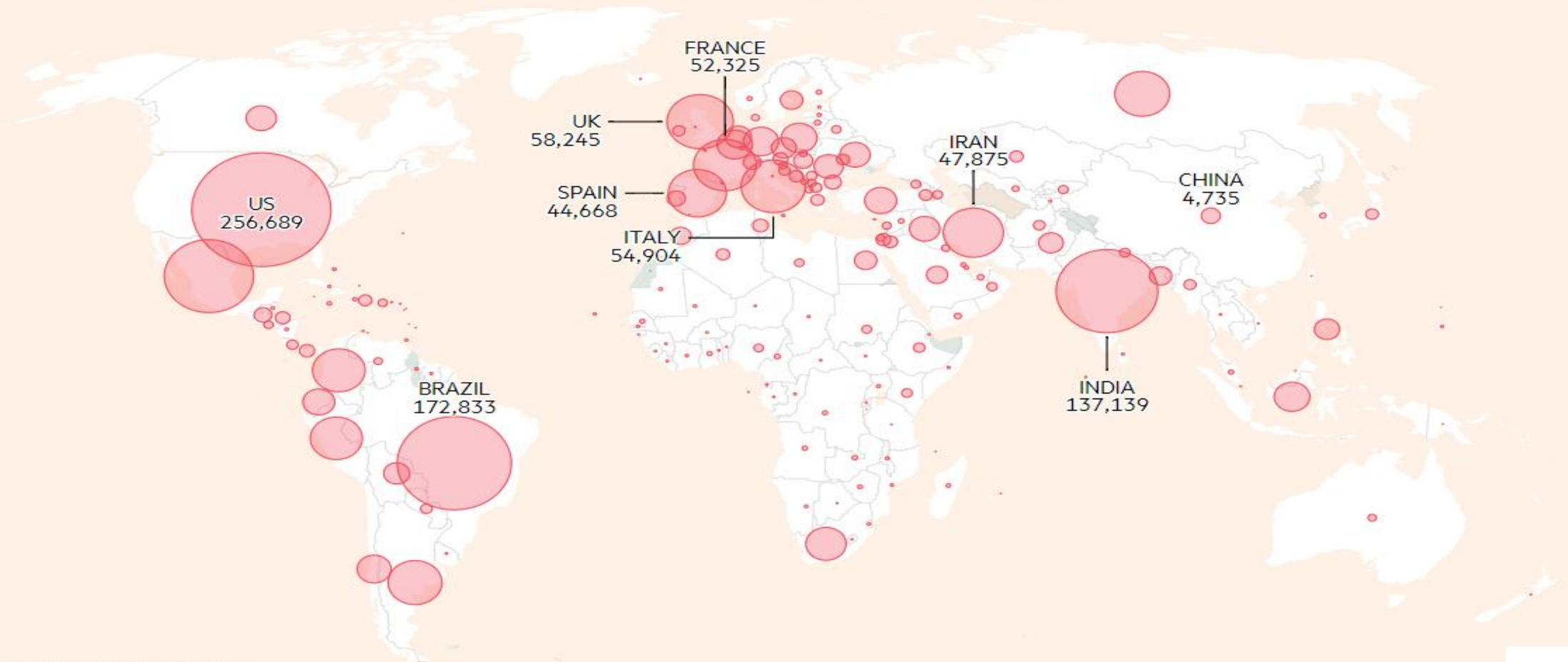
COVID-19: MAPPING THE CORONAVIRUS OUTBREAK

Confirmed cases & Deaths. November 30, 2020

As of 2.38pm November 30 GMT

Confirmed cases
62,463,263

Deaths
1,450,282



Graphic: Steven Bernard and Cale Tilford
Sources: ECDC; Covid Tracking Project; FT research
© FT

COVID-19: TRACKING MAP

Center for Systems Science and Engineering (CSSE), John Hopkins University (JHU)

<https://hub.jhu.edu/novel-coronavirus-information/>



COVID-19 Dashboard by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU)

Global Cases

63.294.405

Cases by Country/Region/Sovereignty

13.545.792 US
9.462.809 India
6.335.878 Brazil
2.302.062 Russia
2.275.016 France
1.648.187 Spain
1.633.733 United Kingdom
1.601.554 Italy
1.424.533 Argentina
1.316.806 Colombia
1.113.543 Mexico
1.071.561 Germany
999.924 Poland
962.530 Peru
962.070 Iran

Admin0 Admin1 Admin2

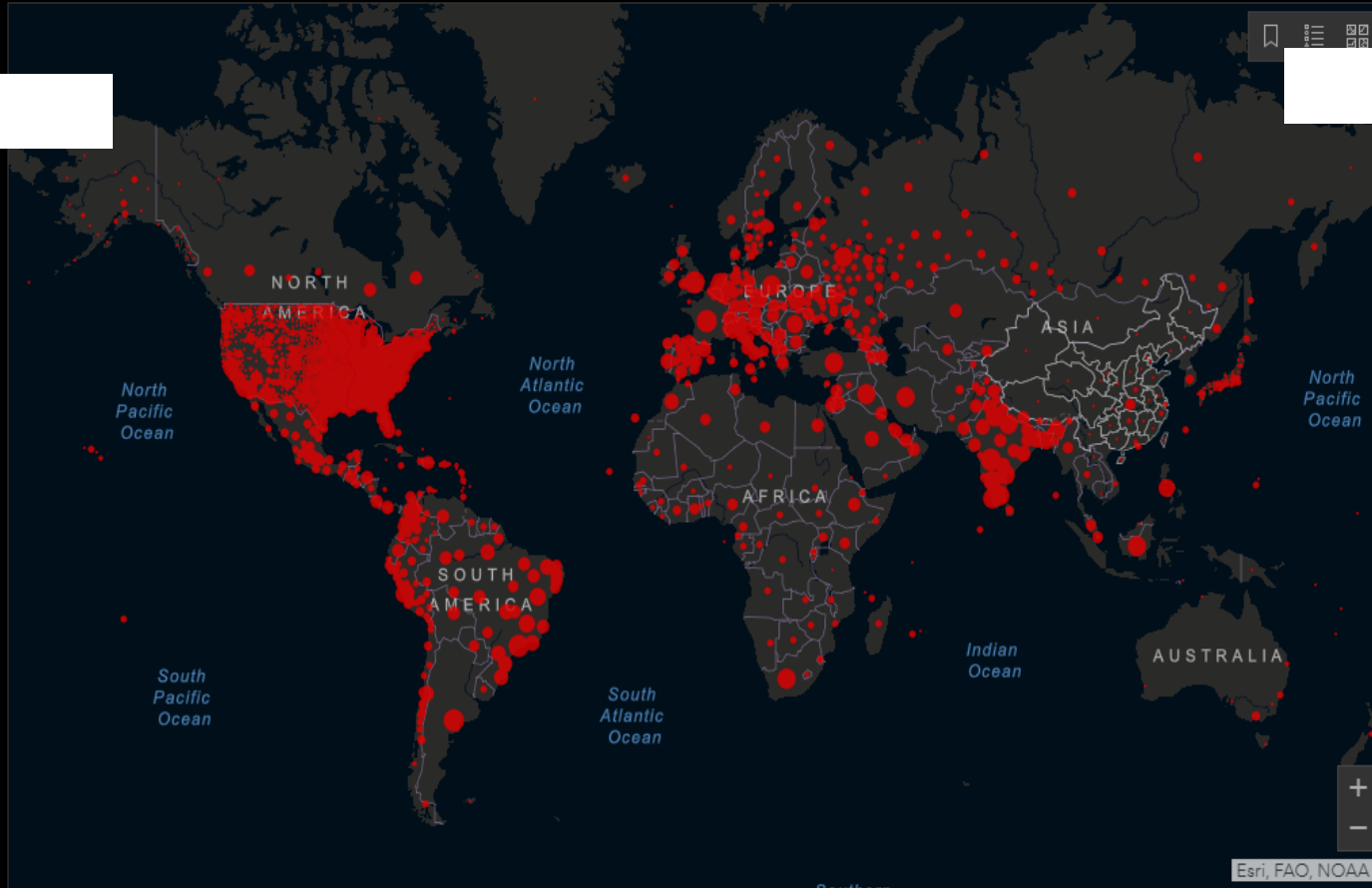
Last Updated at (M/D/YYYY)

12/1/2020 11:25 a. m.

191

countries/regions

Lancet Inf Dis Article: [Here](#). Mobile Version: [Here](#). Data sources: [Full list](#). Downloadable database: [GitHub](#), [Feature Layer](#). Lead by [JHU CSSE](#). Technical Support: [Esri Living Atlas team](#) and [JHU APL](#). Financial Support: [JHU](#), [NSF](#), [Bloomberg Philanthropies](#) and [Stavros Niarchos Foundation](#). Resource support: [Slack](#), [Github](#) and [AWS](#). Click [here](#) to [donate](#) to the CSSE dashboard team, and other JHU COVID-19 Research Efforts. [FAQ](#). Read more in this [blog](#). [Contact US](#).



Cumulative Cases

Active Cases

Incidence Rate

Case-Fatality Ratio

Testing Rate

Global Deaths

1.469.835

268.087 deaths
US

173.120 deaths
Brazil

137.621 deaths
India

105.940 deaths
Mexico

58.545 deaths
United Kingdom

55.576 deaths
Italy

52.819 deaths
France

Global Deaths

Global Recovered

US State Level

Deaths, Recovered

34.605 deaths, 85.556 recovered
New York US

21.896 deaths, 962.639 recovered
Texas US

19.214 deaths, recovered
California US

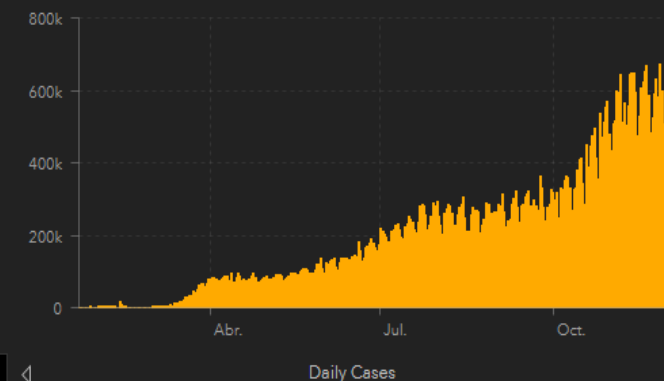
18.597 deaths, recovered
Florida US

16.993 deaths, 43.771 recovered
New Jersey US

12.985 deaths, recovered
Illinois US

10.748 deaths, 155.473 recovered
Massachusetts US

US Deaths, Recovered



COVID-19: UNA PANDÈMIA GLOBAL

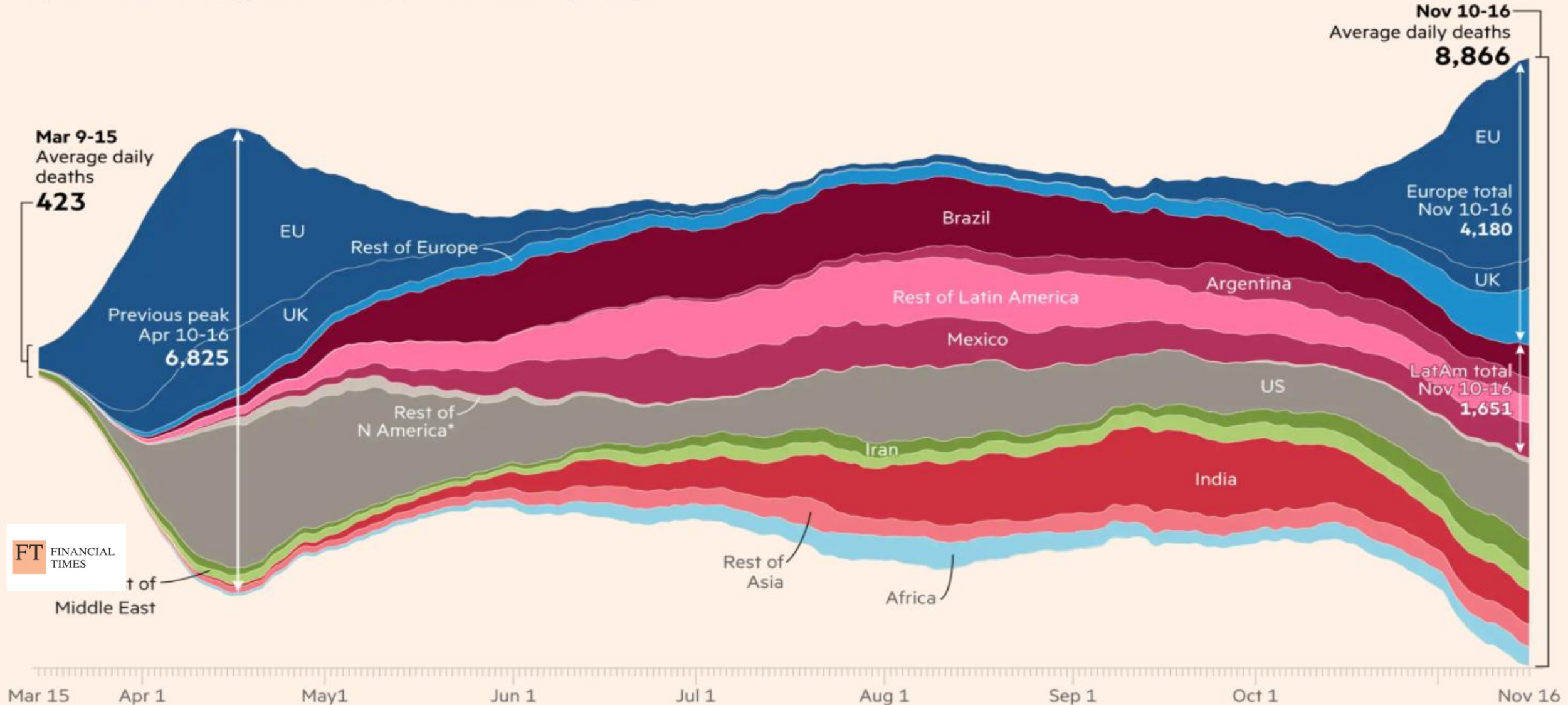
Un problema de governança sanitària



COVID-19: DAILY DEATHS BY COUNTRY

Daily deaths of patients diagnosed with coronavirus (7-day rolling average) (March-November, 2020)

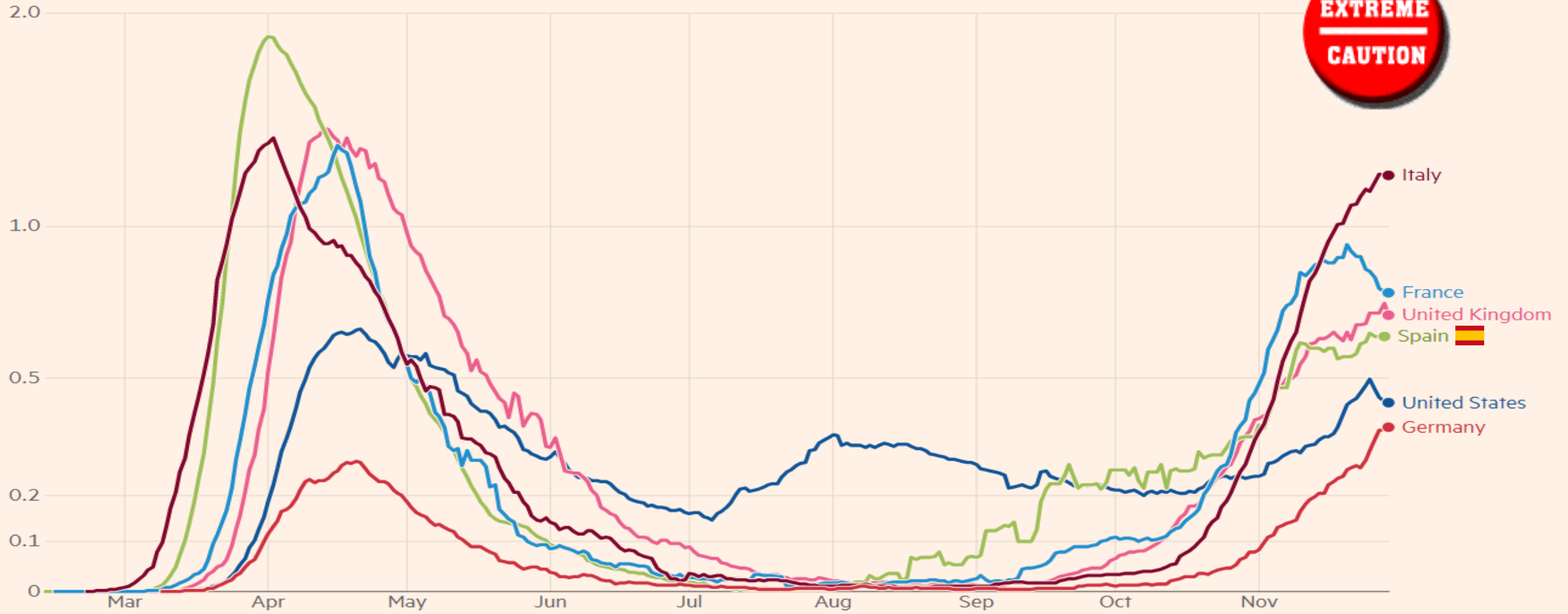
Daily deaths of patients diagnosed with coronavirus (7-day rolling average)



COVID-19: MAPPING THE CORONAVIRUS OUTBREAK

New deaths. 7-day rolling average (November 30, 2020)

Seven-day rolling average of new deaths (per 100k)



Source: Financial Times analysis of data from the European Centre for Disease Prevention and Control, the Covid Tracking Project, the UK Government coronavirus dashboard, the Spanish Ministry of Health and the Swedish Public Health Agency.
Data updated November 30 2020 2.38pm GMT. Interactive version: [ft.com/covid19](https://www.ft.com/covid19)

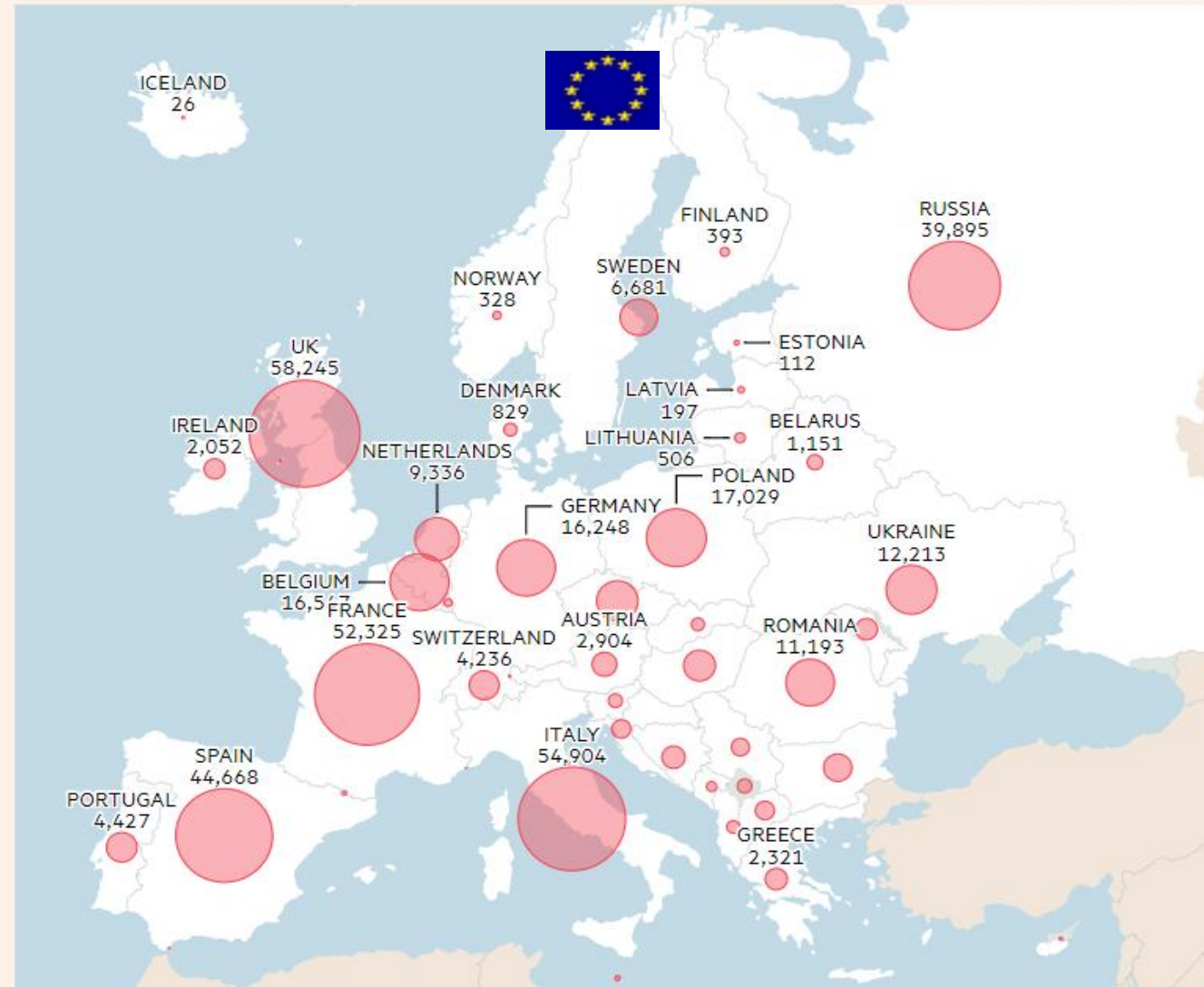
FINANCIAL TIMES



COVID-19: MAPPING THE CORONAVIRUS OUTBREAK

Total deaths in Europe (November 30, 2020)

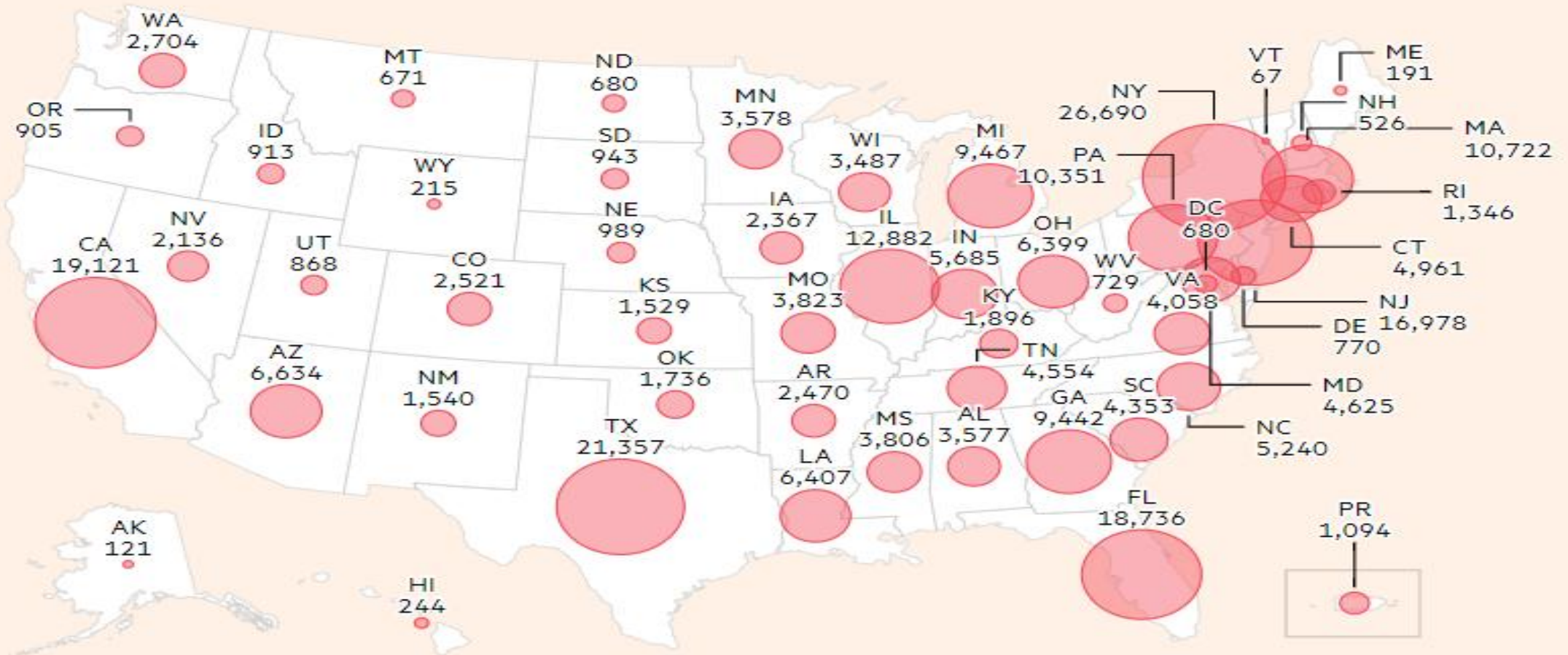
Total deaths as of 2.38pm November 30 GMT



COVID-19: MAPPING THE CORONAVIRUS OUTBREAK

Total deaths in the US (November 30, 2020)

Total deaths as of 2.38pm November 30 GMT



Graphic: Steven Bernard and Cale Tilford

Sources: Covid Tracking Project

© FT



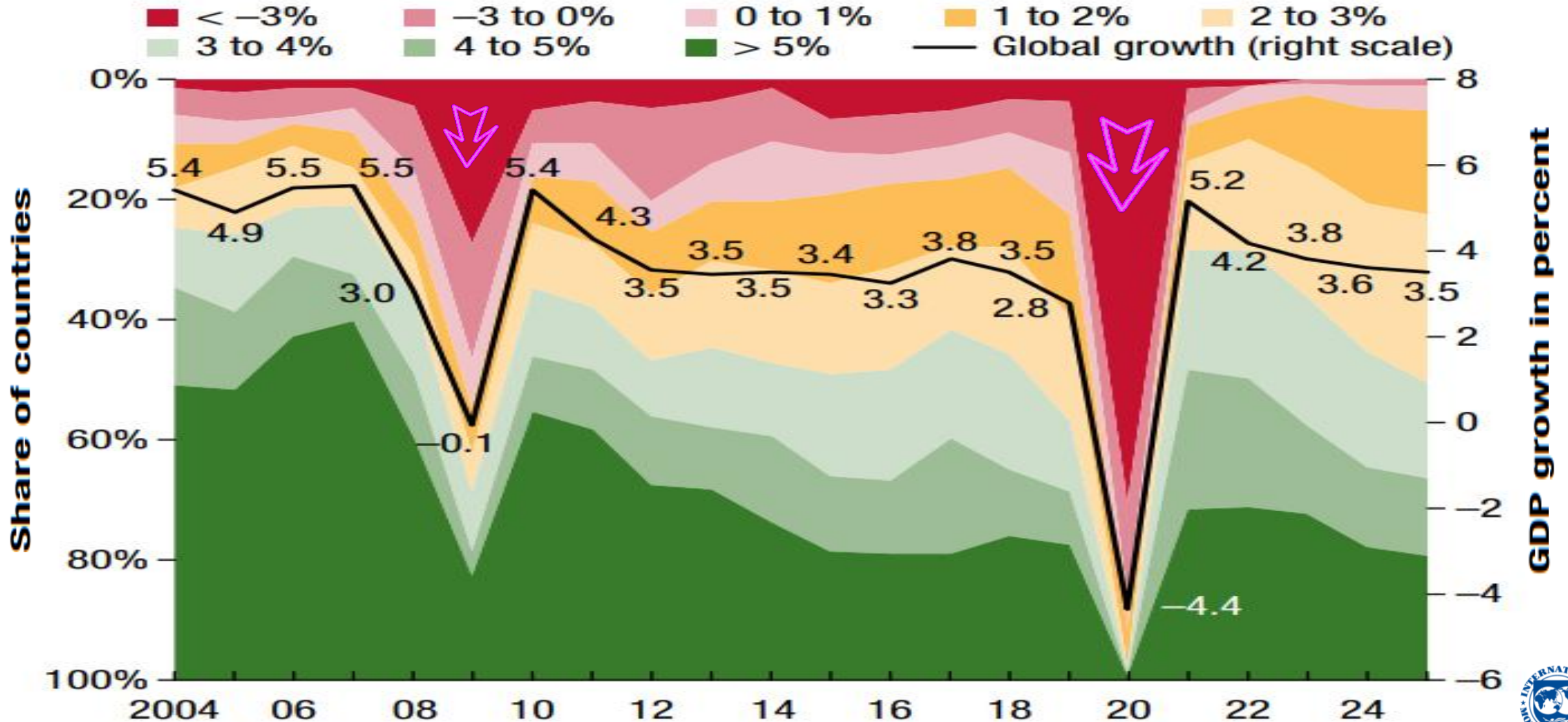
Perspectives econòmiques a tancament d'exercici 2020 i escenaris 2021

L'any que vam viure perillosament

- 1. Covid-19: Un cigne negre**
- 2. Eclosió sense precedents**
- 3. Política de salut pública vs. política econòmica**
- 4. Escenaris 'd. C.' (després del coronavirus)**
- 5. Economia espanyola i catalana**

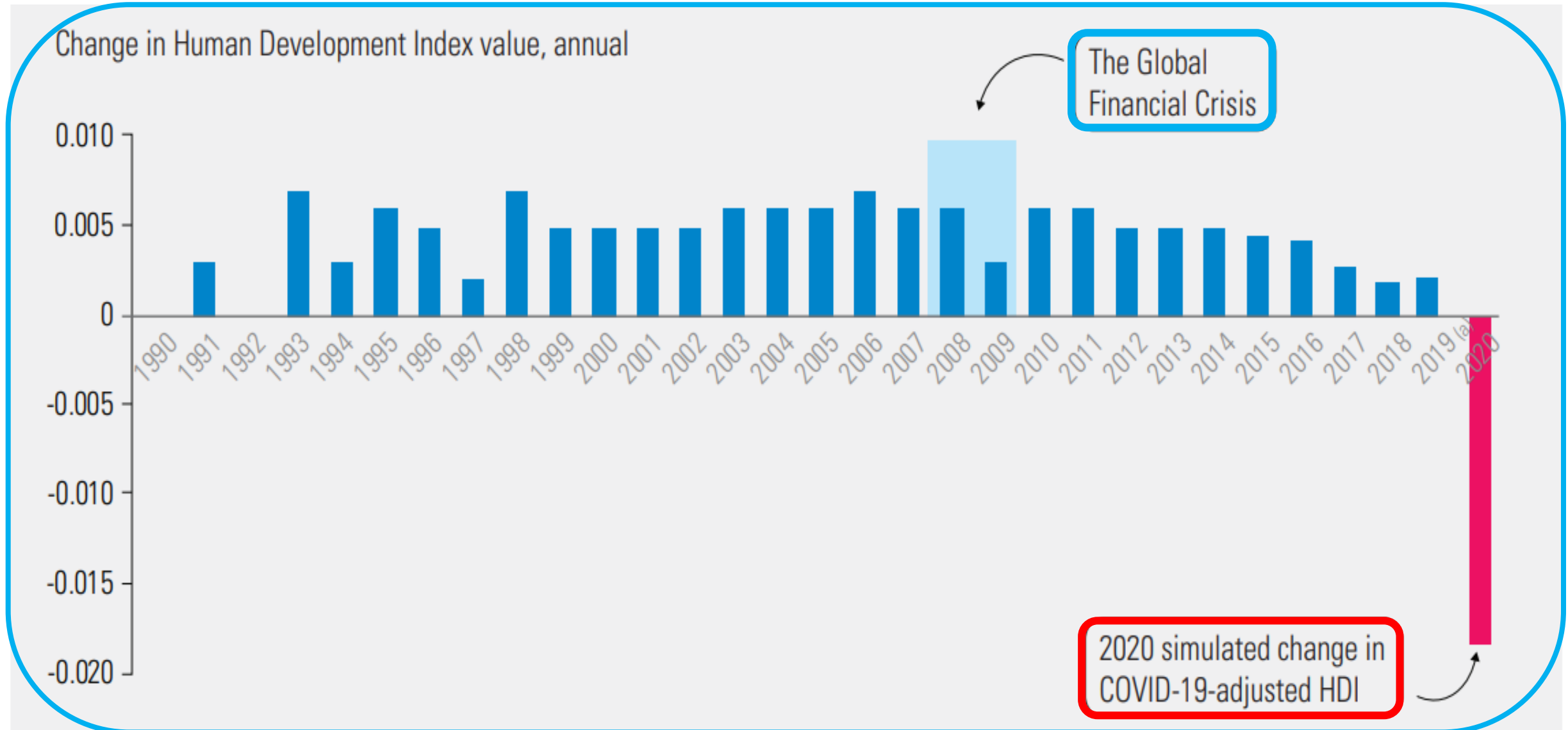
COVID-19: WORLD GDP GROWTH

The Global Financial Crisis vs. The Covid-19 Crisis



COVID-19: HUMAN DEVELOPMENT INDEX

Annual change in value (1990-2020)



COVID-19: TSUNAMI? TERRATRÈMOL!

El risc de rèpliques



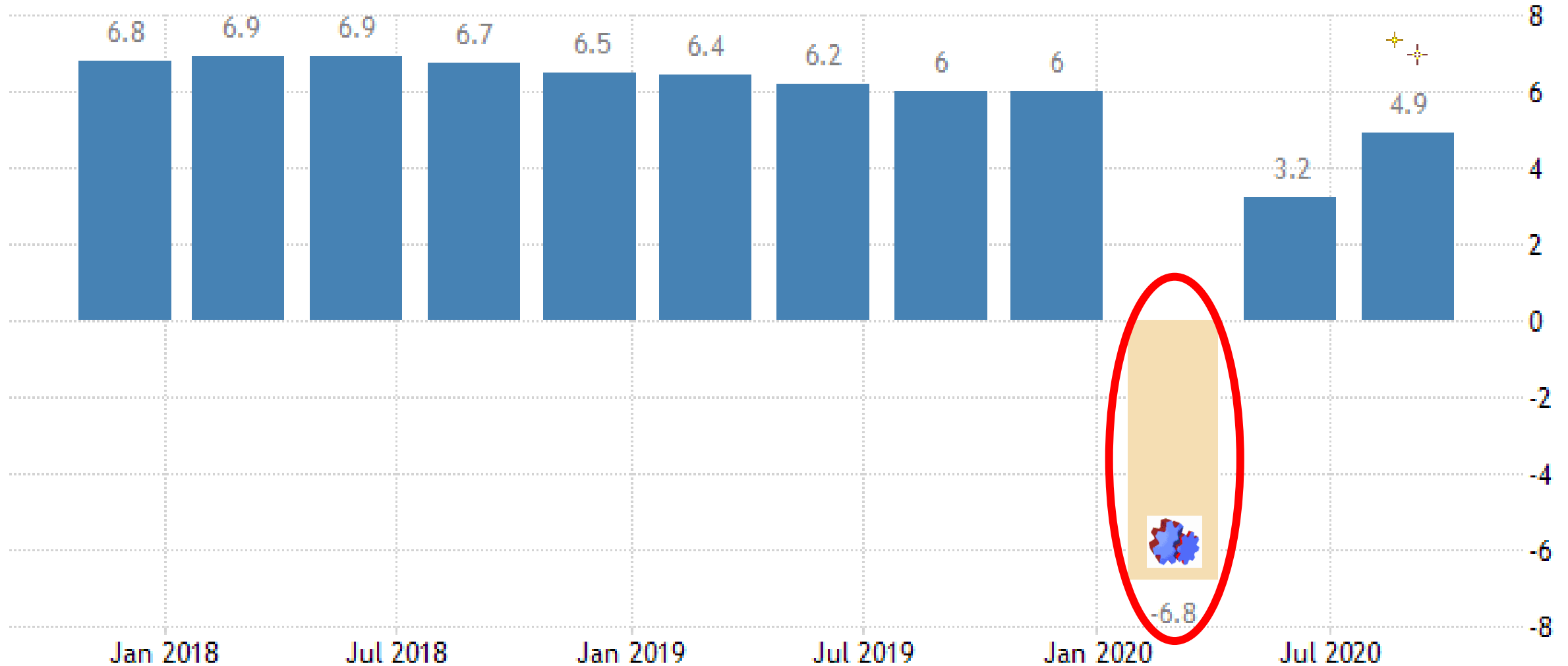
COVID-19: XINA

La 'clau de volta' de l'economia global



COVID-19: CHINA'S GDP

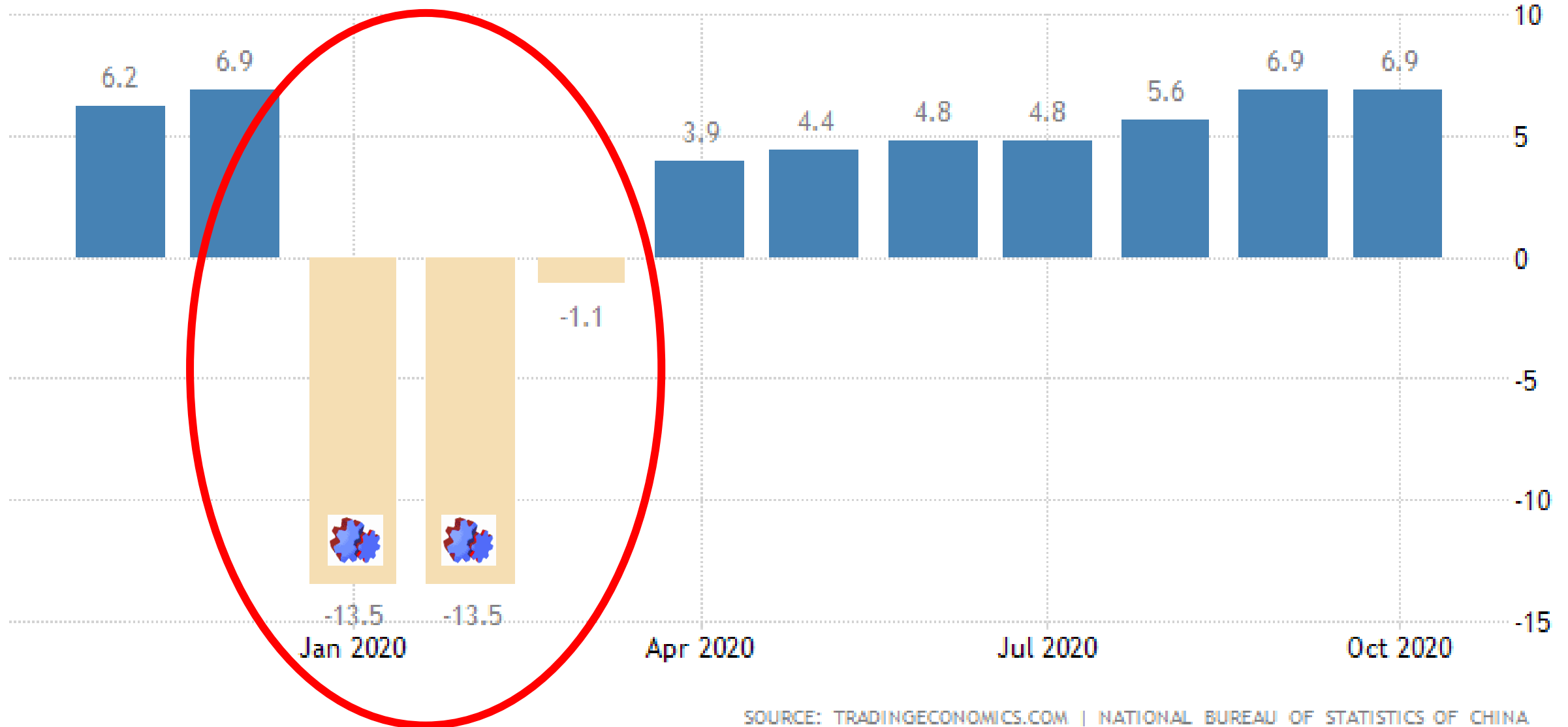
GDP annual growth rate



SOURCE: [TRADINGECONOMICS.COM](https://tradingeconomics.com) | NATIONAL BUREAU OF STATISTICS OF CHINA

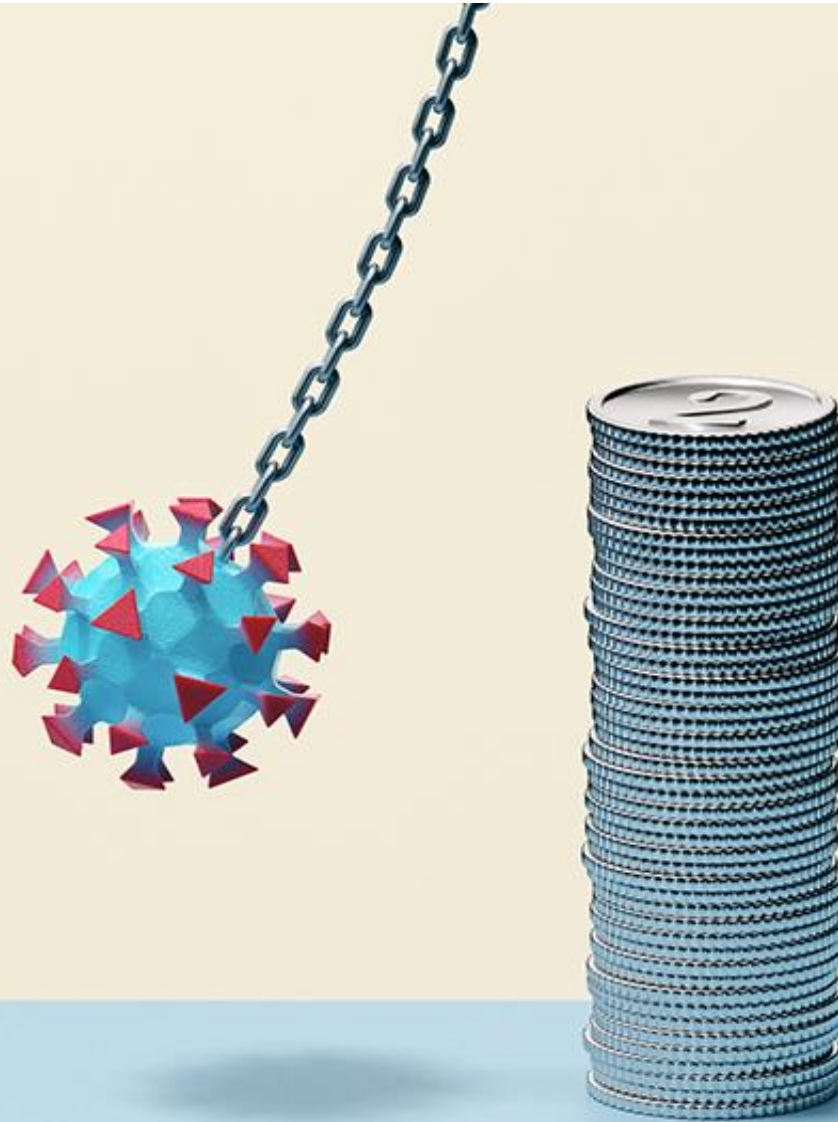
COVID-19: CHINA'S MANUFACTURING

Industrial Production



COVID-19: DE XINA AL MÓN

Un impacte global molt profund



COVID-19: 'SHOCKS' D'OFERTA I DE DEMANDA

Disrupció de les cadenes de valor del comerç global



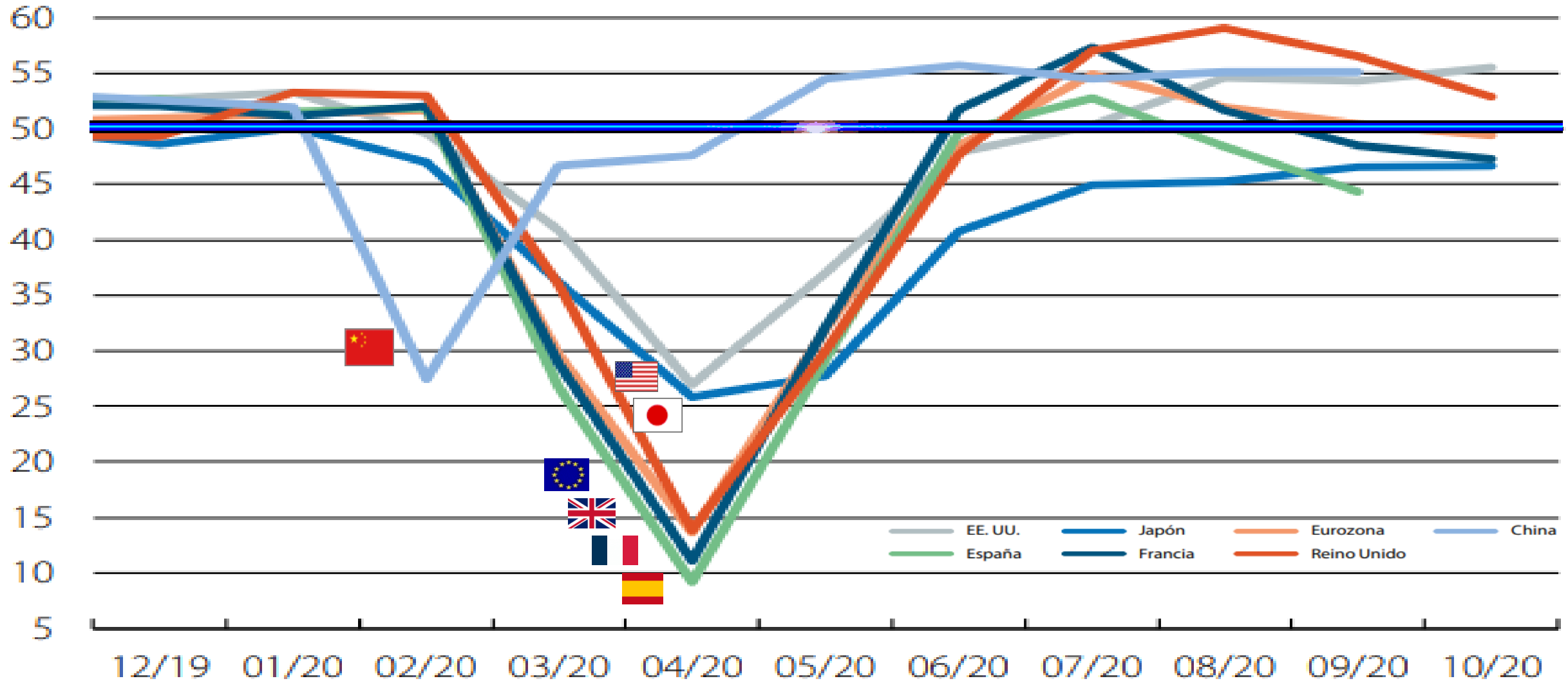
COVID-19: COMERÇ INTERNACIONAL

Transport marítim



COVID-19: PURCHASING MANAGERS INDEX (PMI)

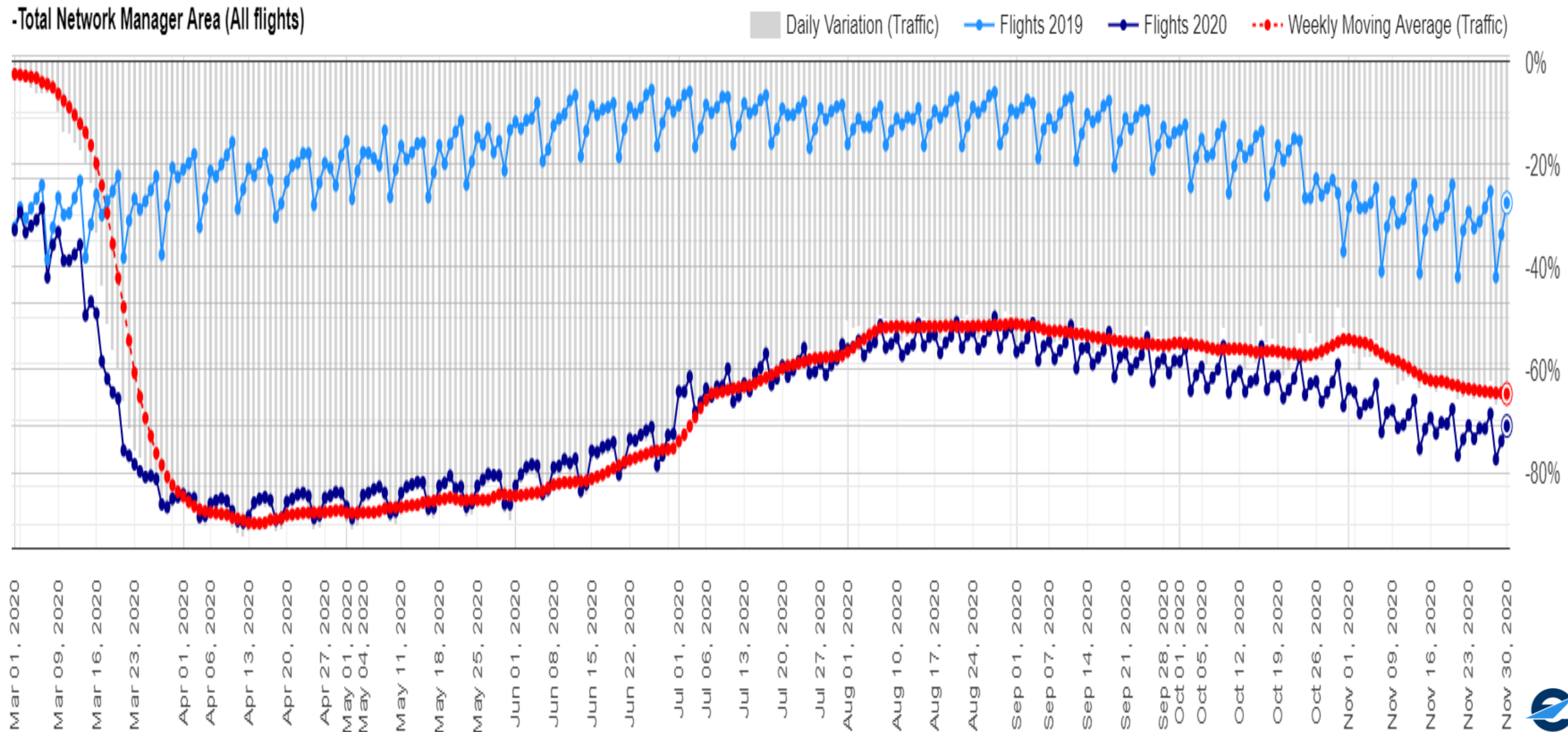
Nivell



Fuente: CaixaBank Research, a partir de datos de Markit.

COVID-19: AIR TRAFFIC

Daily Traffic Variation - Eurocontrol



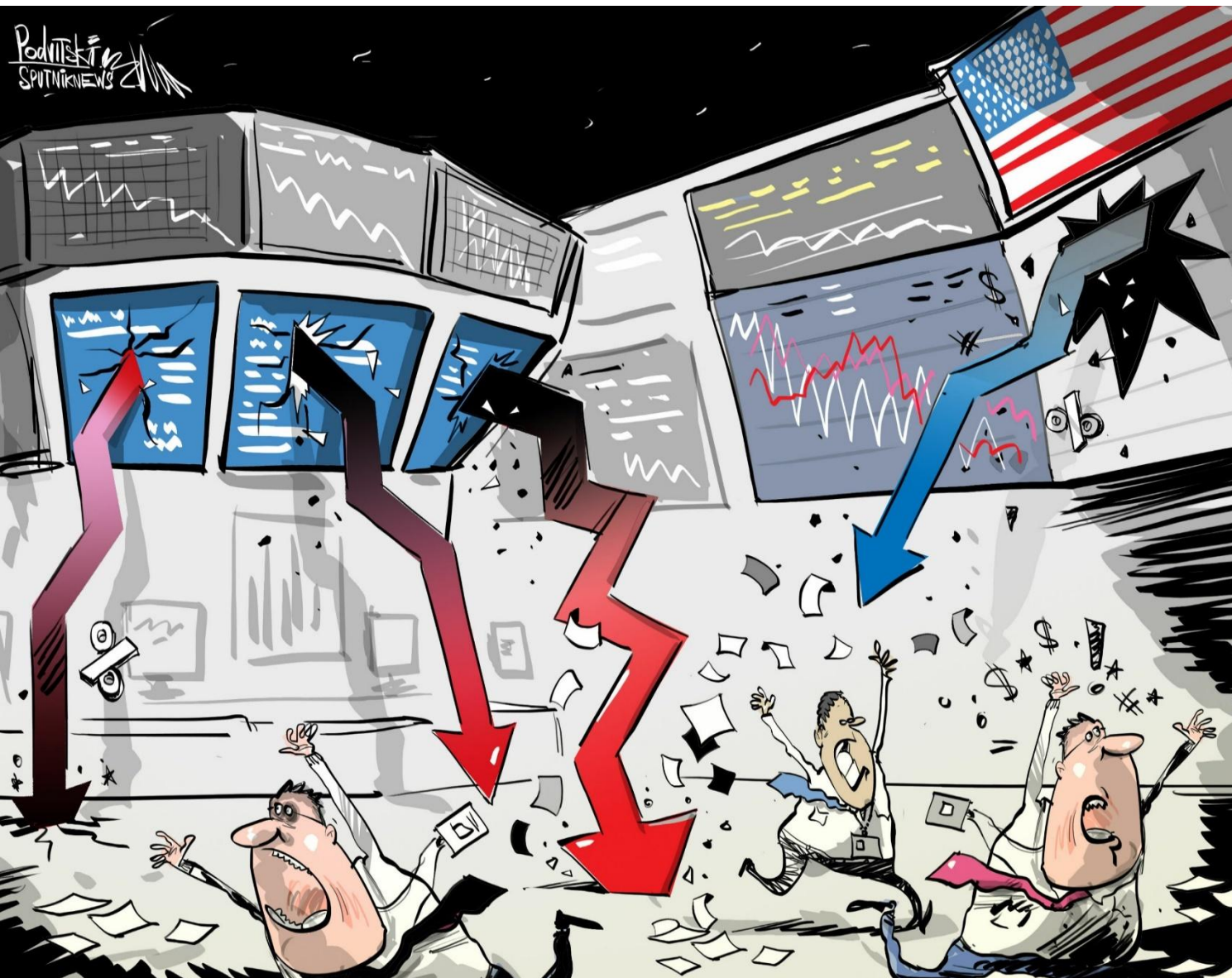
COVID-19: AIR TRAFFIC

'Planes on the ground'



COVID-19: MERCATS FINANCIERS

Índex borsaris



COVID-19: ÍNDEX DE BORSA

USA: S&P's 500, 1 desembre 2020



COVID-19: ÍNDEX DE BORSA

Shanghai Composite Market Index, 1 deembre 2020



COVID-19: ÍNDEX DE BORSA

UEM: Euro Stoxx 50, 1 de desembre 2020



COVID-19: ÍNDEX DE BORSA

UK: FTSE 100, 1 desembre 2020



COVID-19: ÍNDEX DE BORSA

España: IBEX-35, 1 de septiembre 2020



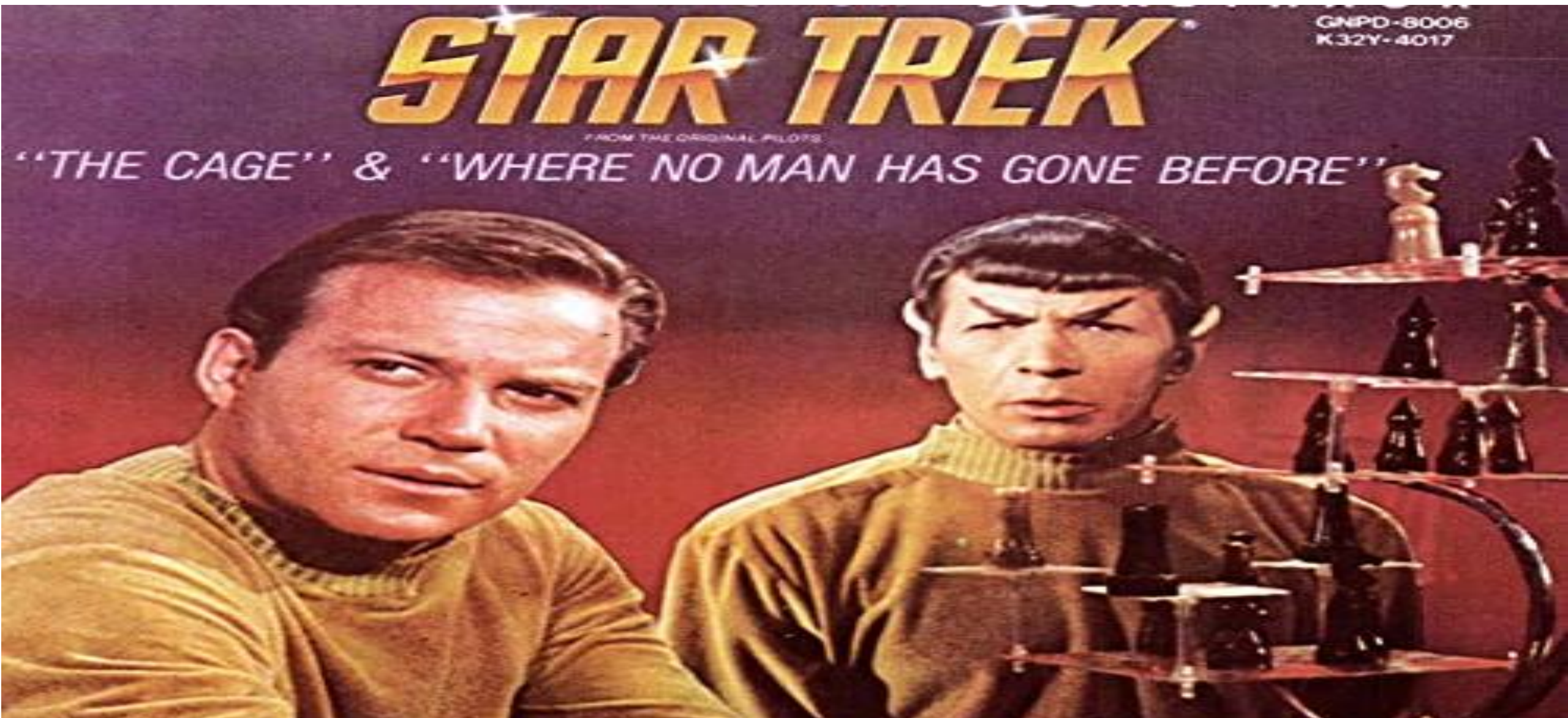
COVID-19: OIL PRICE

Crude oil Brent. 1 de septiembre 2020



COVID-19: THE 'STAR TREK' WORLD

'Where no man and no woman has gone before'





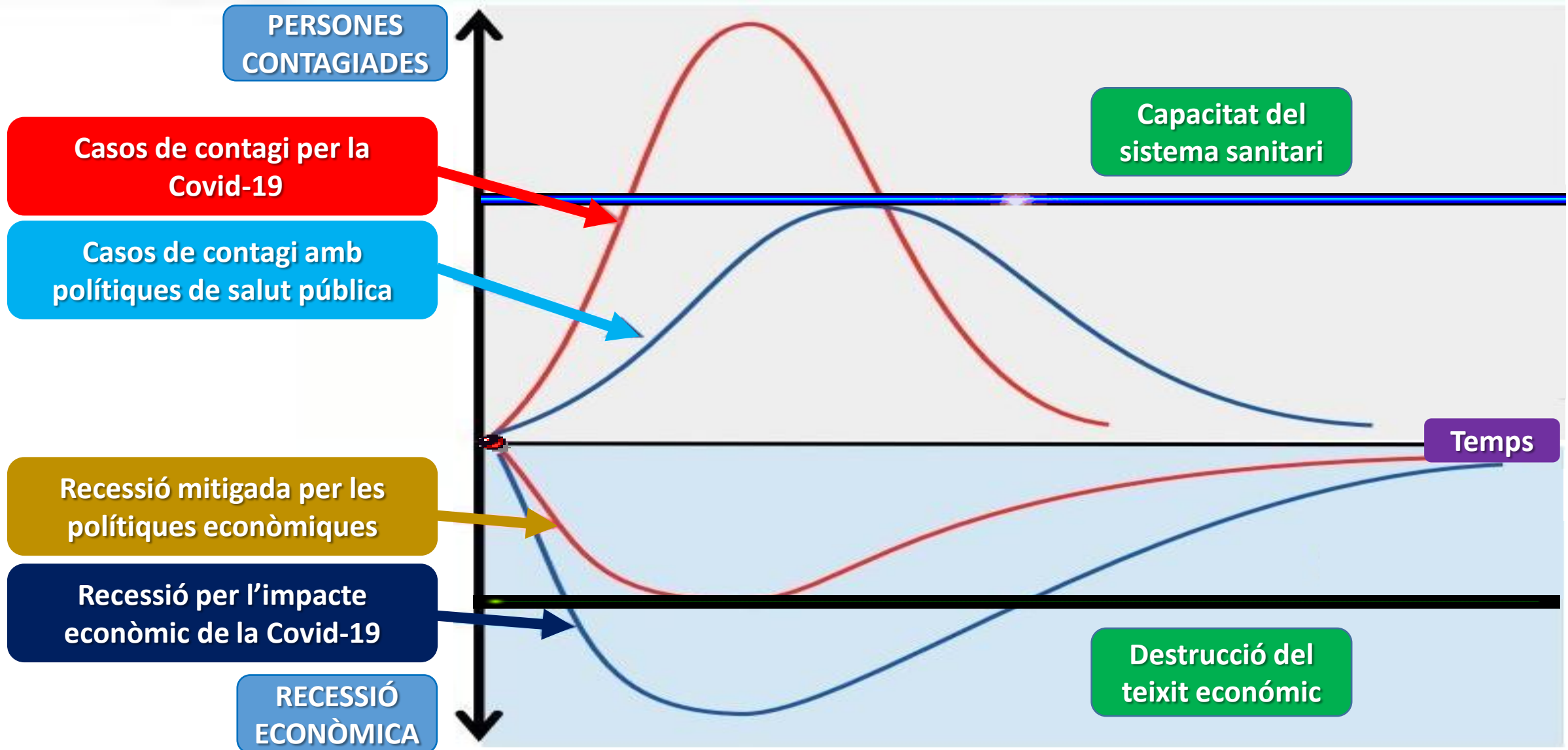
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- 5. Economia espanyola i catalana**

COVID-19: SALUT VS. ECONOMIA

Impacte epidemiològic vs. Impacte econòmic



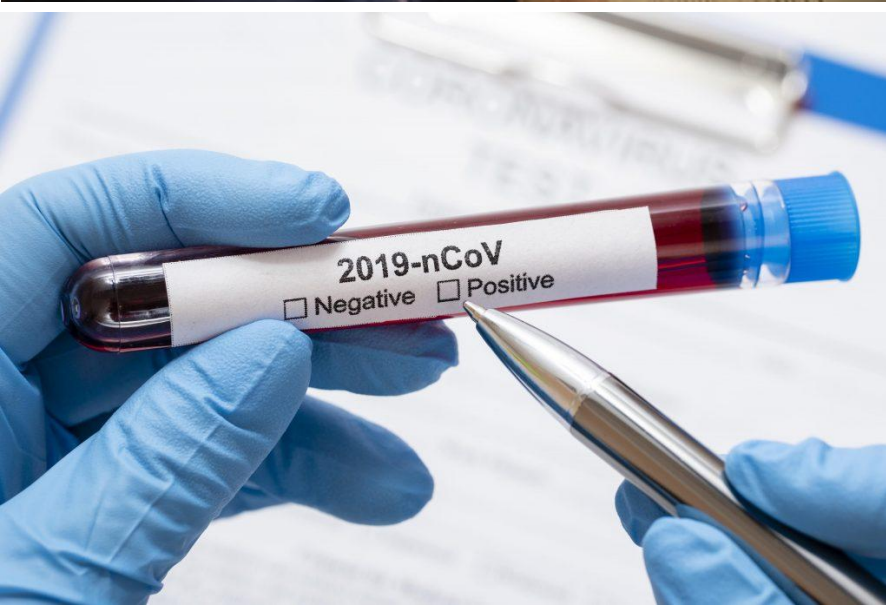
COVID-19: HEALTHCARE SYSTEM CAPACITY

La capacitat dels sistemes sanitaris



COVID-19: TEST-TYPES DETECT INFECTIONS

Molecular (genetic) vs. Serologic



Types	Technology	Details	Availability
Molecular Detect genetic material of the virus	RT-PCR Reverse transcription polymerase chain reaction	- Steps of amplifying and detection of viral genome identifies presence of virus Predominant testing method globally and most accurate - Lab based tests typically takes ~3 days for results - Near point of care takes <1 hour for results	Growing availability varies by geography; Rapid PCR test received emergency FDA approval
	Isothermal amplification	- Rapid diagnostics with a single step identification of virus - Typically near point of care (e.g., hospitals, clinics) taking < 20min	Recently approved tests
	CRISPR	CRISPR protein used after isothermal amplification to detect viral RNA presence	Experimental / proof of concept
Immunological / serologic tests Detect antigens or antibodies	Lateral flow tests	Detects presence of antibodies and antigens based on binding to enzymes - Negative test results don't imply lack of infection but just antibodies below detection limit; test most effective 8-10 days since infection started	Starting to become available in Europe, only one in EUA in the US Over 30 tests under consideration
	CLIA: Chemiluminescence Immuno Assay ELISA: Enzyme linked immune sorbent assay	- Lateral flow tests are shorter, point of care, self administered (like a pregnancy test), Typically <15 min - CLIA / ELISA tests are primarily lab based / near point of care; typically takes <1 hour for results	

Improved speed and scale of live case confirmation will be critical to facilitating test and trace strategies for lower burden settings or for countries that have successfully contained initial outbreaks and are moving towards economic restart

COVID-19: 'SALUT I VIDA' VS. 'ECONOMIA'

'A False Dilemma: Save lives or save Jobs'

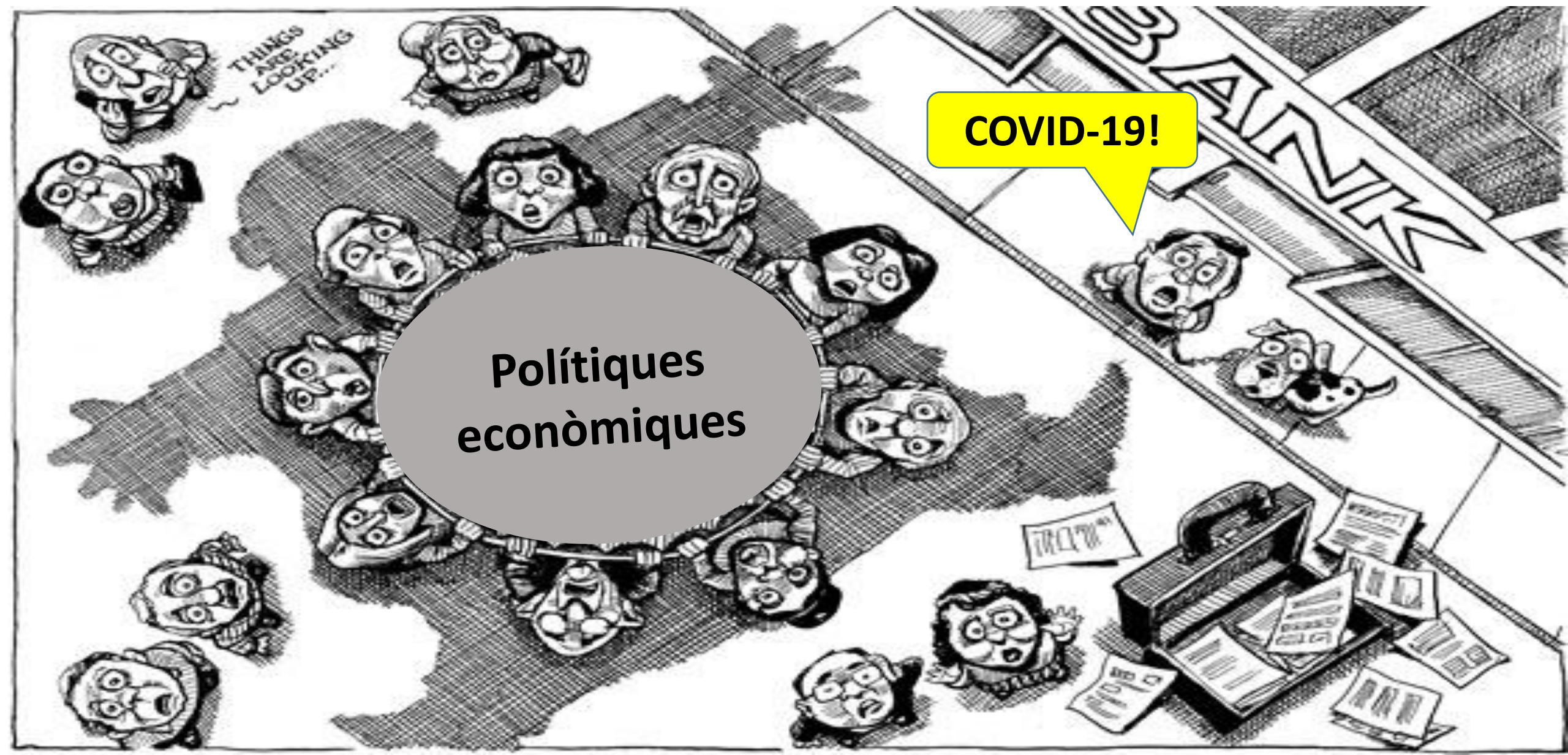


O NOS MATA EL #CORONAVIRUS

O NOS MORIMOS DE HAMBRE

COVID-19: TOO BIG TO BAIL-OUT?

Les polítiques econòmiques per mitigar la destrucció de teixit productiu



COVID-19: ON ÉS EL G20?

Acció coordinada global



COVID-19: POLICY RESPONSES

Policy Tracker by Country, International Monetary Fund (IMF)



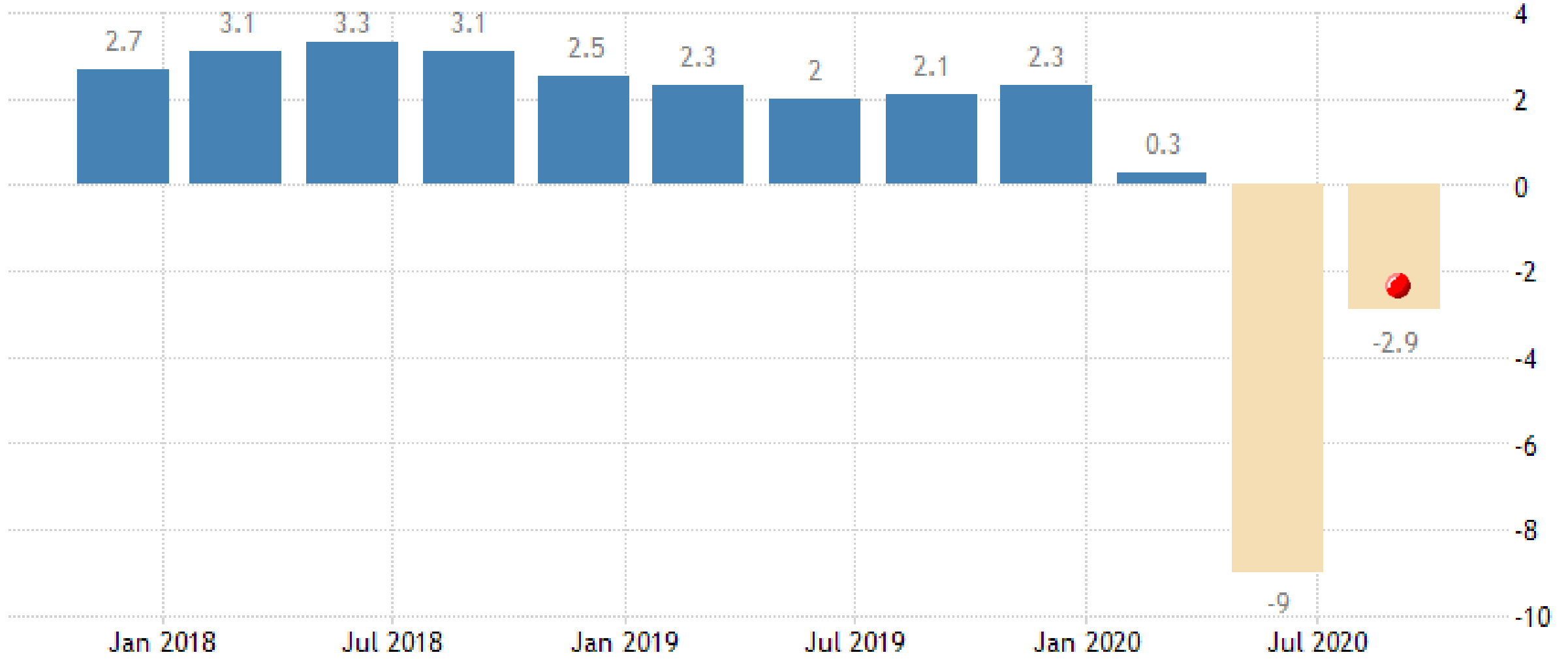
COVID-19: USA

Política econòmica



COVID-19: USA

GDP annual growth rate (%)

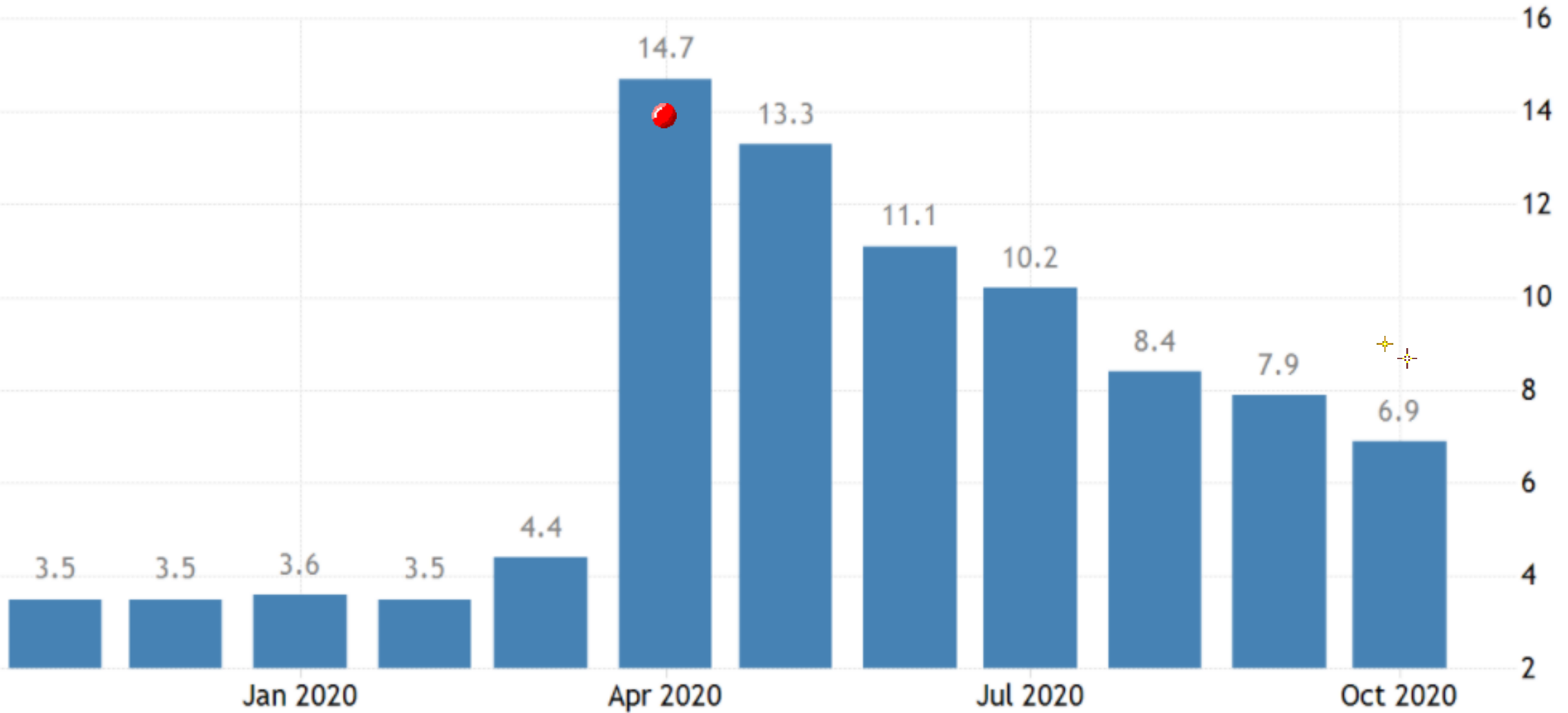


SOURCE: [TRADINGECONOMICS.COM](https://tradingeconomics.com) | U.S. BUREAU OF ECONOMIC ANALYSIS



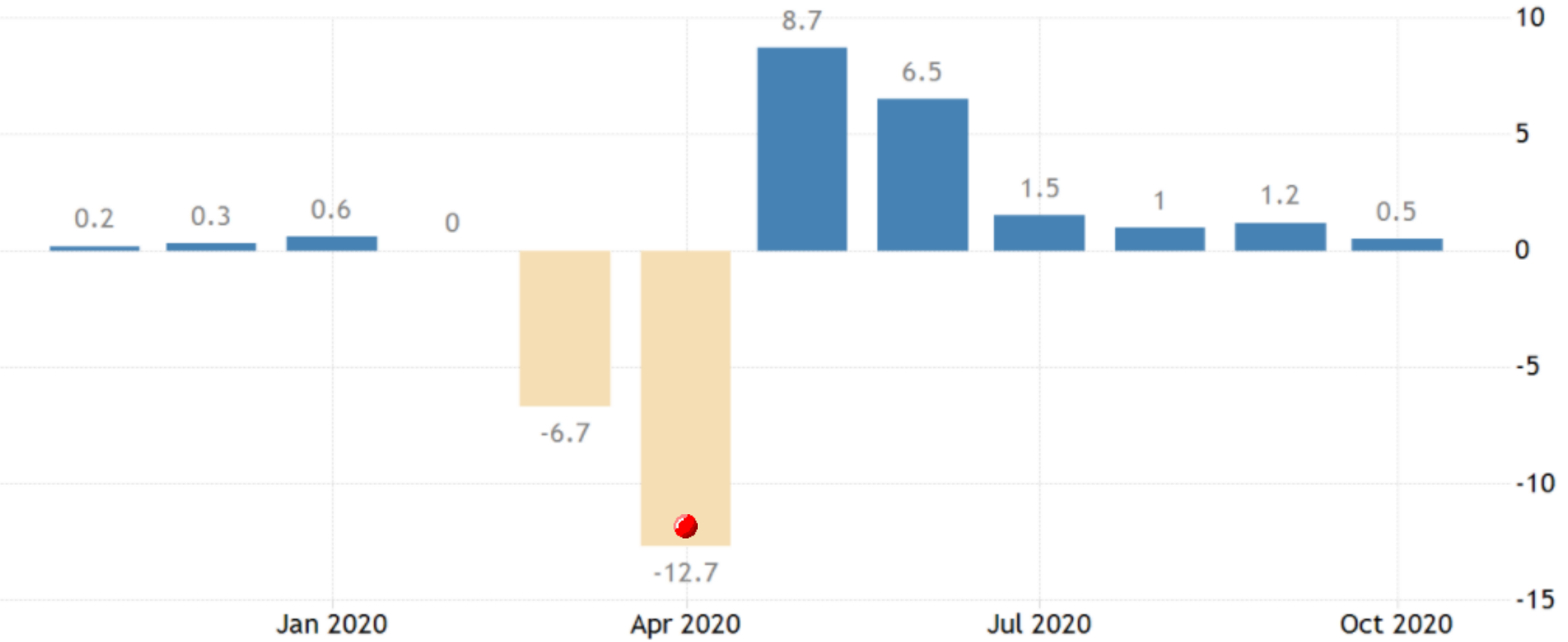
COVID-19: USA

Taxa d'atur (%)



COVID-19: USA

Personal Spending (MoM %)



SOURCE: [TRADINGECONOMICS.COM](https://tradingeconomics.com) | U.S. BUREAU OF ECONOMIC ANALYSIS



COVID-19: THE US FEDERAL RESERVE (FED)

Política monetària



The Federal Reserve



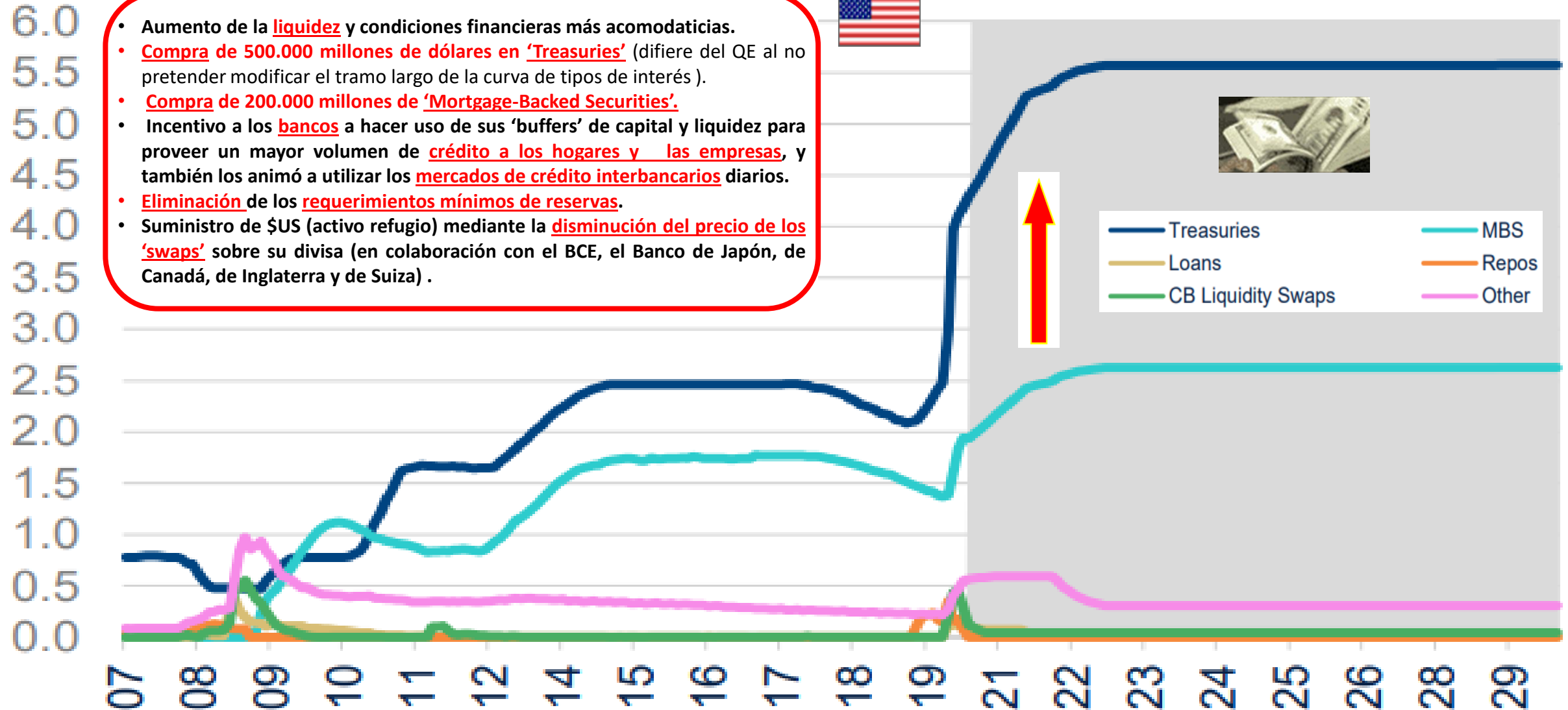
COVID-19: POLÍTICA MONETÀRIA DE LA FED

El 'bazooka'



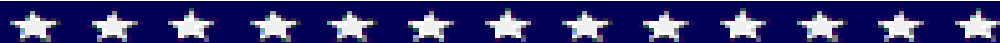
COVID-19: POLÍTICA MONETÀRIA DE LA FED

Factors supplying reserves (\$Tn)



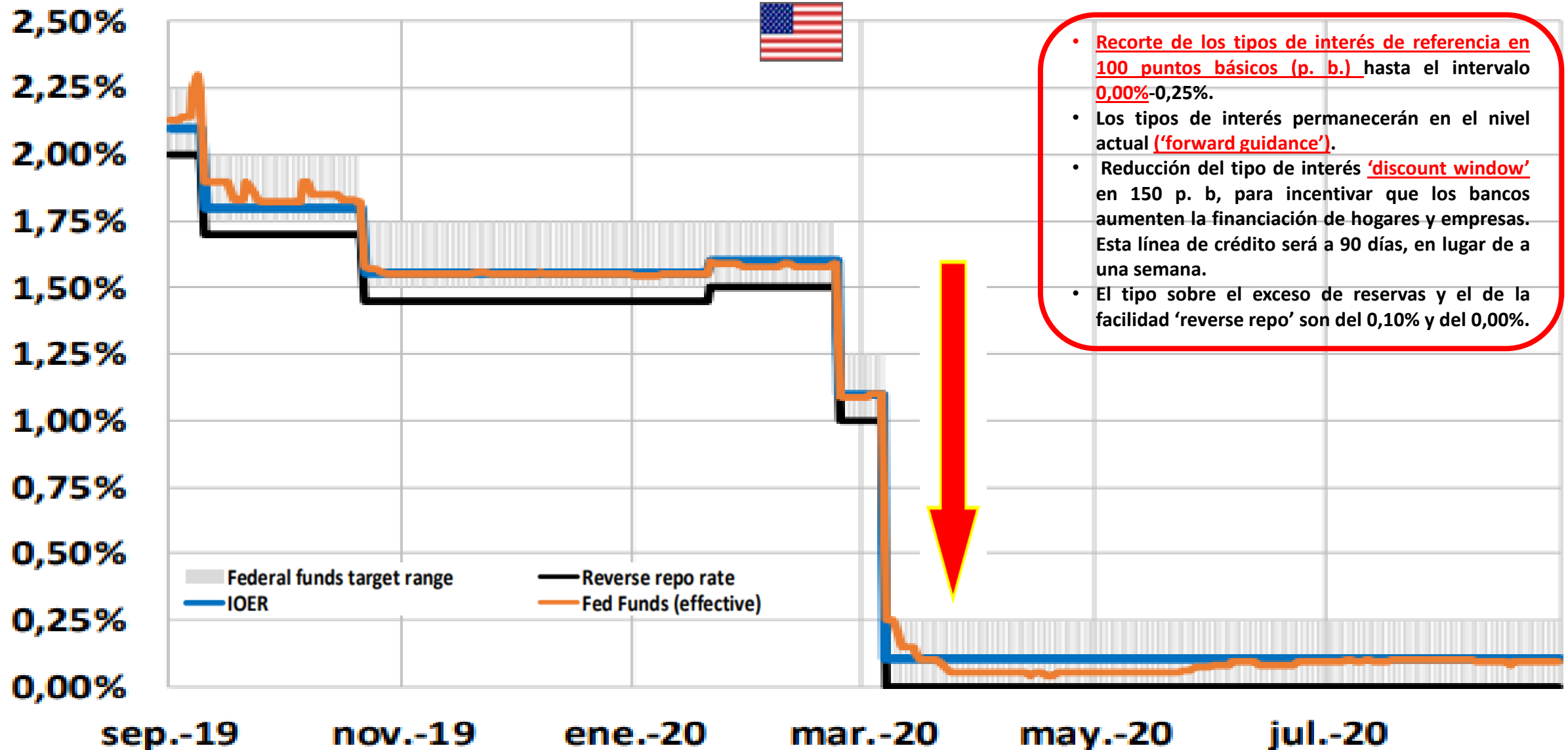
COVID-19: POLÍTICA MONETÀRIA DE LA FED

'Quantitative easing'



COVID-19: POLÍTICA MONETÀRIA DE LA FED

Tipus d'interès oficials & interbancari (%)



COVID-19: THE TREASURY

Política fiscal



JANET YELLEN

Treasury



THE TREASURY

Política fiscal



Wally Ademeyo, Deputy Treasury



Neera Tanden, Office of Management and Budget



Cecilia Rouse, Chair of CEA



Jared Bernstein, Council of Economic Advisors

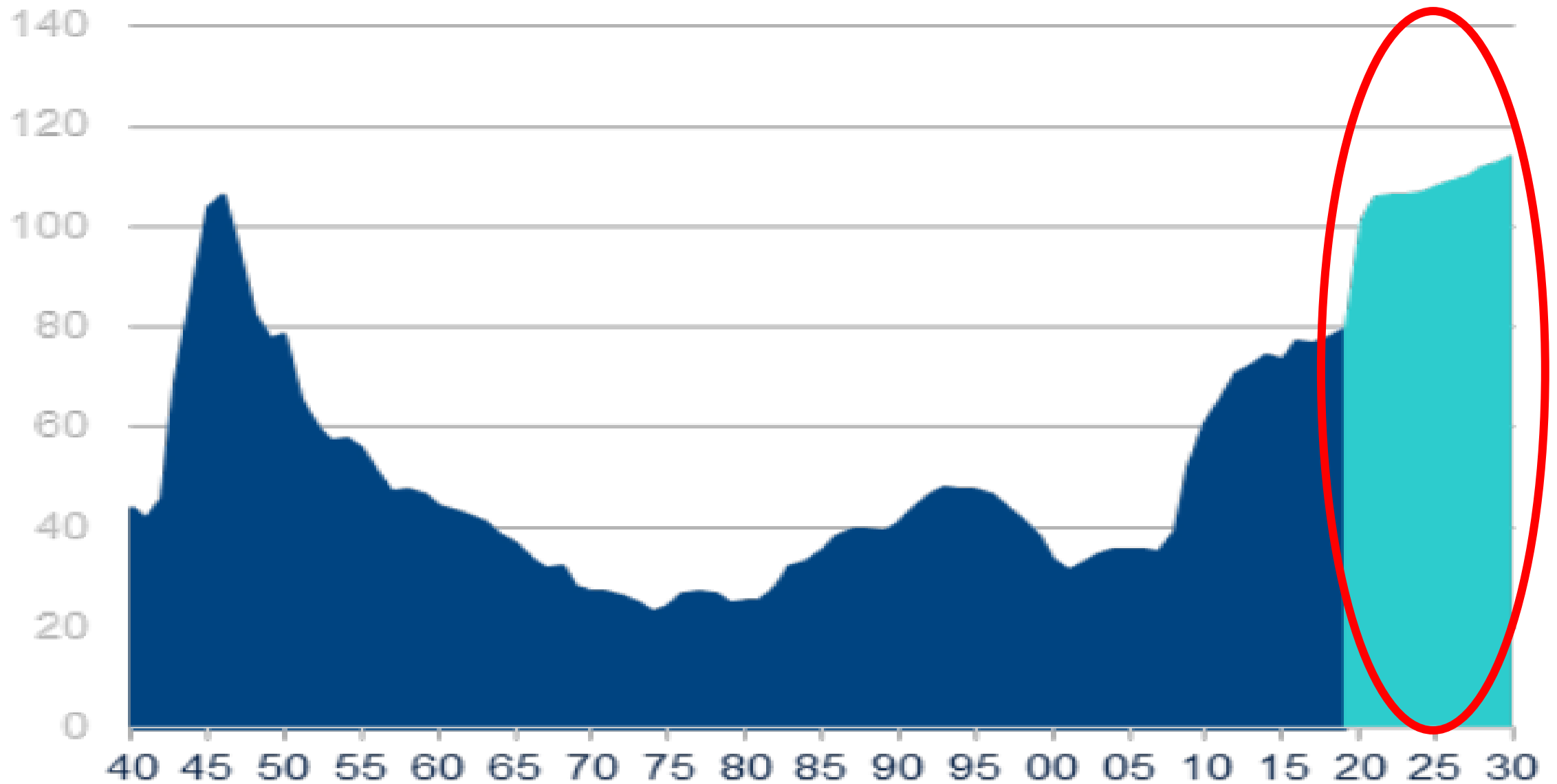


Heather Boushey, Council of Economic Advisors



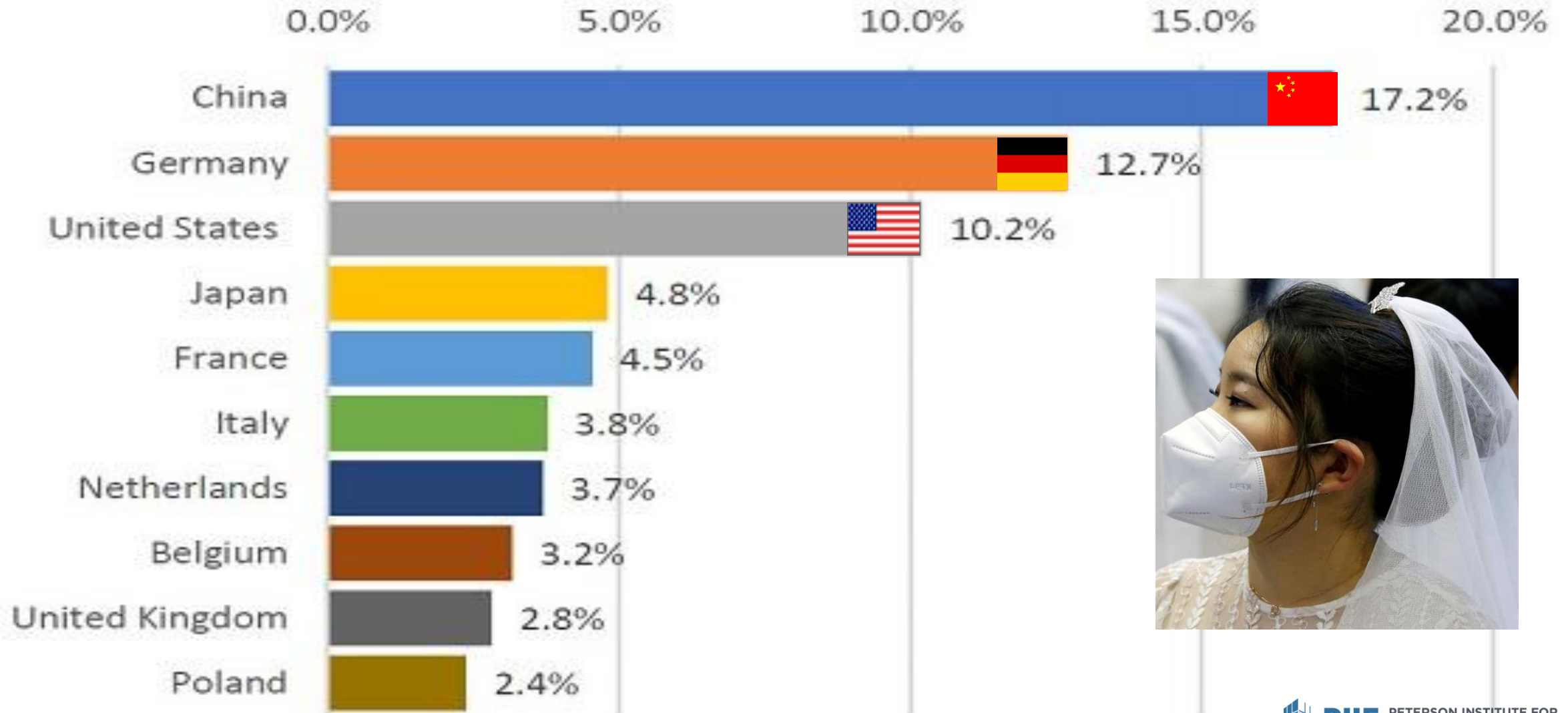
COVID-19: POLÍTICA FISCAL USA

Deute Público (% PIB)



COVID-19: PERSONAL PROTECTIVE PRODUCTS

Top exporters (%) (World Trade Organization, WTO)



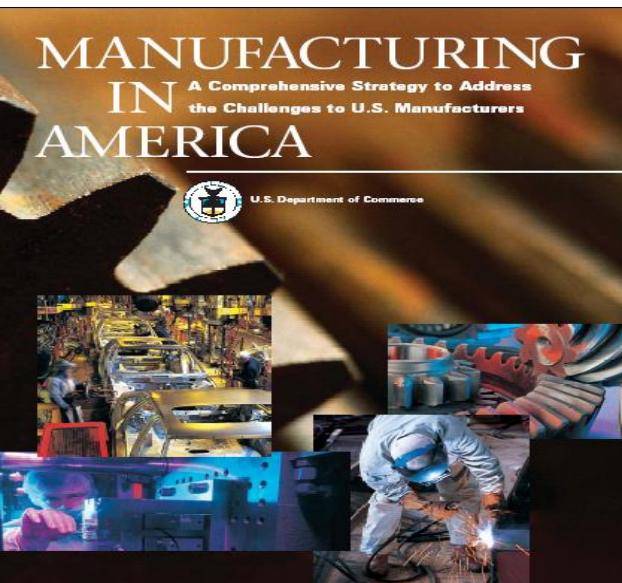
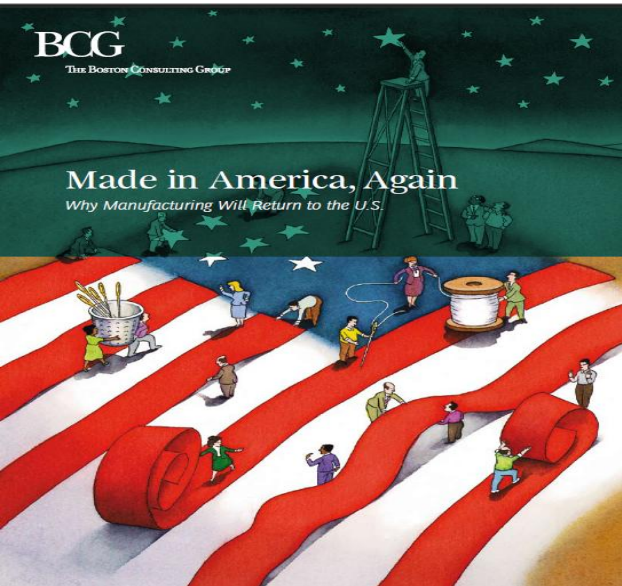
COVID-19: MERCAT D'IMPORTACIÓ COMPETITIU

Desinfectants, mascaretes, guants, sabó de mans, ulleres protectores i viseres, EPIs



COVID-19: 'MADE IN AMERICA, AGAIN'

'Made in USA': 'Manufacturing in America'



COVID-19: SECTORS ESTRATÈGICS

Producció domèstica no deslocalitzada



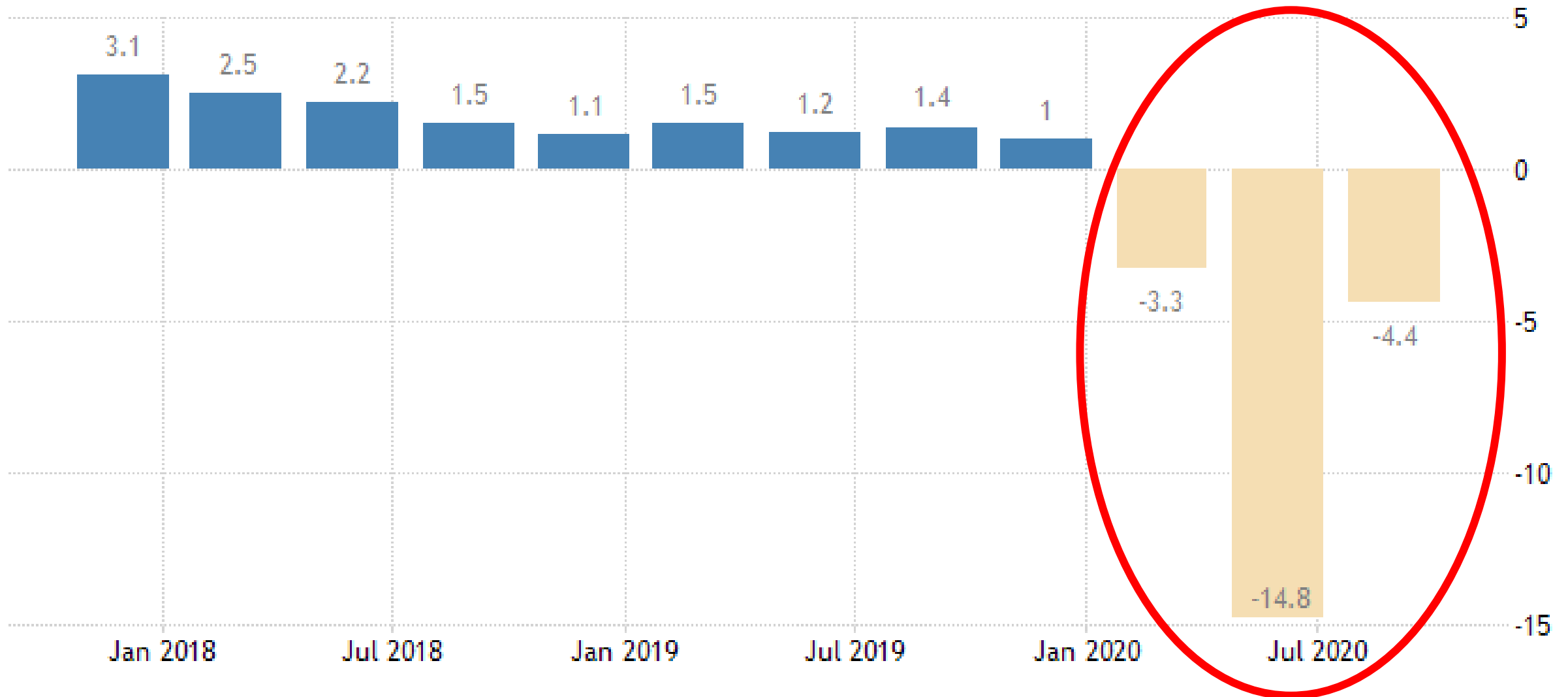
COVID-19: UNIÓ EUROPEA

Política monetària - Política fiscal - Supervisió i regulació



COVID-19: UNIÓ EUROPEA (UEM)

GDP annual growth rate (%)



SOURCE: TRADINGECONOMICS.COM | EUROSTAT



COVID-19: BANC CENTRAL EUROPEU (ECB)

Headquarters (Frankfurt)



COVID-19: POLÍTICA MONETÀRIA DEL BCE

'Helicopter money'



El Consejo de Gobierno del BCE aprobó el 12 marzo 2020 nuevas operaciones de refinanciación de deuda bancaria a largo plazo (TLTRO y TLTRO-III), con una ampliación del programa de compra de activos (APP), por 120.000 millones de €.

El Consejo de Gobierno del BCE aprobó el 18 de marzo 2020 un nuevo programa de emergencia (Pandemic Emergency Purchase Program, PEPP) de compra de activos, bonos públicos y privados (750.000 millones de euros, incluida deuda pública griega) durante este año, prorrogable.

El programa es flexible en relación a las reglas vigentes, en su distribución temporal, en los activos y por países, pudiendo ser revisado para preservar su efectividad.



COVID-19: POLÍTICA MONETÀRIA DEL BCE

Tipus d'interès al 0%

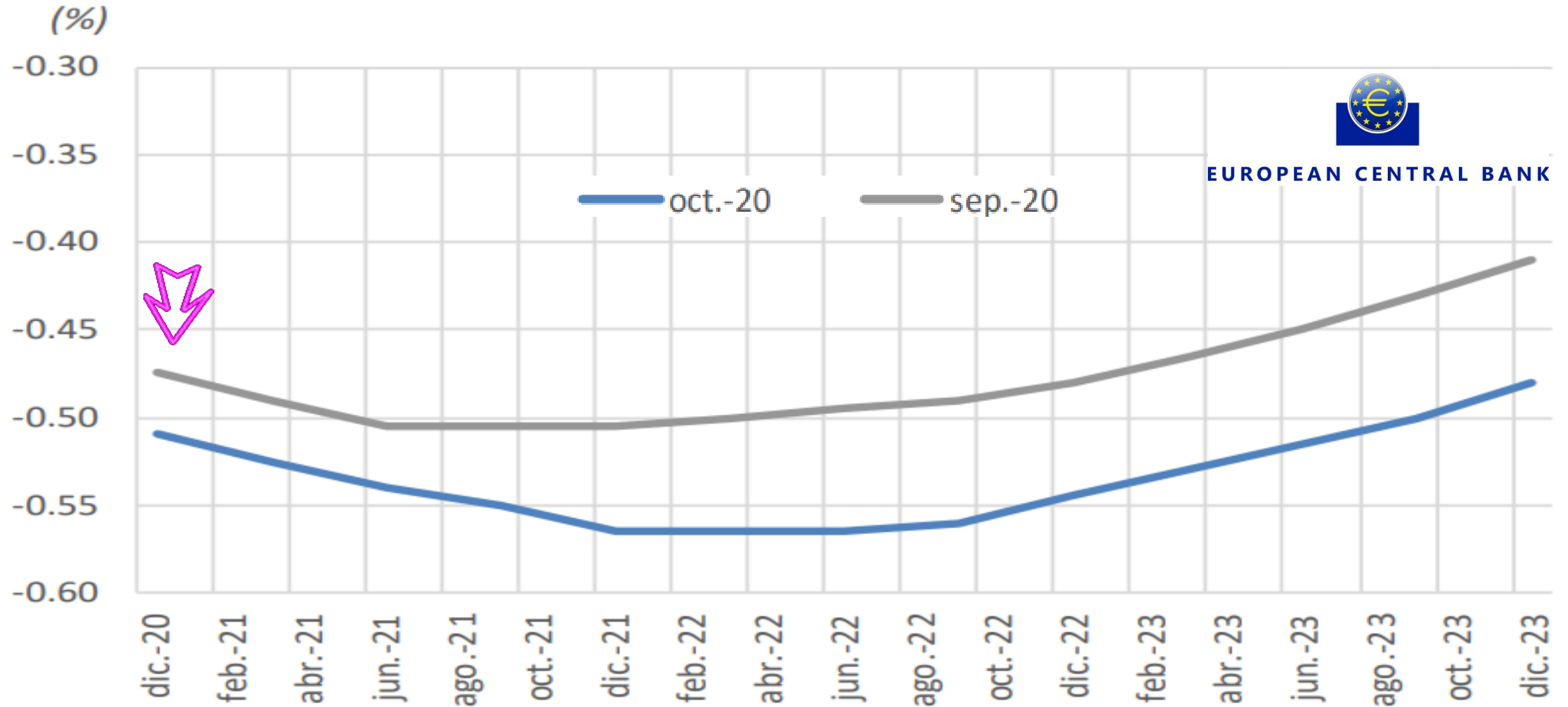


SOURCE: TRADINGECONOMICS.COM | EUROPEAN CENTRAL BANK



COVID-19: EURIBOR

Futurs de l'Euribor a 3 mesos (%)



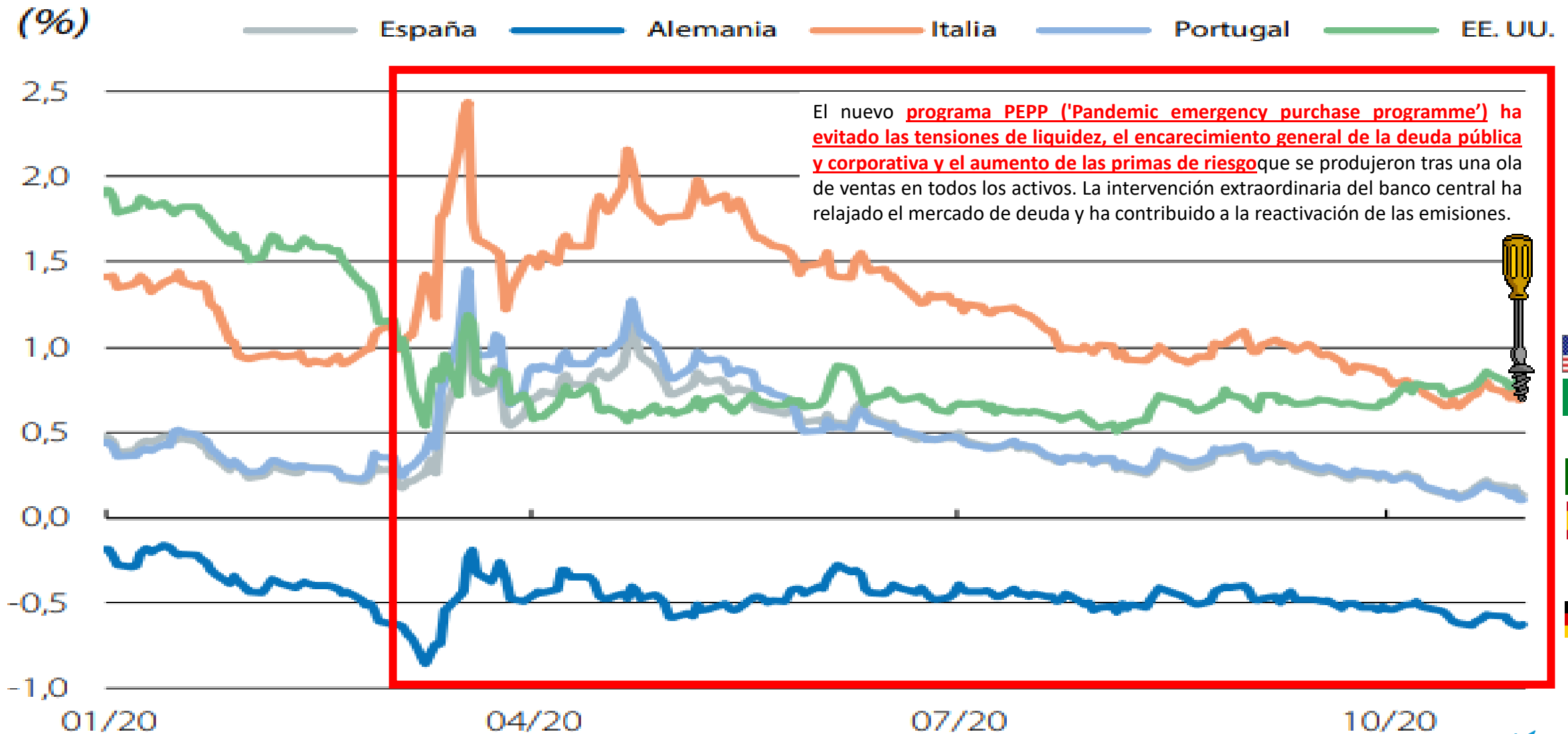
COVID-19: UNA ECONOMIA 'NARCOTITZADA'

Tipus d'interès zero



COVID-19: PRIMES DE RISC SOBIRANES

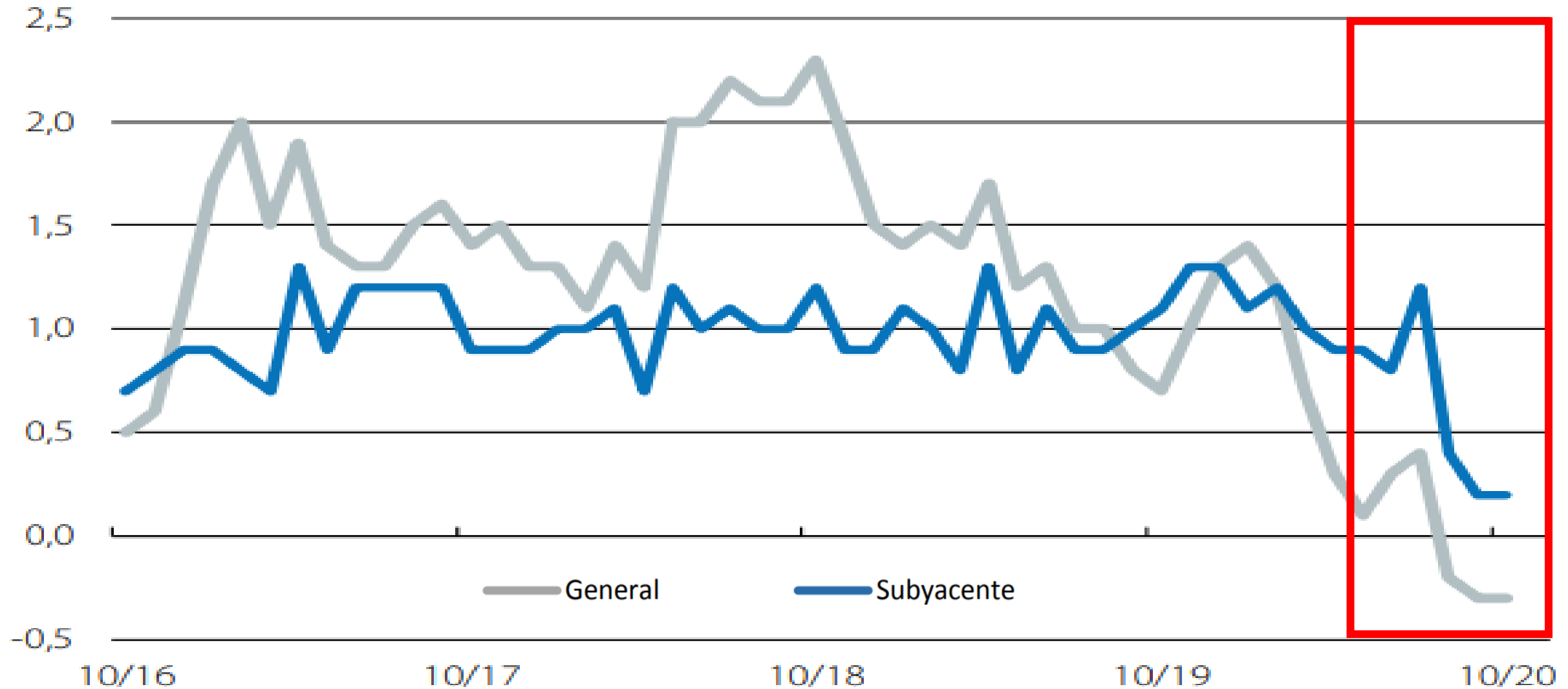
USA - Alemanya - Espanya - Itàlia - Portugal



Fuente: CaixaBank Research, a partir de datos de Bloomberg.

COVID-19: INFLACIÓ

Inflació subjacent (IPCA). Taxa de variació interanual (%)



Fuente: CaixaBank Research. a partir de datos de Eurostat.



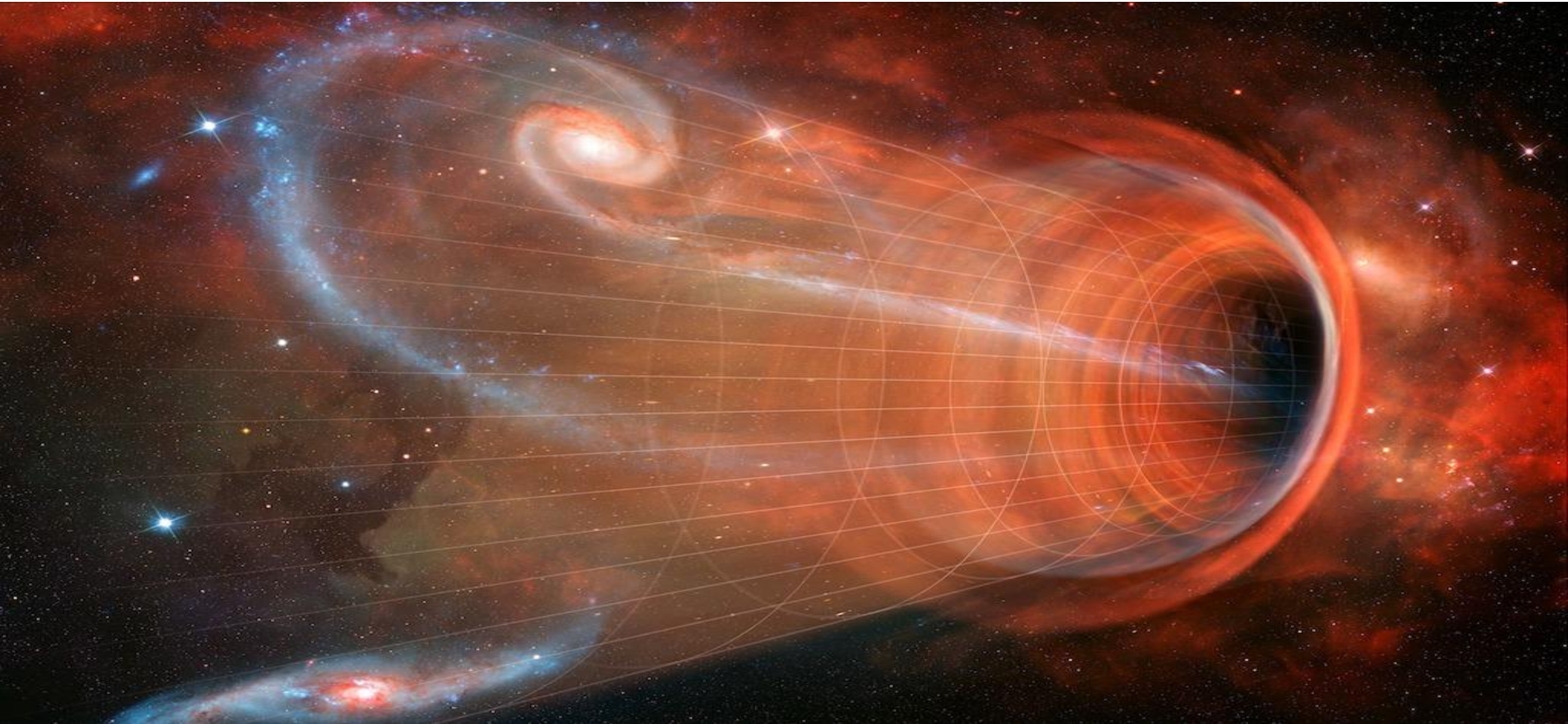
UEM: RISC DE 'JAPONITZACIÓ'

Estancament secular ('Economia zombie')



UEM: RISC DE 'JAPONITZACIÓ'

L'economia del 'black hole'



COVID-19: REGLES FISCALS I COMPETÈNCIA

Comissió Europea

- Suspensión temporal de las reglas fiscales europeas (déficit y deuda públicos) durante 6 trimestres hasta 2022.
- Suspensión temporal del Pacto de Estabilidad y Crecimiento (déficit excesivo).
- Programa 'Sure', de 100.000 millones de euros para ayudar a los trabajadores a mantener sus ingresos (ERTEs).
- Incremento de los Fondos estructurales.
- Relajación en las ayudas de Estado y el derecho de la competencia.
- Activar la cláusula general de salvaguardia del marco presupuestario (ECOFIN).
- Nuevo Marco Financiero Plurianual.



Presidenta de la Comisión Europea, Ursula von der Leyen



COVID-19: UNIÓ? EUROPEA

'Tous ensemble contre le COVID-19'



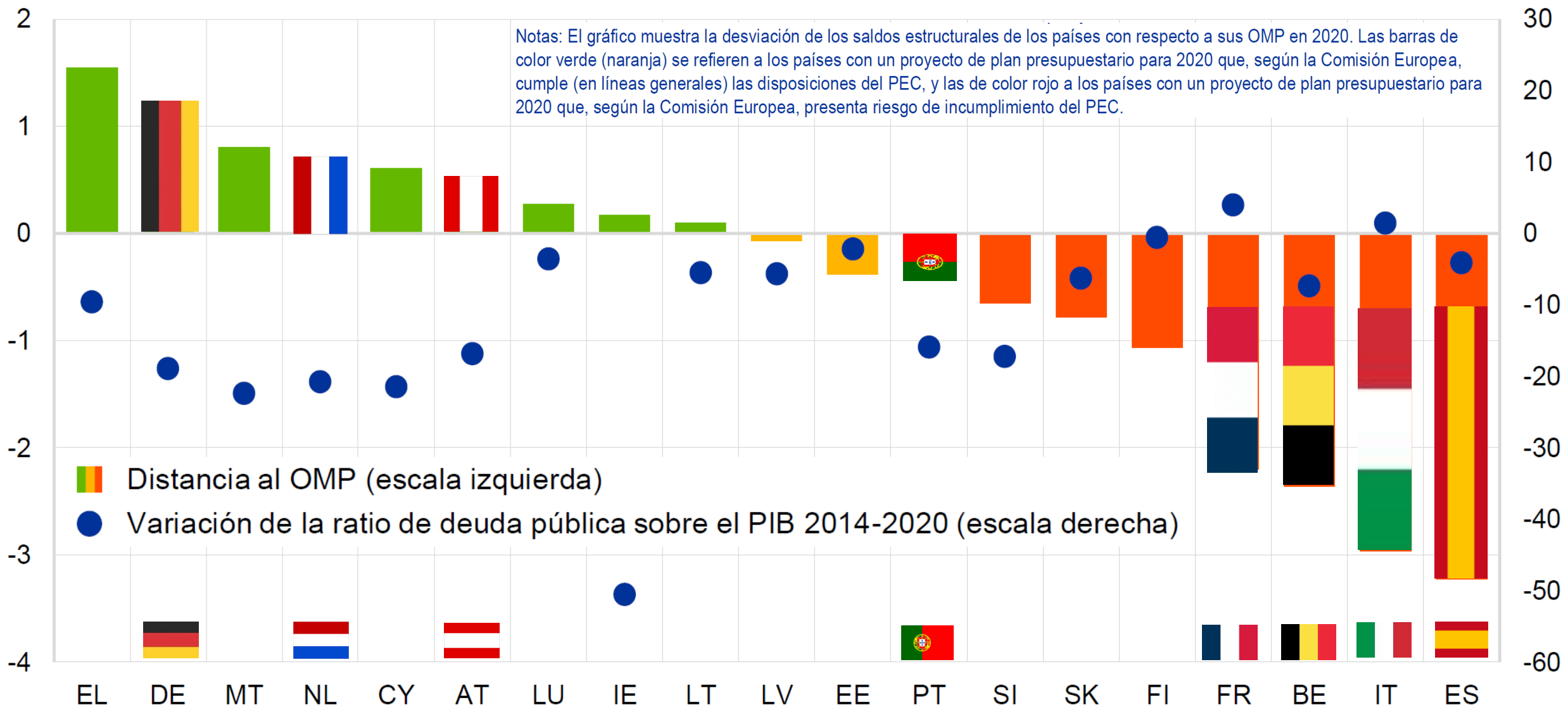
COVID-19: UNIÓ? EUROPEA

El Nord calvinista i el Sud catòlic



UEM: MARGE DE POLÍTICA FISCAL

Desviació entre el saldo estructural i l'Objectiu Pressupostari a Mitjà Termini (OMP). % del PIB



UNIÓ EUROPEA: PLA DE RECUPERACIÓ EUROPEU

Crèdits i ajuts directes (21 juliol 2020)



COVID-19: RESPUESTA DE LA UNIÓN EUROPEA

Mecanismo d'Estabilitat (MEDE) - Banc Europeu d'Inversions (BEI) - SURE - Next Generation EU

COMISIÓN EUROPEA

CRII (a)

Mobilización inmediata de los fondos de cohesión

37 mm €

NEXT GENERATION EU

Presupuesto suplementario y temporal, que incluye el Fondo de Recuperación y Resiliencia para financiar reformas e inversiones, en un plazo de 4 años

Transferencias: 427 mm €

Préstamos: 250 mm €

SURE (a)

Instrumento temporal de préstamo para protección del empleo, garantizado por los EEMM (a)

100 mm €

FINANCIACIÓN MOVILIZADA A TRAVÉS DEL GRUPO BEI (b)

Fondos de liquidez, compras de titulizaciones y garantías

25 mm €

Instrumento de Apoyo a la Solvencia: garantías, préstamos y capital a empresas europeas (c)

31 mm €

MEDE

Línea preventiva para financiar gastos sanitarios directos e indirectos relacionados con la pandemia por valor del 2 % del PIB de cada país

240 mm €

TOTAL FONDOS UE + MEDE + BEI: 1.100 mm € (7,9 % DEL PIB DE LA UE)

FUENTES: Banco de España, basado en fuentes de la UE. Las partes de color claro son medidas propuestas por la Comisión dentro de Next Generation EU, pendientes de aprobar.

a CRII son las siglas de *Coronavirus Response Investment Initiative*, SURE corresponde a *Support to mitigate Unemployment Risks in an Emergency* y EEMM significa «Estados miembros».

b El BEI incluye dos programas con el objetivo de movilizar hasta 240 mm €.

c El Instrumento de Apoyo a la Solvencia es parte de las propuestas avanzadas en el *Next Generation EU*.



COVID-19: NEXT GENERATION EU

750.000 M€

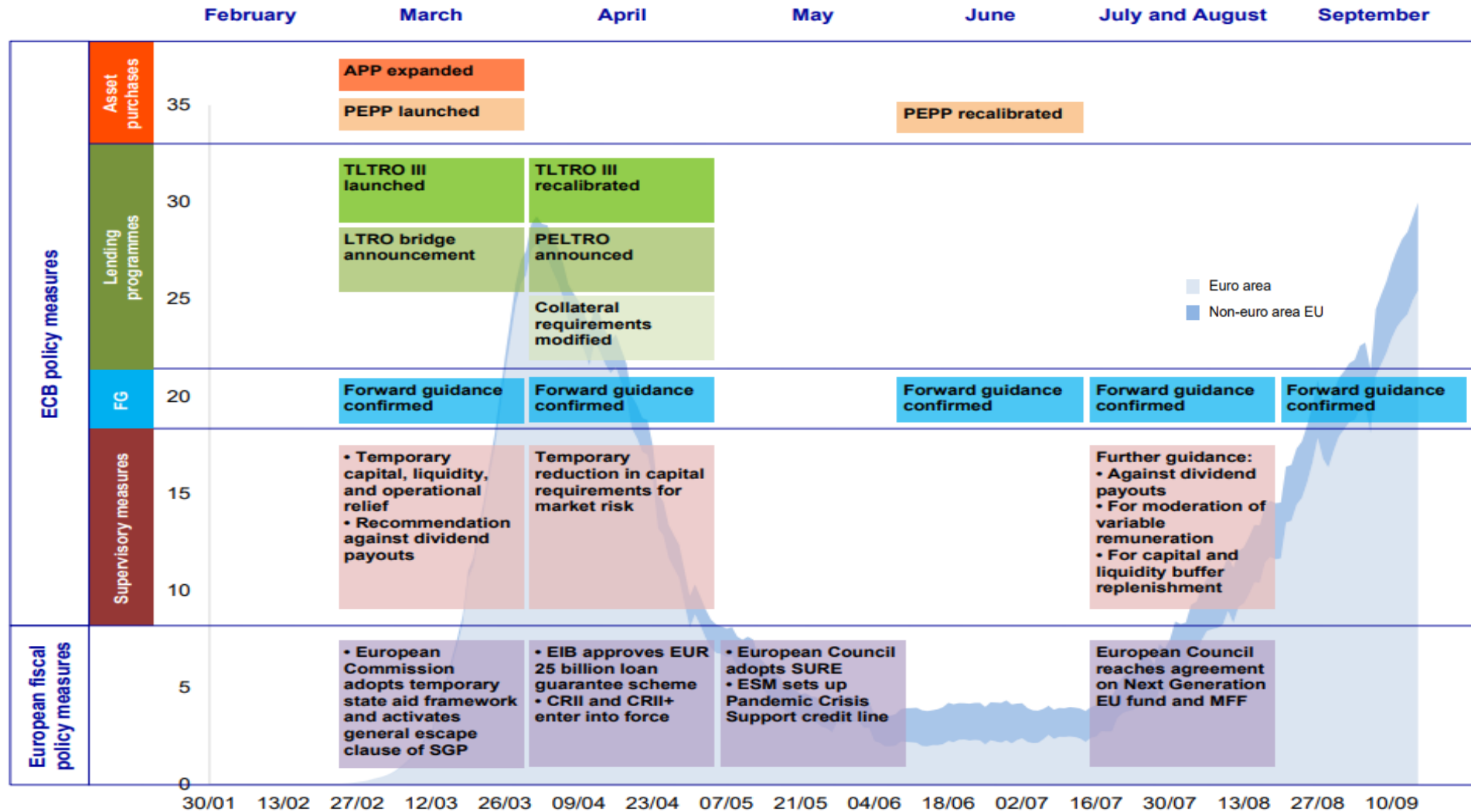
Next Generation EU

#NextGenerationEU #EUBudget



COVID-19: EU MONETARY AND FISCAL POLICIES

Overview (Economic Bulletin (ECB), november 12, 2020)



Sources: ECB, Johns Hopkins via Bloomberg and ECB calculations.

COVID-19: 'NEVER LET A GOOD CRISIS GO TO WASTE'

Winston Churchill



“Never let a good crisis go to waste.”

- Winston Churchill



UEM: ALEMANYA VIGILA

Pacte d'Estabilitat i Creixement



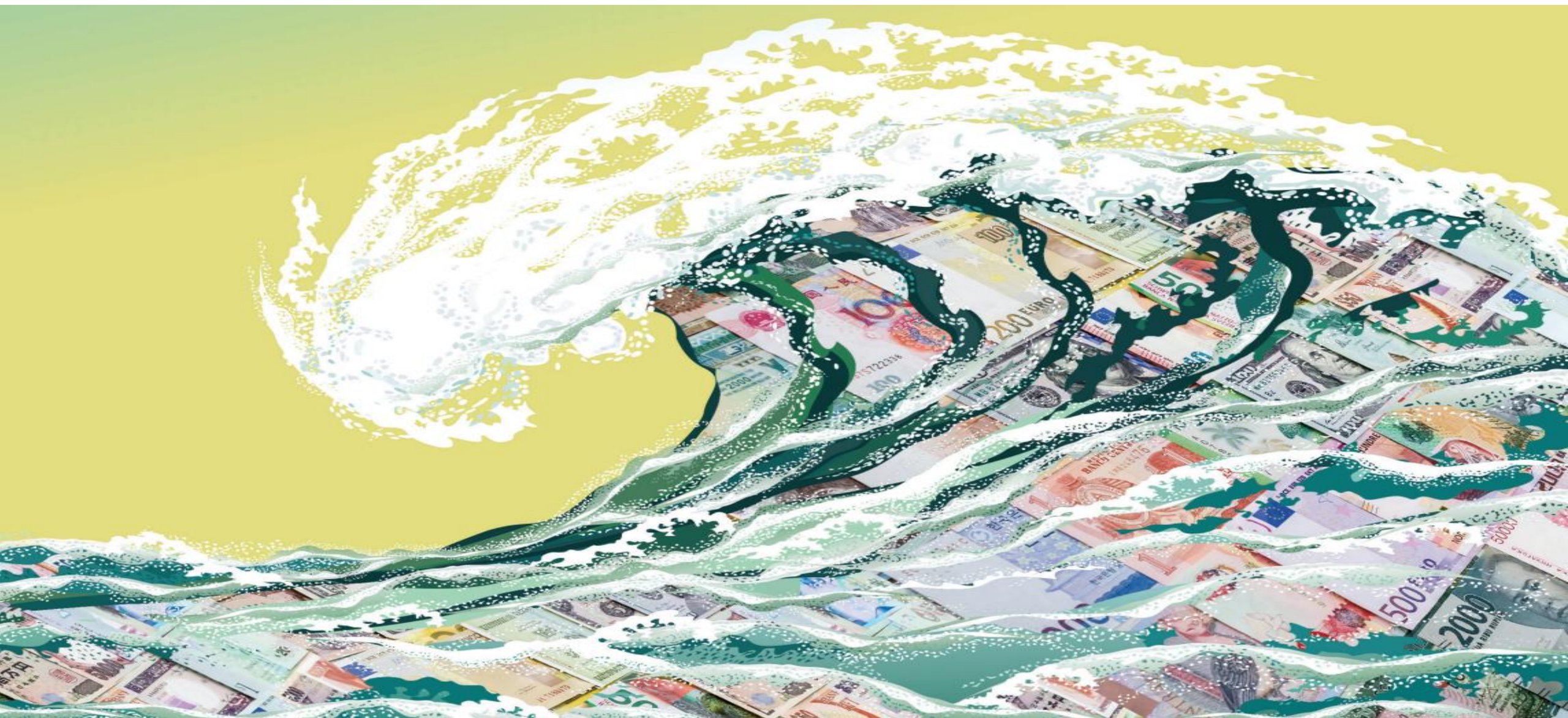
UEM: DISCIPLINA FISCAL

Dèficit fiscal i Deute Públic del 'Club Mediterrannée' ('PIGS')



AMÈRICA LLATINA: DEUTE PÚBLIC

Deute extern en divisa





Perspectives econòmiques a tancament d'exercici 2020 i escenaris 2021

L'any que vam viure perillosament

- 1. Covid-19: Un cigne negre**
- 2. Eclosió sense precedents**
- 3. Política de salut pública vs. política econòmica**
- 4. Escenaris 'd. C.' (després del coronavirus)**
- 5. Economia espanyola i catalana**

COVID-19: LA PREDICCIÓN DEL FUTUR

"Déu va crear els meteoròlegs per a no deixar en evidència els economistes"

**PLEASE BELIEVE
THESE DAYS
WILL PASS**

**PLEASE
BELIEVE
THESE
DAYS
WILL
PASS**

**PLEASE
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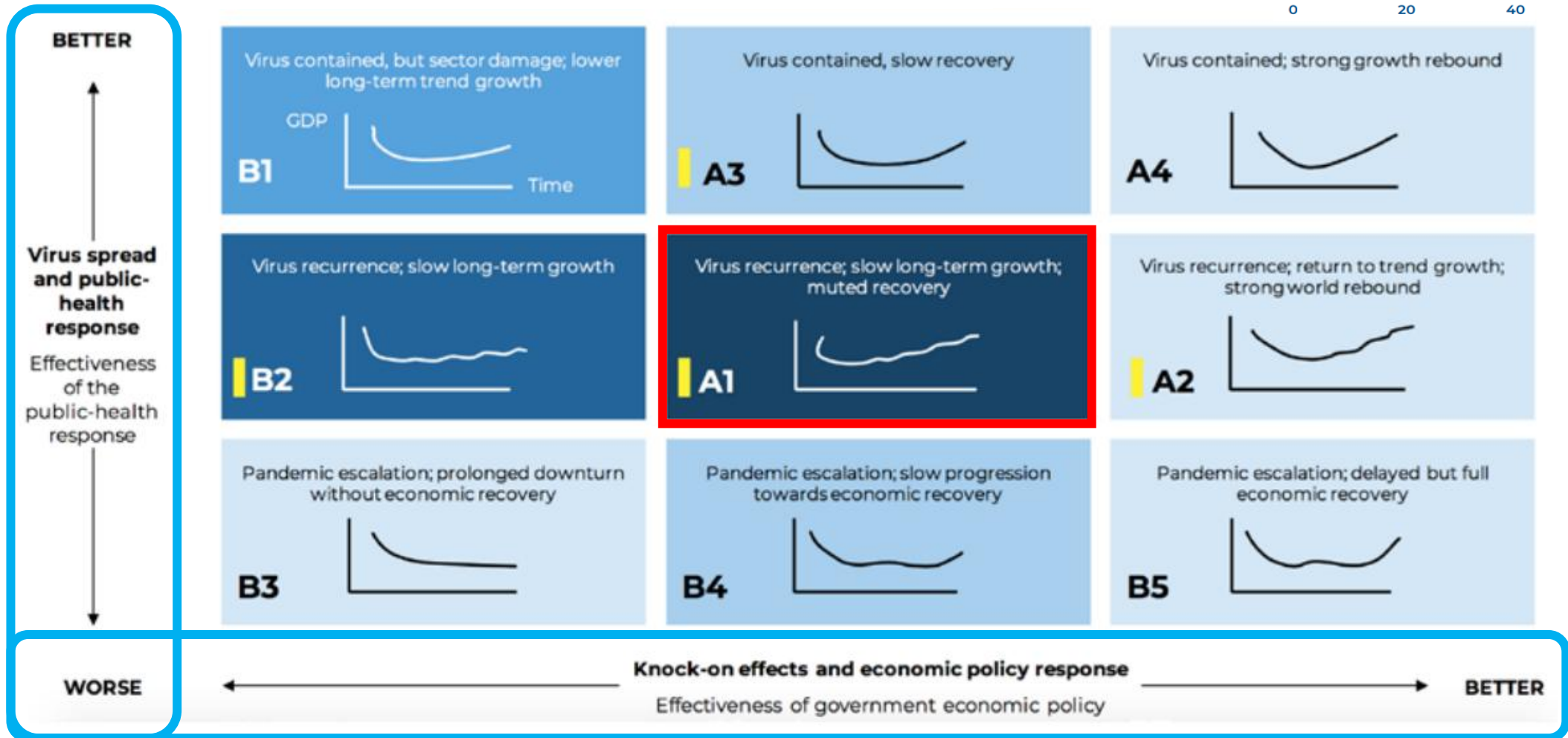
COVID-19: SCENARIOS OF ECONOMIC IMPACT

De crisàlida a papallona

Most likely scenario for COVID-19's impact on global GDP,
% of executive respondents (n = 2,071)

Focus scenarios for
McKinsey tourism
demand recovery model

McKinsey
& Company



Source: McKinsey analysis, in partnership with Oxford Economics



COVID-19: VIRUS RECURRENCE SCENARIO

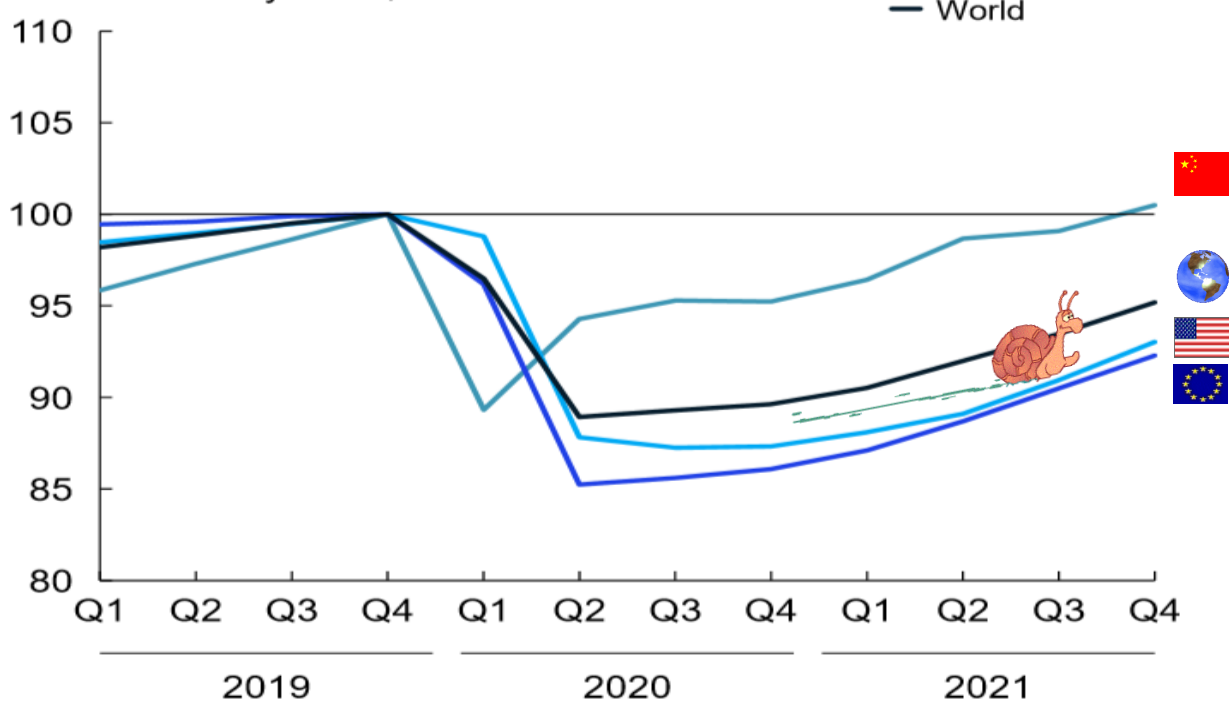
Real GDP 1019 (Q4) = 100

Scenario A1: virus recurrence, with muted recovery

Large economies

Real GDP, indexed

Local Currency Units, 2019 Q4=100



1. Seasonally adjusted by Oxford Economics

Source: McKinsey analysis, in partnership with Oxford Economics

	Real GDP Drop 2019Q4-2020Q2 % Change	2020 GDP Growth % Change	Return to Pre- Crisis Level Quarter (+/- 1Q)
China 	-5.7%	-4.4%	2021 Q4
United States 	-12.2%	-9.0%	2023 Q2
Eurozone 	-14.8%	-11.5%	2023 Q3
World 	-11.1%	-8.1%	2022 Q3

COVID-19: VIRUS CONTAINED SCENARIO

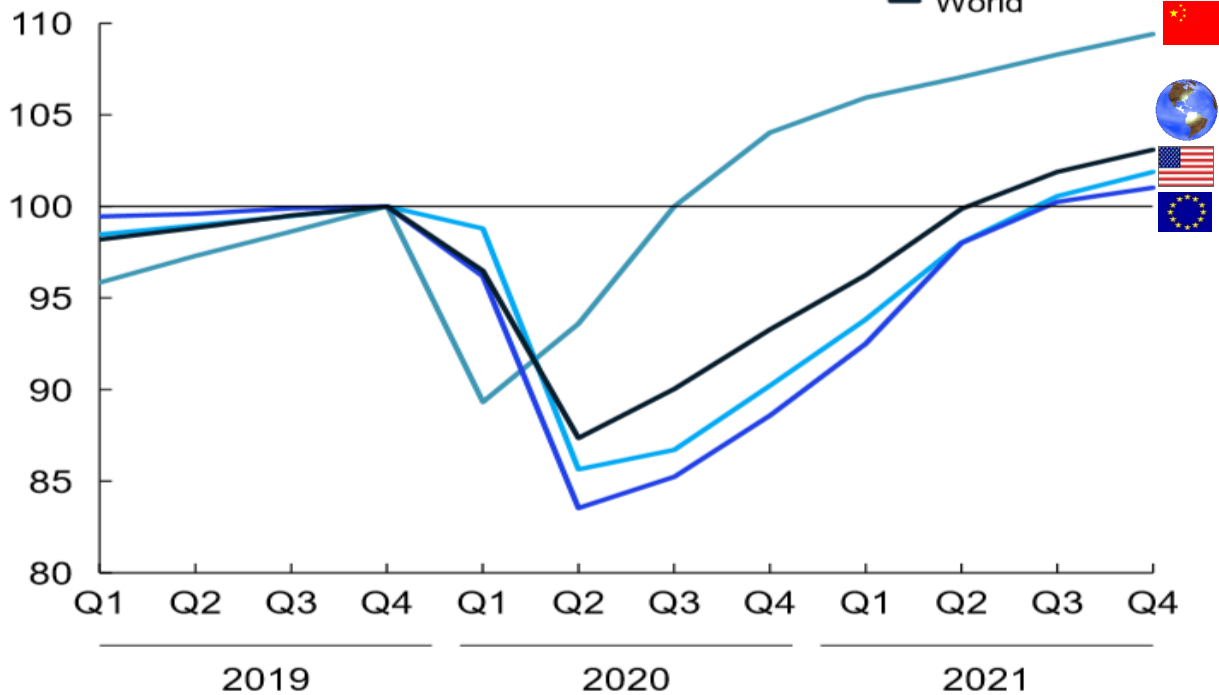
Real GDP 1019 (Q4) = 100

Scenario B1: virus contained, with lower long-term growth

Large economies

Real GDP, indexed

Local Currency Units, 2019 Q4=100



1. Seasonally adjusted by Oxford Economics

Source: McKinsey analysis, in partnership with Oxford Economics

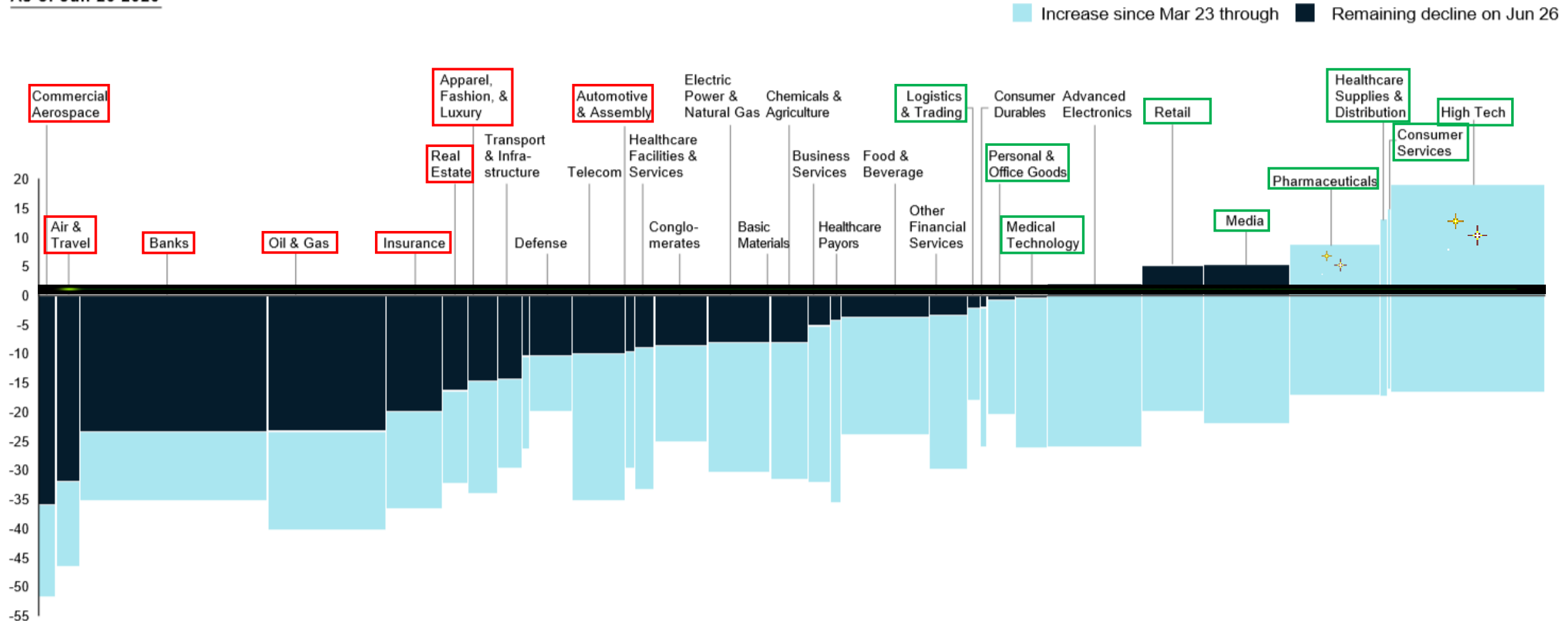
	Real GDP Drop 2019Q4-2020Q2 % Change	2020 GDP Growth % Change	Return to Pre- Crisis Level Quarter (+/- 1Q)
China 	-6.4%	-0.9%	2020 Q4
United States 	-14.4%	-9.0%	2021 Q3
Eurozone 	-16.5%	-11.4%	2021 Q3
World 	-12.6%	-7.4%	2021 Q3

COVID-19: MARKET CAPITALIZATION ACROSS SECTORS

Total shareholder returns by industry (%)

Weighted average year-to-date local currency shareholder returns by industry in percent¹. Width of bars is starting market cap in \$

As of Jun 26 2020



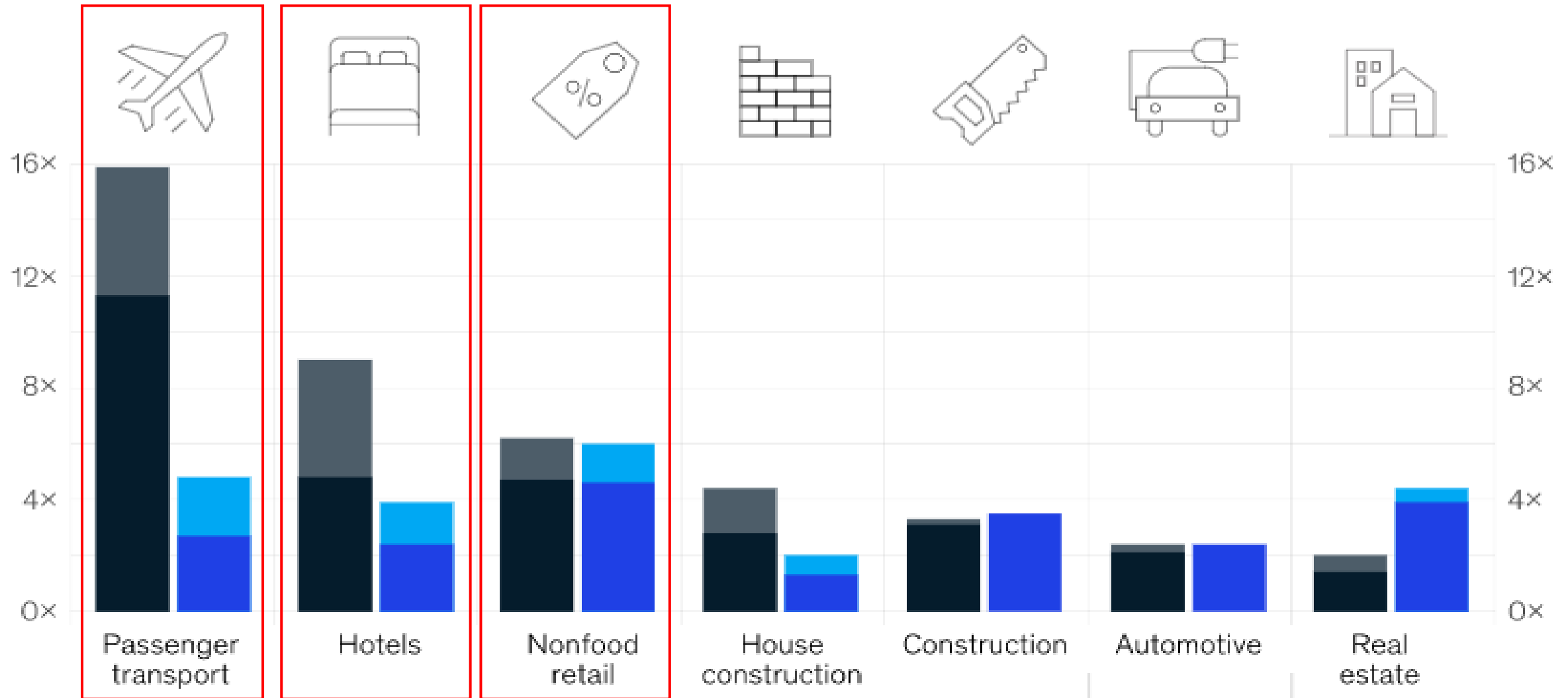
1. Data set includes global top 5000 companies by market cap in 2019, excluding some subsidiaries, holding companies and companies who have delisted since

COVID-19: THE HARDEST HIT SECTORS

Probability of default among sectors

multiplier range

■ Corporates ■ Small and medium-size enterprises

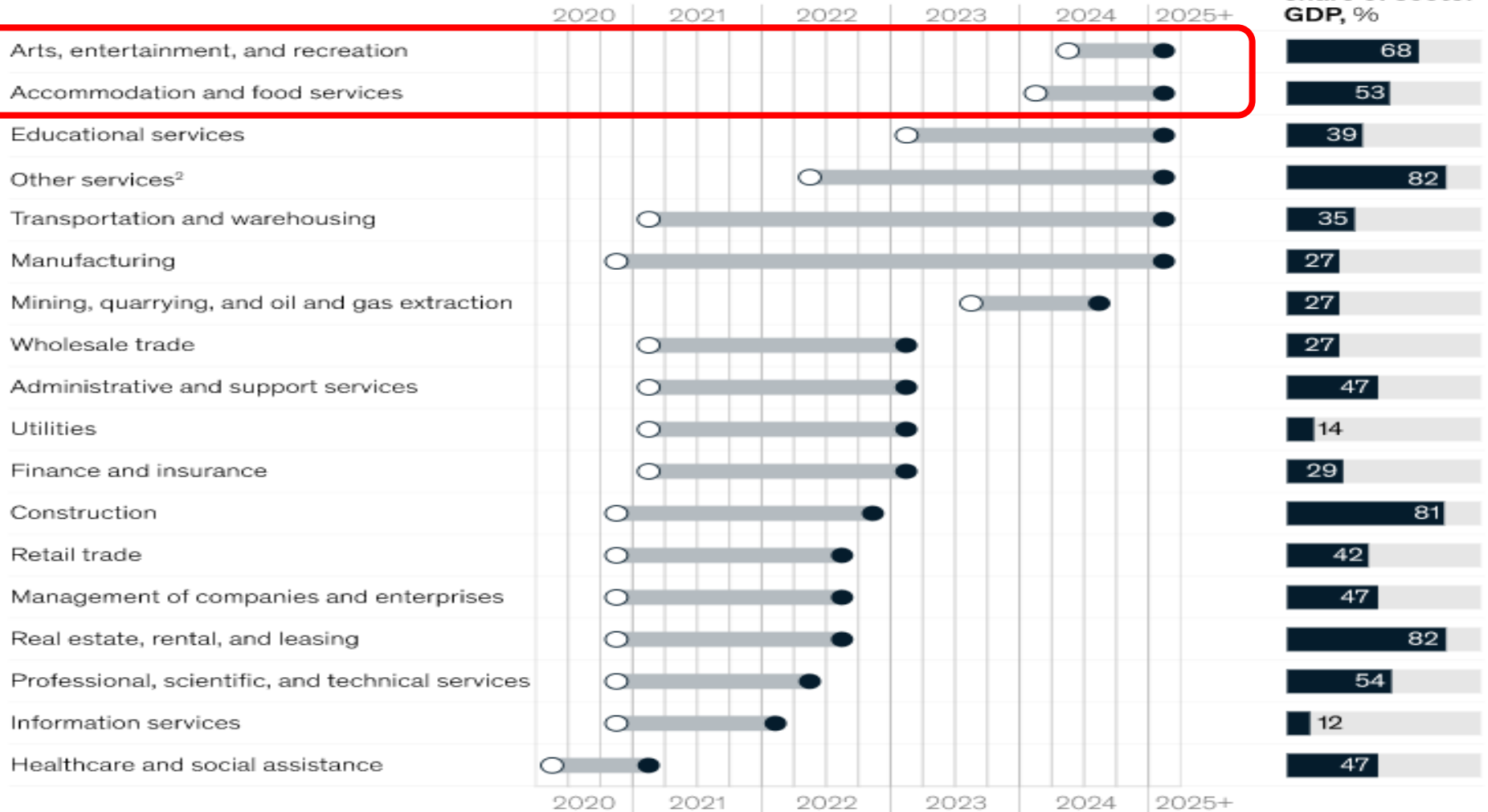


COVID-19: THE HARDEST HIT SECTORS

The most affected sectors to get back to 2019-level contributions to GDP

Estimated time to recover to pre-COVID-19 sector GDP¹

○ Virus-contained scenario ● Muted-recovery scenario



COVID-19: TELETREBALL

El gran mur de contenció del tancamet de l'activitat econòmica no essencial



COVID-19: TELETREBALL

'La família que teletreballa unida, romandrà unida'



COVID-19: TOWARDS REMOTE WORKING

'Zoom' (conferencing software) stock price



% change since beginning of 2020 in the stock price of Zoom (ticker: ZM)



USA vs. XINA

L'economia del s. XXI



USA vs. XINA

Partit Republicà & Partit Demòcrata



'This is a win-lose world'

Donald Trump
US President

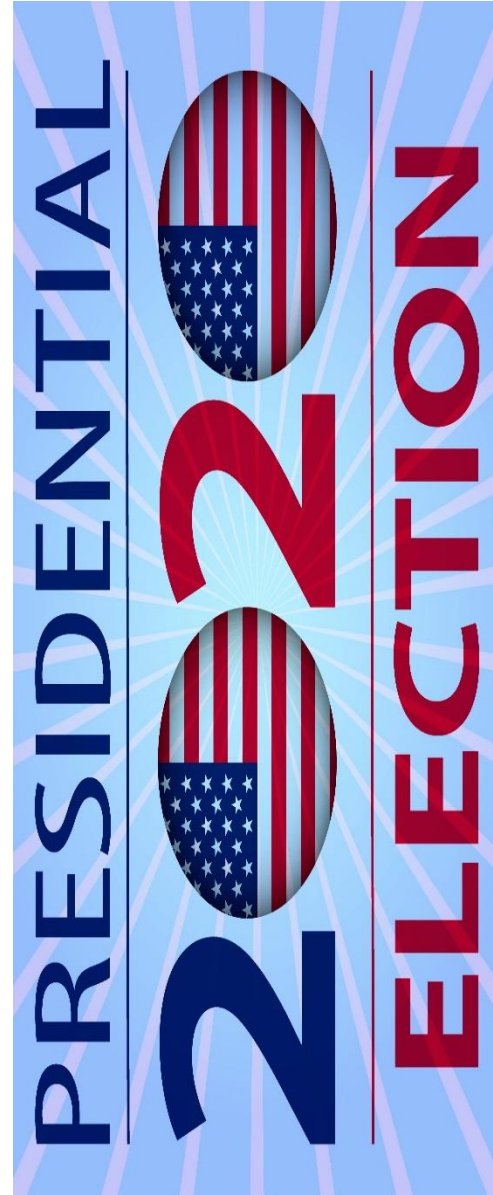
'They need us more than we need them'

Chuck Schumer
Democratic Senate Leader



USA: ELECCIONS PRESIDENCIALS

The 2020 United States presidential election is scheduled for Tuesday, November 3, 2020



USA: PERSPECTIVES 2020

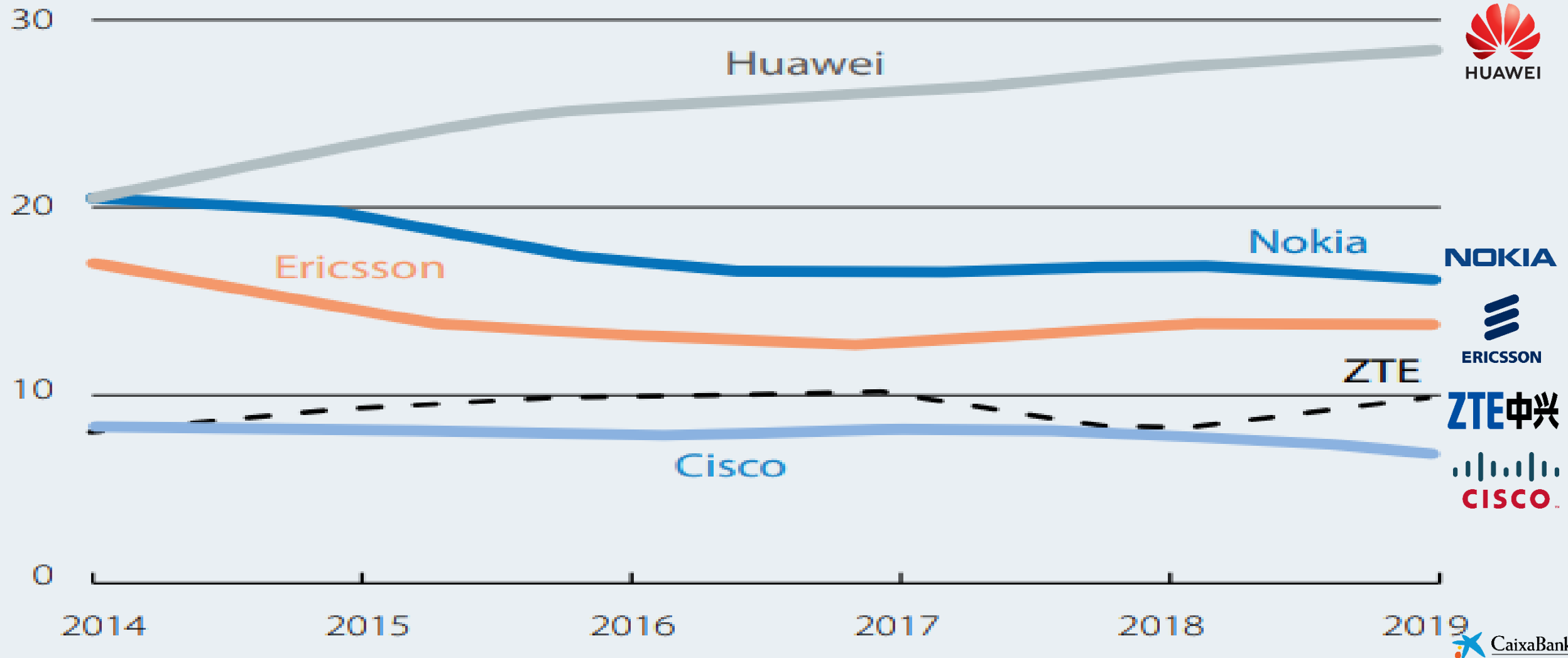
Joe Biden



USA vs. XINA

Vendes mundials d'equips TIC

(% de ventas del total mundial)



COVID-19: USA vs. XINA

Acusacions mútues



COVID-19: LA CARRERA PER LA VACUNA

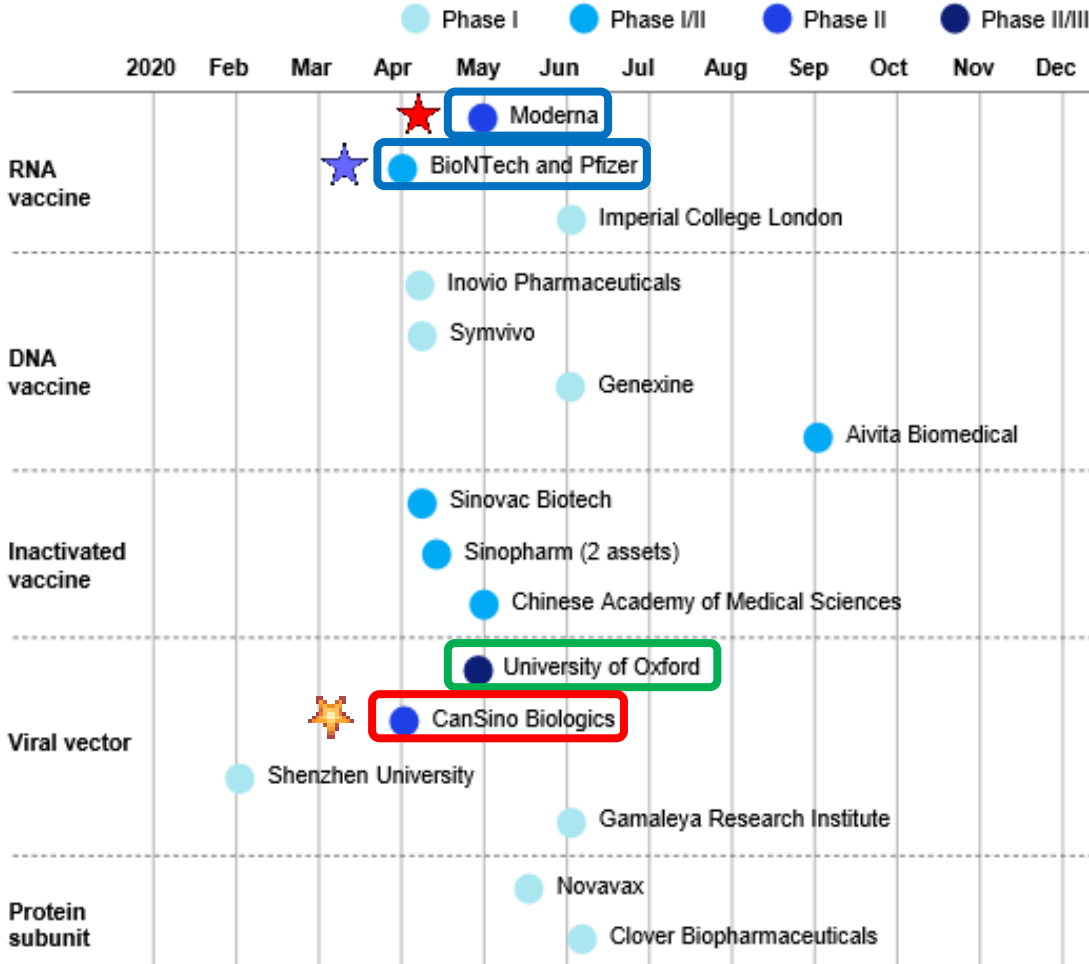
Seqüenciació del genoma del virus (11 gener 2020)



COVID-19: LA CARRERA PER LA VACUNA

Multiple vaccine candidates in development

There are 17 COVID-19 vaccine candidates in clinical trials...



...And many considerations for and against the availability of a vaccine in the next 12 – 18 months

	Reasons to believe a vaccine could be available by mid-2021	Potential roadblocks that could prevent a vaccine by mid-2021
Virus characteristics	Limited evidence that SARS-CoV-2 is mutating at a rapid rate, with similar patterns of low mutation rates observed in other COVID ¹	The longer the virus is in circulation in the population, the greater the chance of a potential mutation which could affect vaccine efficacy ¹
Unprecedented pipeline	220+ vaccine candidates in development with ~16 vaccines in human clinical trials ² First candidate was created 42 days after the virus was sequenced ³	No COVID-19 vaccines have been approved by any regulatory agency Limited data available on safety and efficacy profiles of vaccine candidates
Technology platforms	Vaccine candidates span 8+ technologies with broad range of attributes, including novel platforms (e.g., mRNA, DNA) with potential for faster development timelines ^{1,4}	Several of the platforms most advanced in development for COVID-19 vaccines (e.g., mRNA, DNA) have 0 approved products for human use ⁶
Regulatory	Potential for expedited regulatory approval timelines ⁵ Emergency Use Authorization being considered by FDA regulators ⁵	Multiple unknowns remain regarding the disease ⁷ and some novel vaccine technology platforms

1. [WHO](#)

2. Milken Institute COVID-19 tracker

3. [Time.com](#)

4. [NCBI](#)

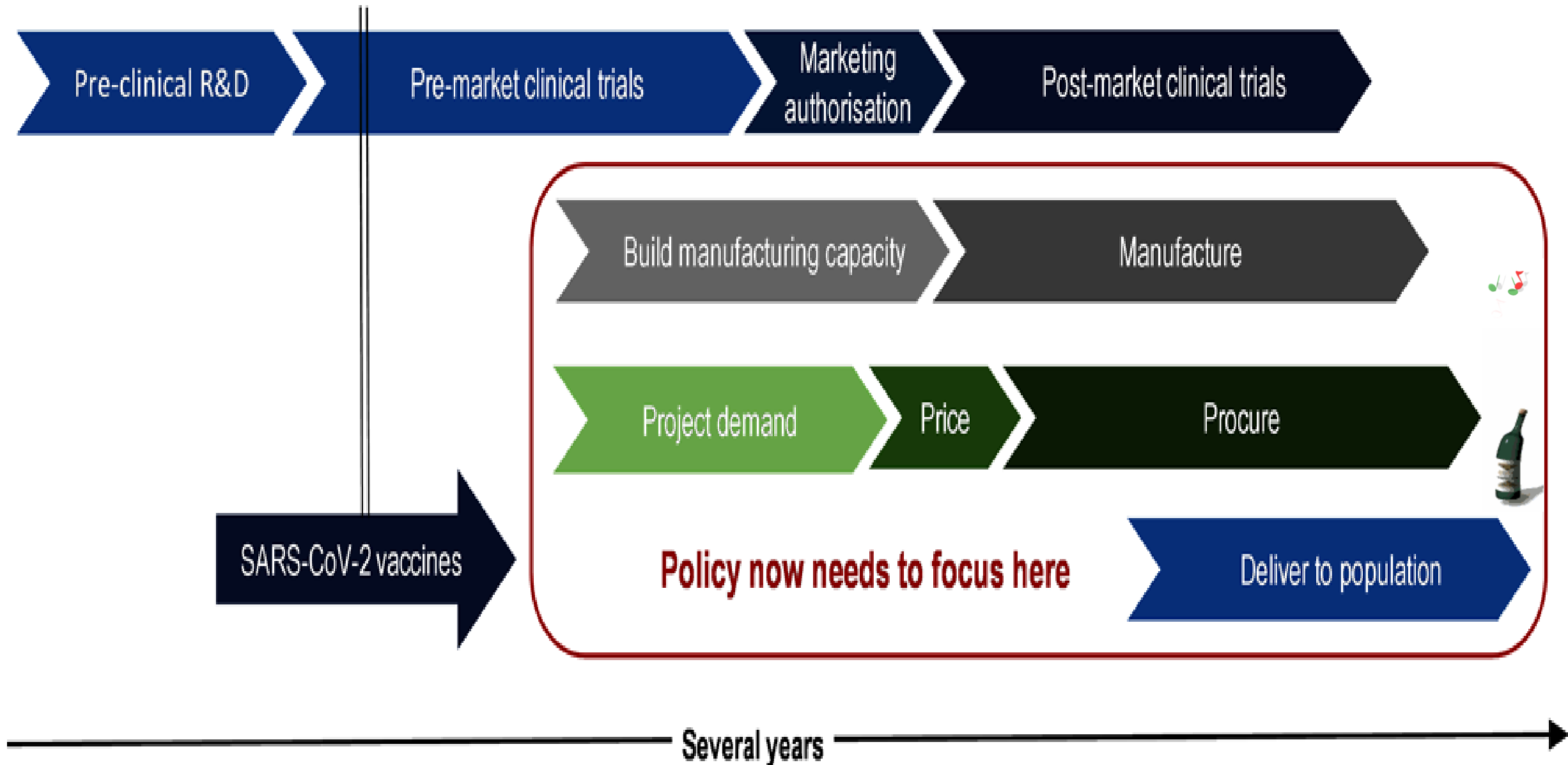
5. [Natalawreview.com](#)

6. [Cen.acs.org](#)

7. [Msphere.asm.org](#)

COVID-19: LA CARRERA PER LA VACUNA

Biomedical innovation from 'bench to bedside'



COVID-19: USA vs. XINA

Lideratge global



COVID-19: USA vs. XINA

Global Leadership





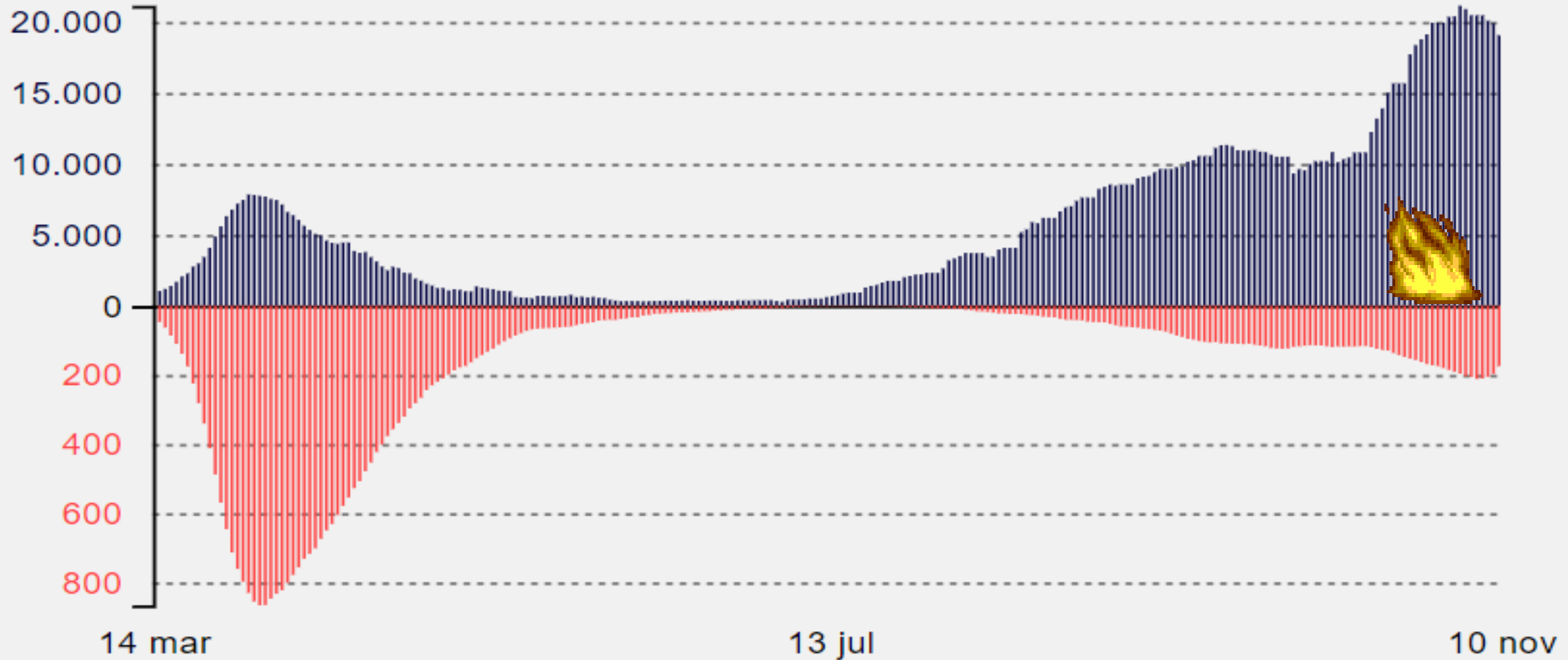
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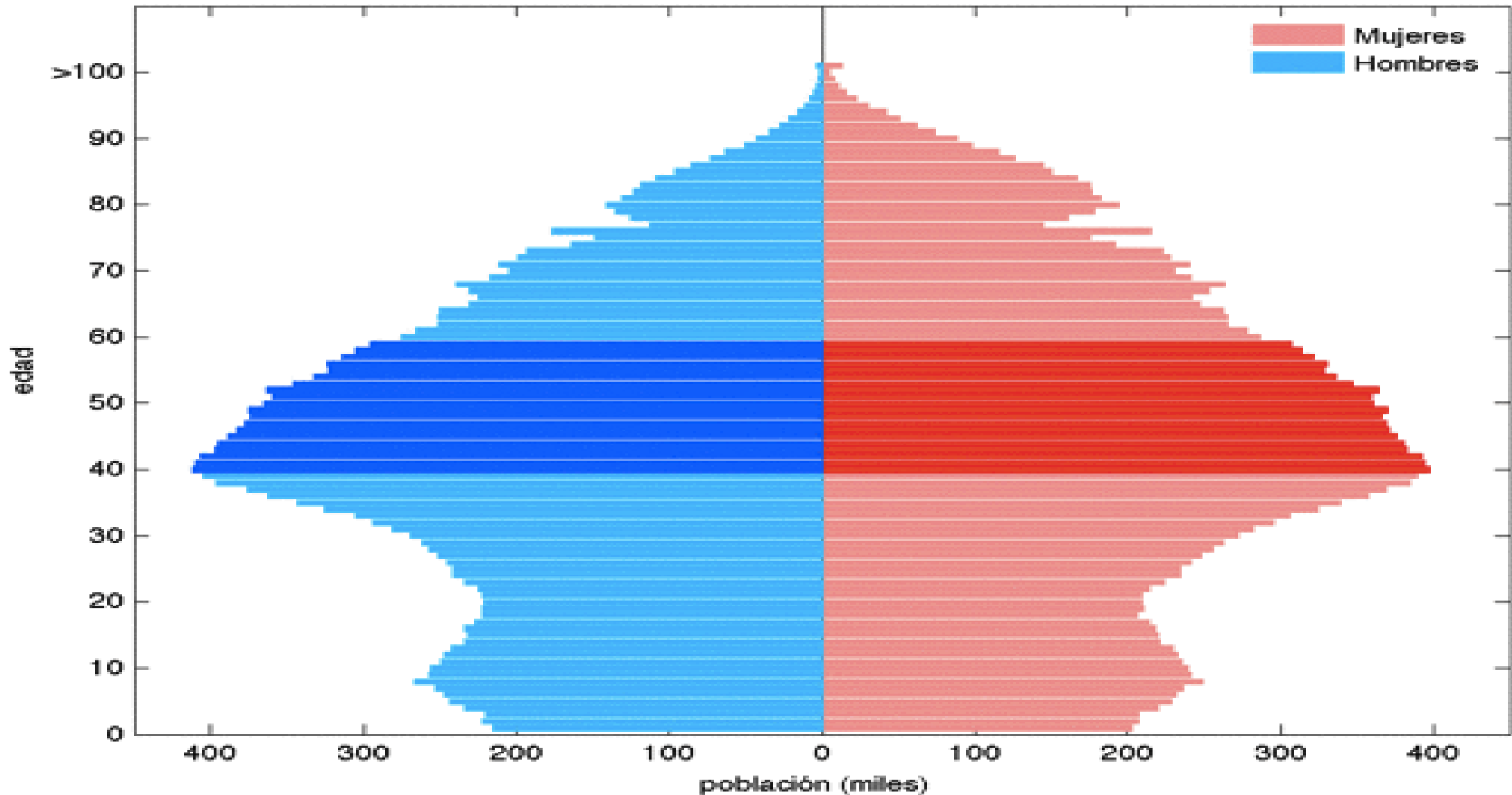
COVID-19: CASOS I DEFUNCIONS A ESPANYA

Casos diaris diagnosticats i defuncions, mitjana mòbil 7 dies



COVID-19: PIRÀMIDE DEMOGRÀFICA D'ESPANYA

Cohorts poblacionals per edat. Projeccions.

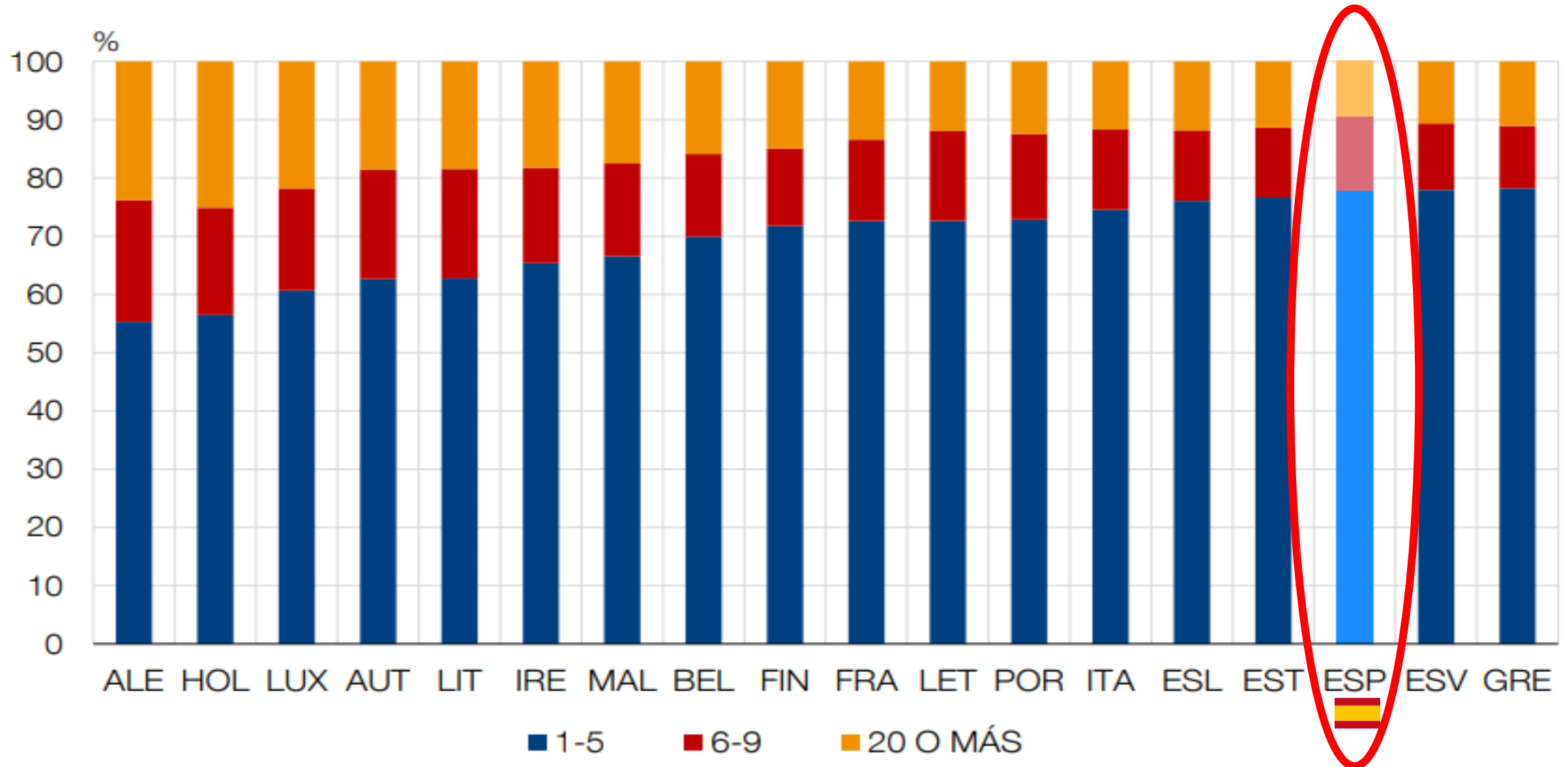


Fuente: INE

Conde-Ruiz y González, NeG (2016)

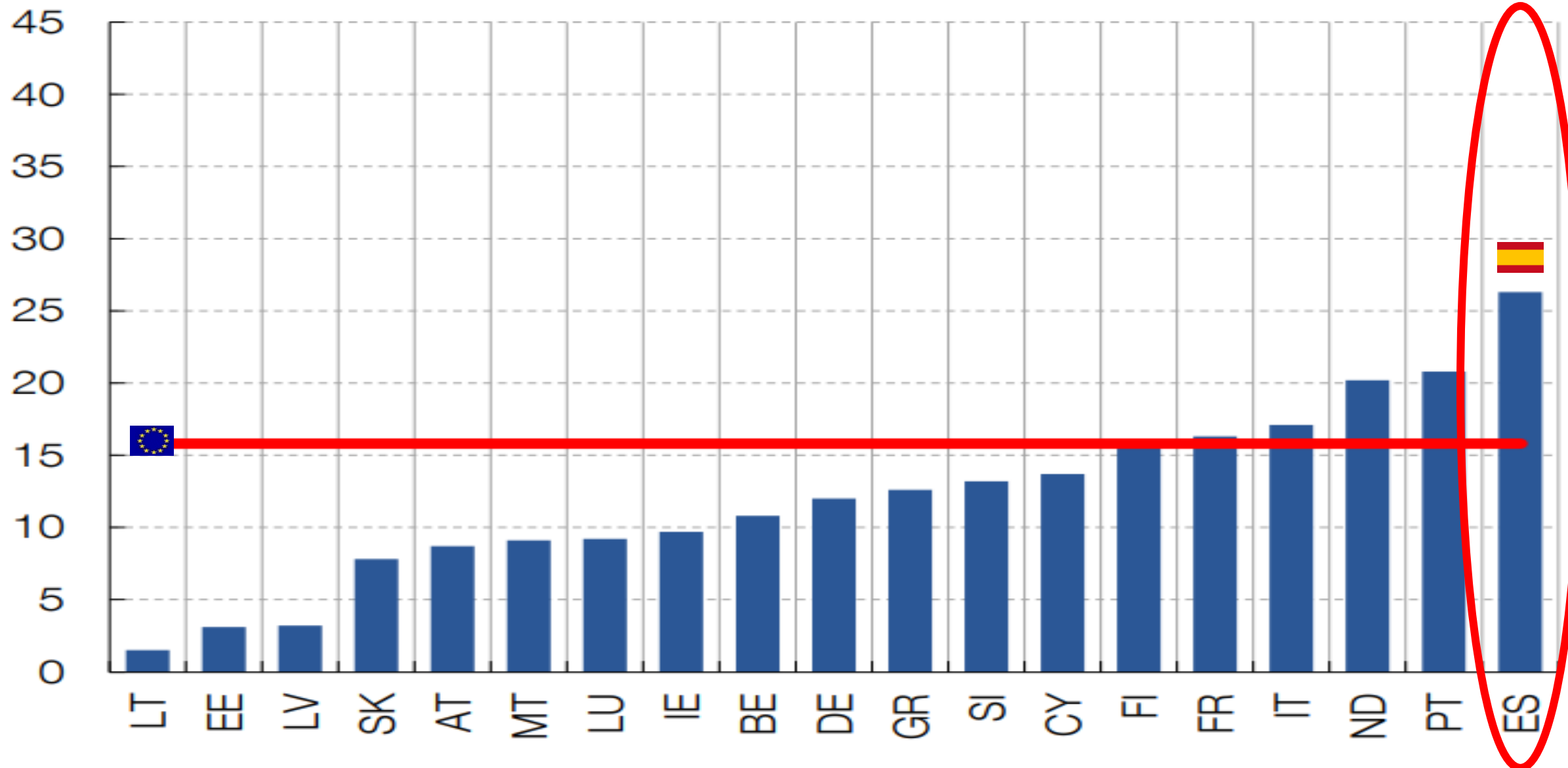
COVID-19: MIDA EMPRESES A ESPANYA

Pimes i estructura productiva comparada UEM. Nombre d'empreses per plantilla de treballadors



COVID-19: TAXA DE TEMPORALITAT A ESPANYA

% ocupats (16-64 anys) amb contracte temporal. Espanya vs. UEM



COVID-19: ECONOMIA SUBMERGIDA A ESPANYA

Economía informal en negro



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- SE LIMPIAN PERSIANAS

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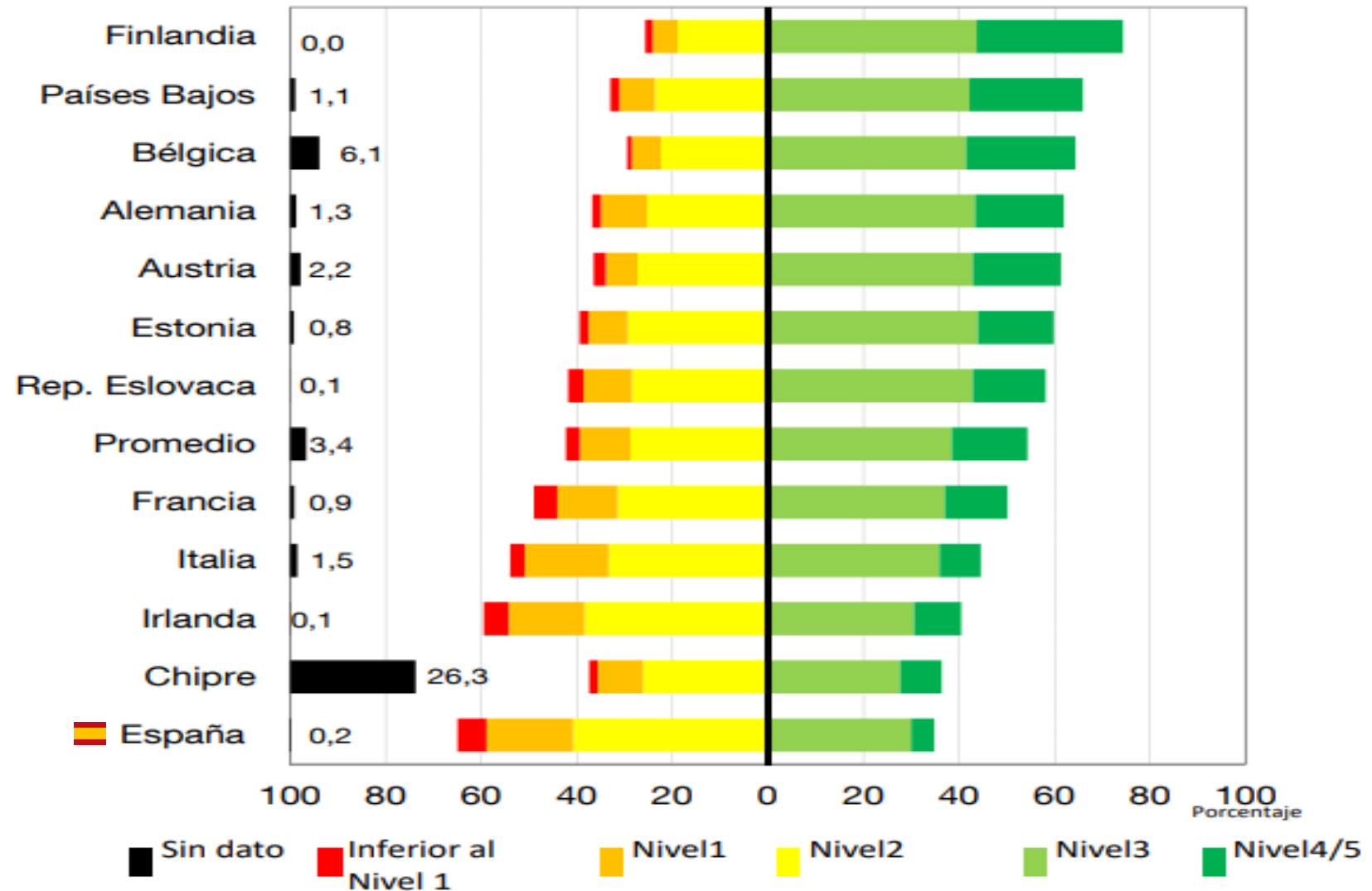
Imparte clases de Inglés a todos los niveles

Primaria Secundaria Bachillerato Universidad

COVID-19: CAPITAL HUMÀ I PRODUCTIVITAT

Habilitats cognitives i competència matemàtica (25-29 anys), OCDE

Competencia matemática de adultos 25-29 años en países de eurozona en PIAAC (% por nivel)



Fuente: OCDE (PIAAC, 2013)

'BREXIT'

Sortida del Regne Unit (UK) de la Unió Europea (UE)

Brexit



'BREXIT': EUROPA PERD UN ESTEL

Referèndum, 23 juny 2016



'BREXIT': CONSEQÜÈNCIES PER ESPANYA

Declaració duanera - Drets arancelaris - Control sanitari - Control fitosanitari

ADUANAS

El Brexit implicará que los flujos de mercancías entre España y Reino Unido **dejarán de tener la consideración de operaciones intracomunitarias para pasar a estar sujetos a formalidades aduaneras**. Dichas formalidades incluyen la presentación de una **declaración aduanera** de importación/exportación o vinculación a otro régimen aduanero para cada envío, la realización de **controles aduaneros**, el pago de **derechos arancelarios** y otros gravámenes que se devenguen a la introducción o la necesidad de obtener **certificaciones sanitarias, fitosanitarias**, de calidad o de otro tipo para poder disponer de sus mercancías. La introducción/envío de mercancías desde la Península, Baleares o Canarias a Reino Unido requerirá la presentación de una declaración en aduana normal.



IVA

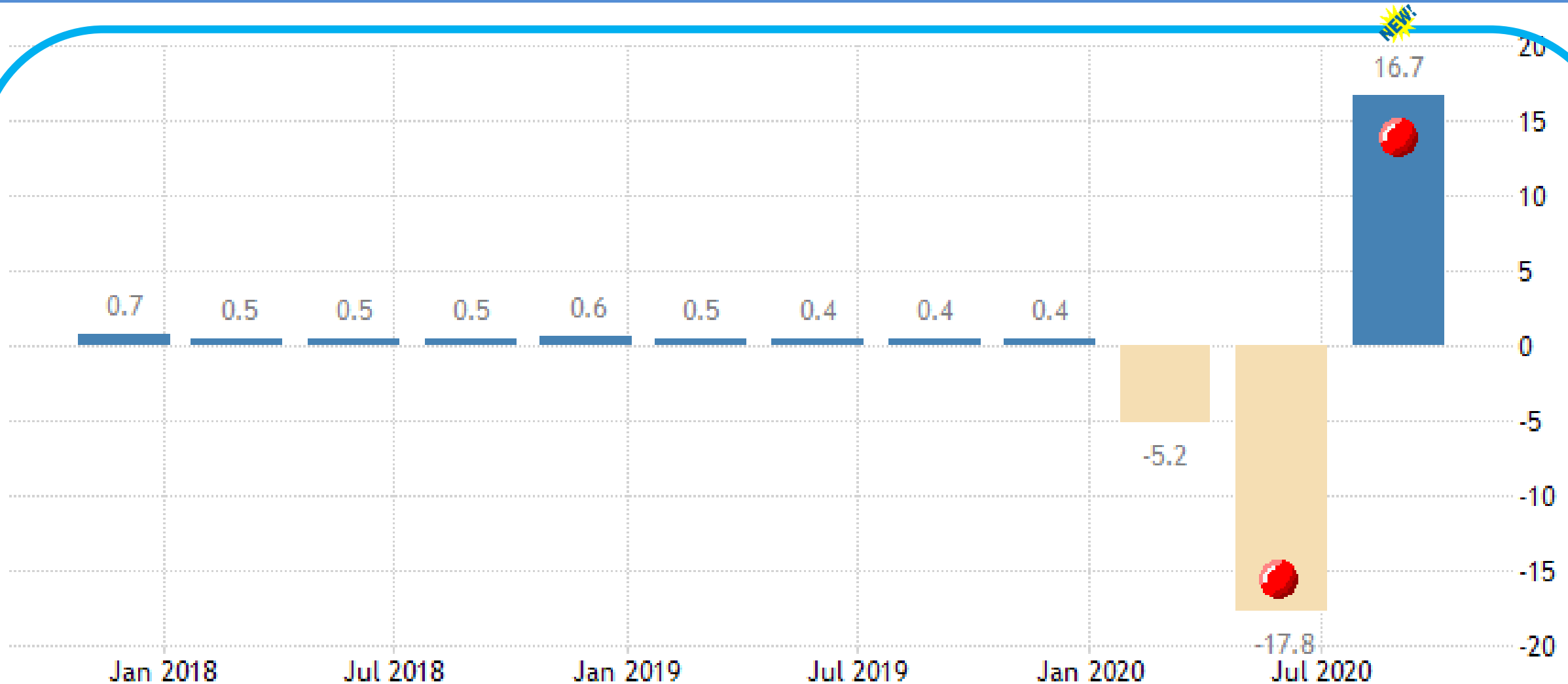
Los envíos a Reino Unido estarán exentos como exportaciones. Las **importaciones de Reino Unido estarán sujetas al pago del IVA a la importación**.

IMPUESTOS ESPECIALES

Las expediciones y recepciones de productos objeto de Impuesto Especial se convierten en **exportaciones o importaciones**.

COVID-19: PIB ESPANYA

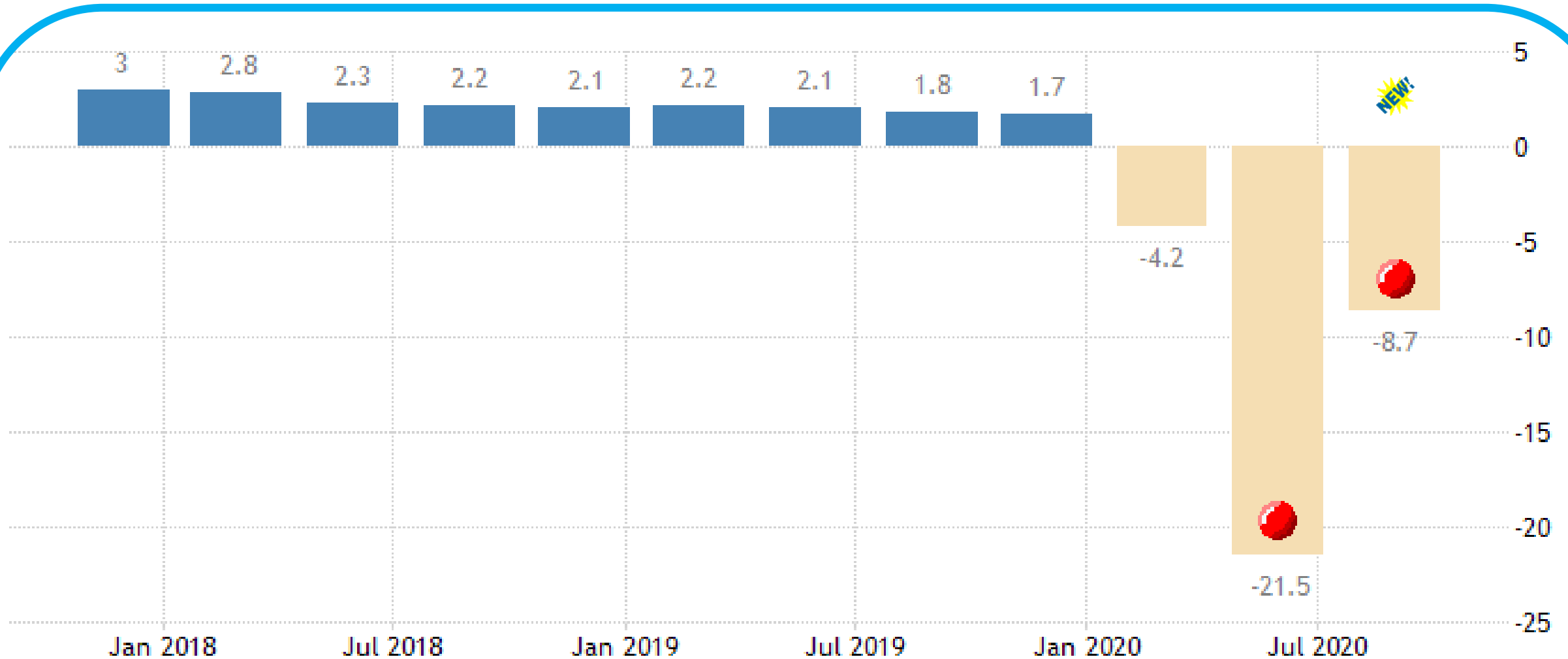
Taxa de variació intertrimestral (%). INE, Comptabilitat Nacional 3r trimestre 2020, cvec



SOURCE: TRADINGECONOMICS.COM | NATIONAL STATISTICS INSTITUTE (INE)

COVID-19: PIB ESPANYA

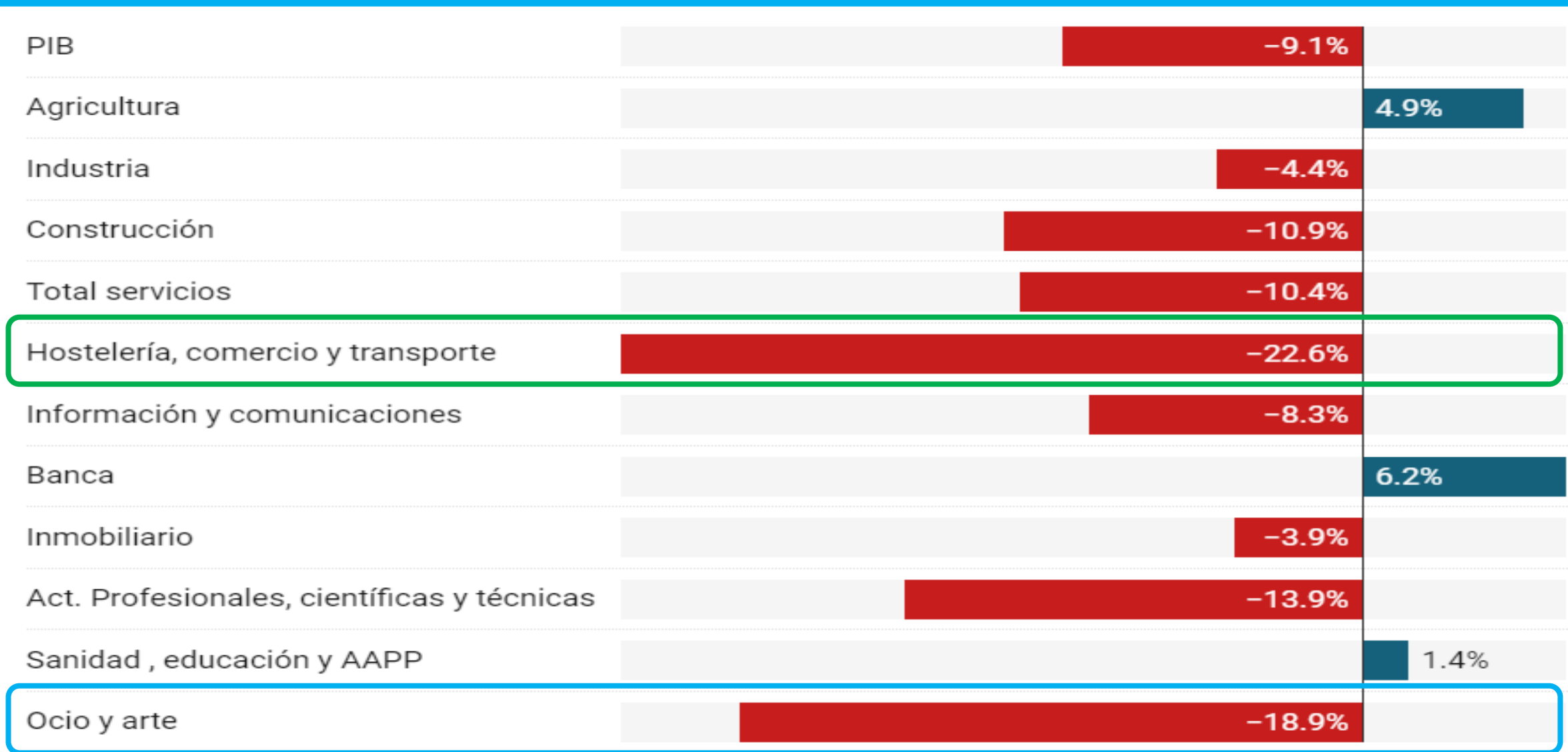
Taxa de variació interanual (%). INE, Comptabilitat Nacional 3r trimestre 2020, cvec



SOURCE: TRADINGECONOMICS.COM | NATIONAL STATISTICS INSTITUTE (INE)

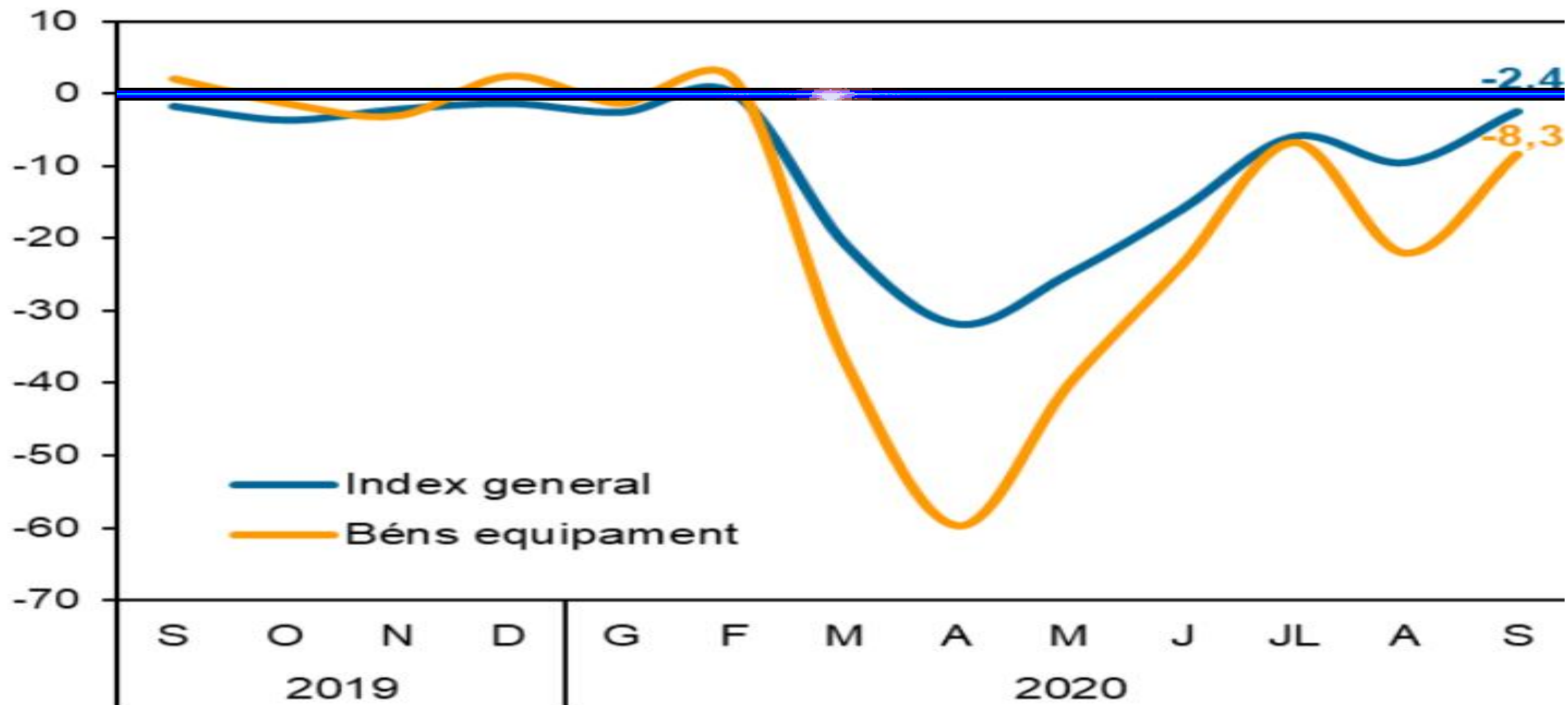
COVID-19: PIB ESPANYA PER SECTORS

Taxa de variació interanual (%). 3r trimestre 2020



CATALUNYA: ÍNDEX PRODUCCIÓ INDUSTRIAL (IPI)

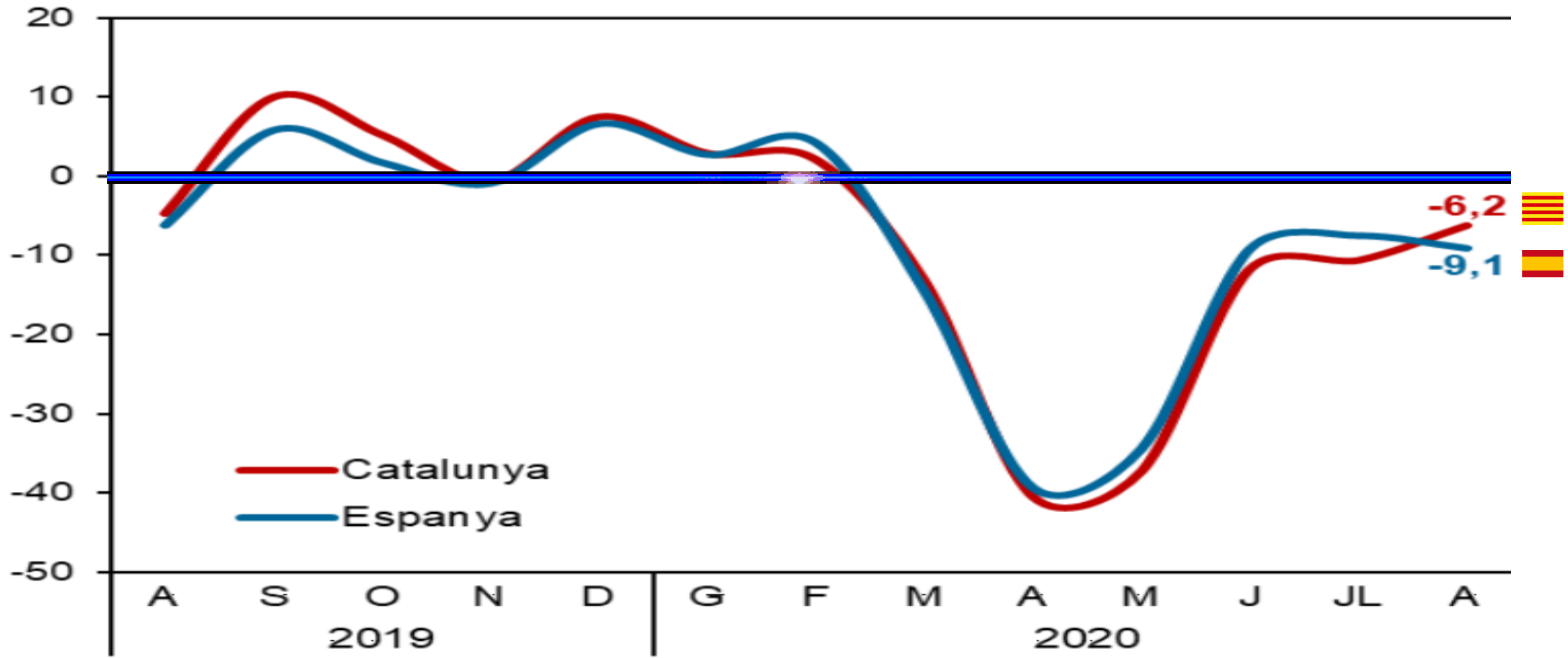
Taxa de variació interanual (%)



Font: Idescat.

CATALUNYA: EXPORTACIONS DE BÉNS

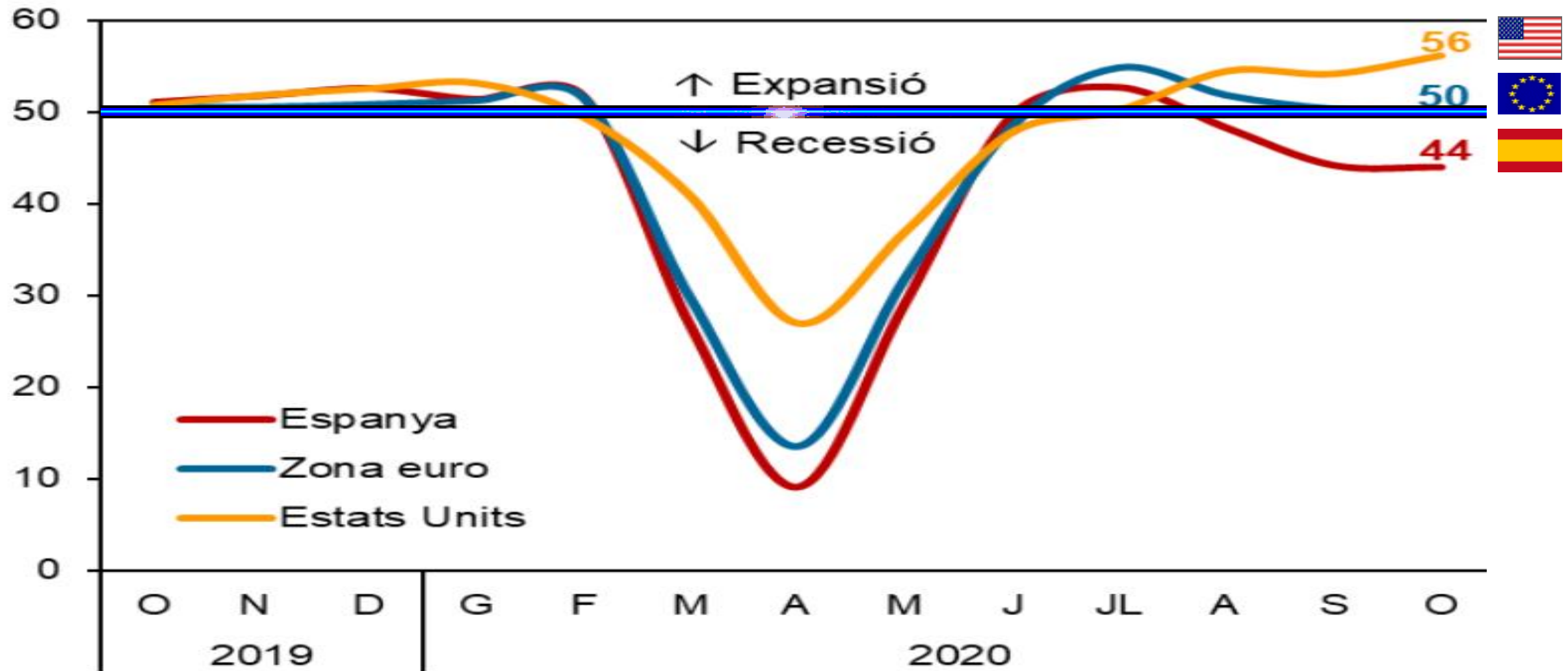
Taxa de variació interanual (%)



Font: Idescat.

COVID-19: ÍNDEX GESTORS DE COMPRES

Purchasing Managers Index (PMI)

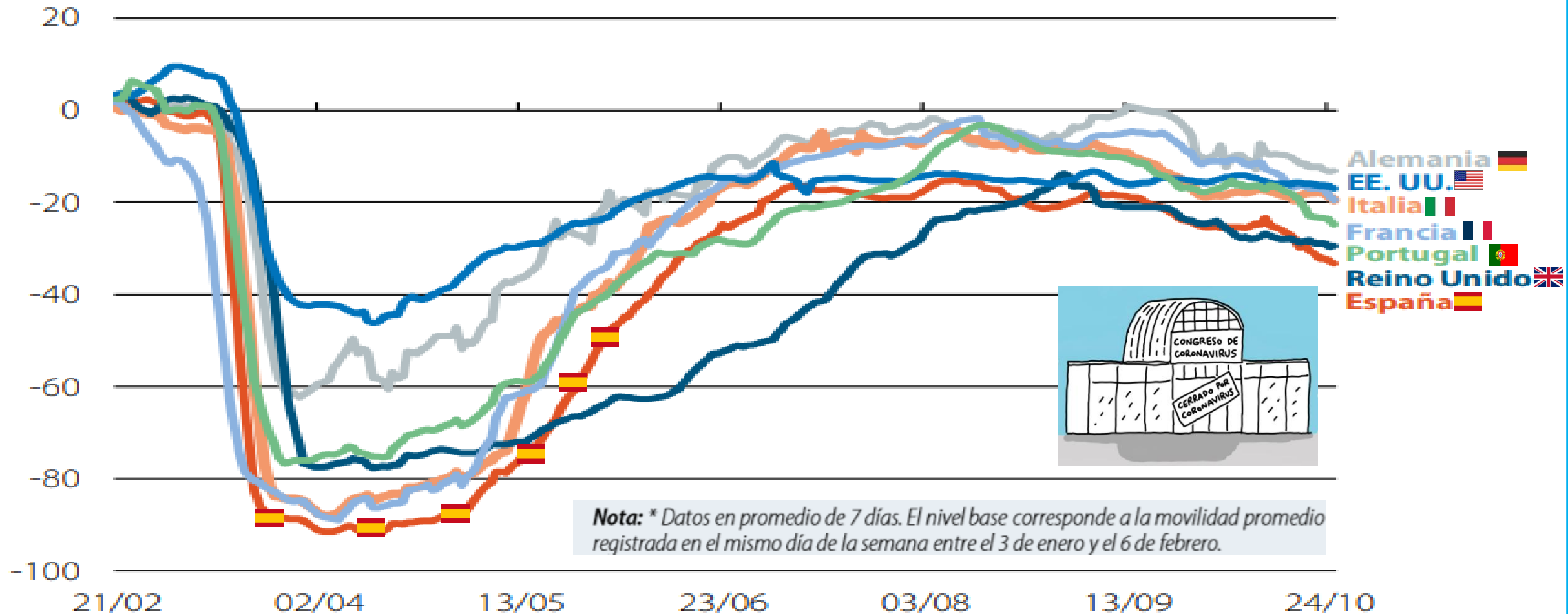


Font: Markit

COVID-19: COMMUNITY MOBILITY REPORT

Comerç minorista. Informes de mobilitat Google, mitjana mòbil de 7 dies

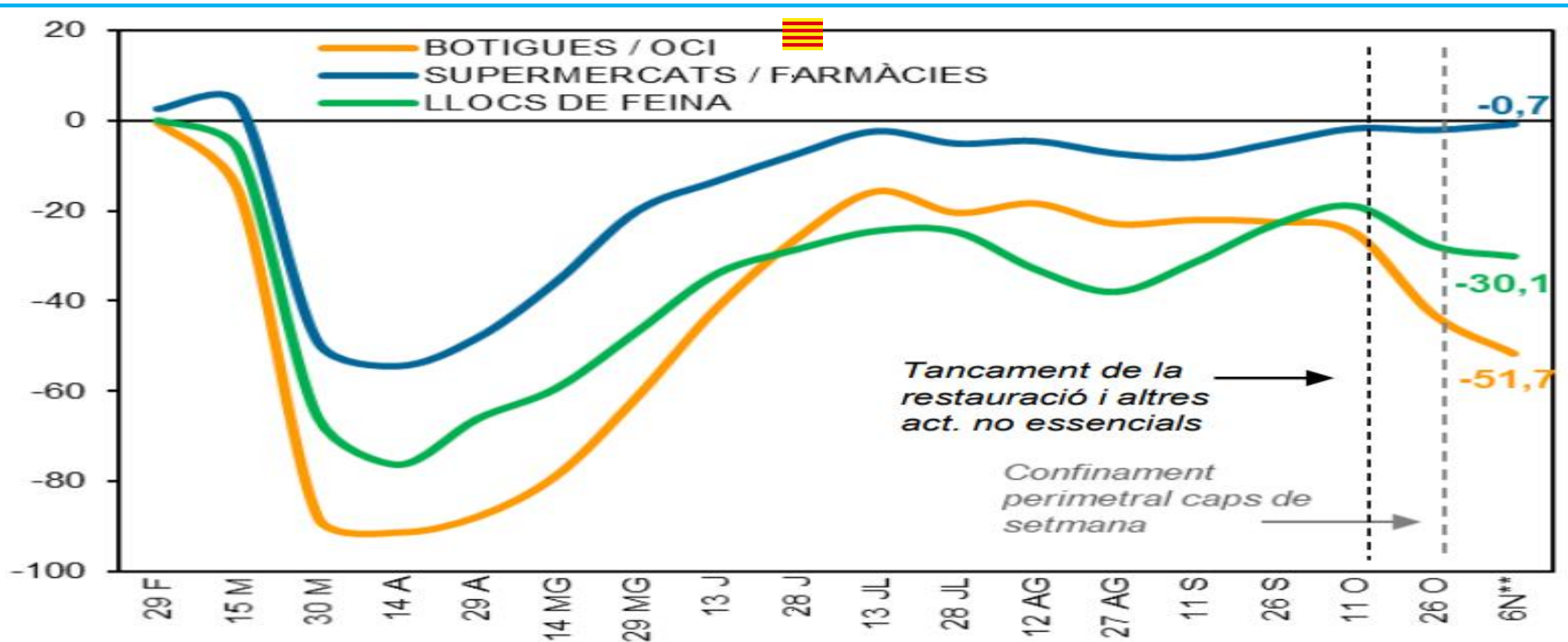
*Variación con respecto al nivel base * (%)*



Fuente: CaixaBank Research, a partir de Google Mobility Report.

CATALUNYA: COMMUNITY MOBILITY REPORT

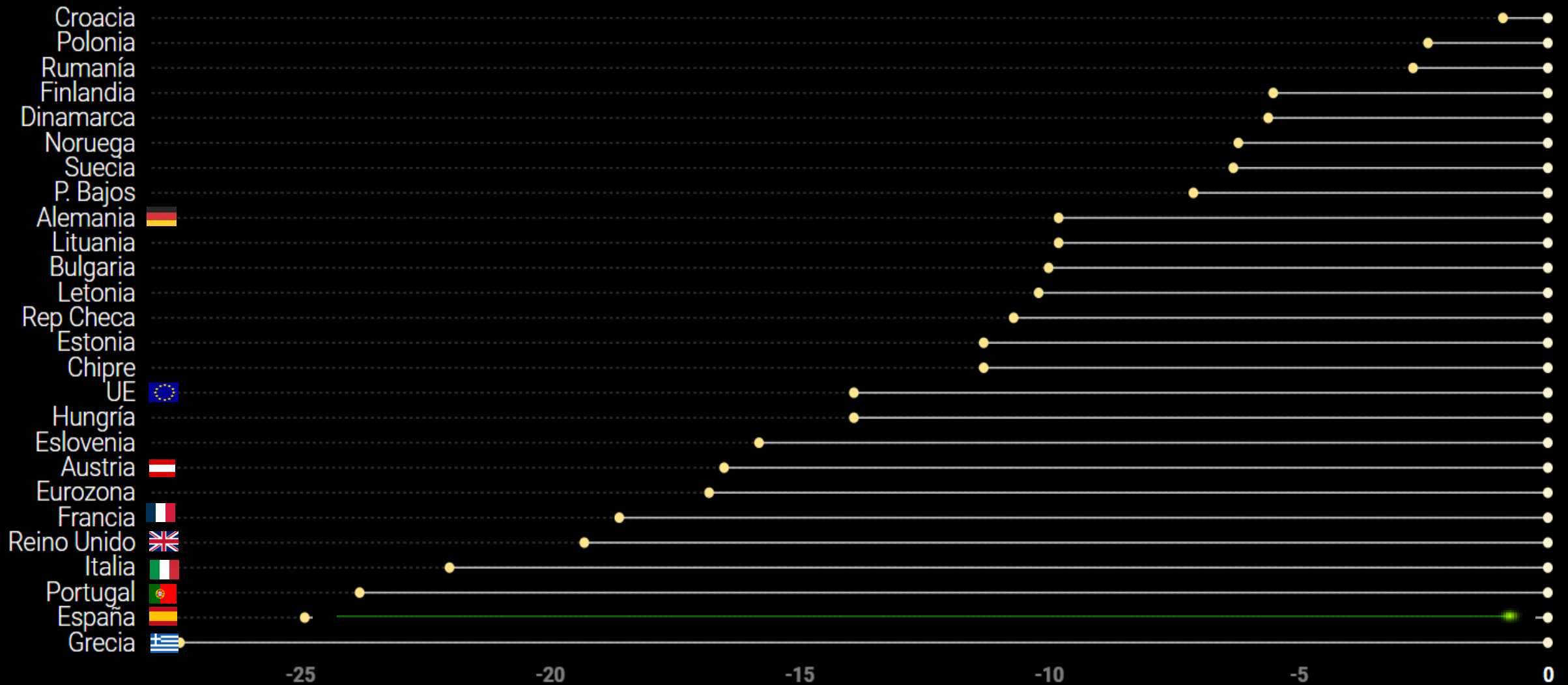
Comerç - Oci - Feina. Informes de mobilitat Google. Mitjana últims 15 dies de la variació diària (%)



Font: Community Mobility Reports de Google. **Notes:** *La variació diària es calcula en relació amb el valor mitjà per al corresponent dia de la setmana des del 3 de gener fins al 6 de febrer de 2020. **Mitjana 11 dies.

COVID-19: HORES DE TREBALL PERDUDES

Taxa de variació (%), 2 tr respecte 1 tr, 2020



COVID-19: TURISME ESTRANGER

Estadístiques 2019

	Millones de personas	%
Visitantes extranjeros	126,1	100,0
Turistas	83,7	66,4
1 noche	4,2	3,3
De 2 a 3 noches	15,5	12,3
De 4 a 7 noches	39,7	31,5
De 8 a 15 noches	18,9	15,0
Más de 15 noches	5,4	4,3
Excursionistas (0 noches)	42,4	33,6
Turistas por vía de acceso		100,0
Aeropuerto		82,1
Carretera		15,2
Puerto		2,3
Tren		0,4
Turistas por tipo de alojamiento		100,0
De mercado		81,6
Hotelero		65,4
Otros alojamientos no hoteleros de mercado		16,2
Vivienda en alquiler		11,2
Resto de mercado		5,0
No de mercado		18,4
Vivienda en propiedad		5,9
Vivienda de familiares o amigos		11,3
Resto de no mercado		1,2

	%
Turistas según país de residencia	100,0
Alemania	13,3
Bélgica	3,0
Francia	13,3
Irlanda	2,6
Italia	5,4
Países Bajos	4,4
Países nórdicos	6,6
Portugal	2,9
Reino Unido	21,6
Rusia	1,6
Suiza	2,2
Resto de Europa	7,7
Estados Unidos de América	4,0
Resto de América	4,5
Resto del mundo	6,8
Turistas por motivo del viaje	100,0
Ocio, recreo y vacaciones	87,4
Negocio, motivos profesionales	6,4
Otros motivos	6,2
Turistas por forma de organización del viaje	100,0
Sin paquete turístico	71,9
Con paquete turístico	28,1

COVID-19: TURISME ESTRANGER

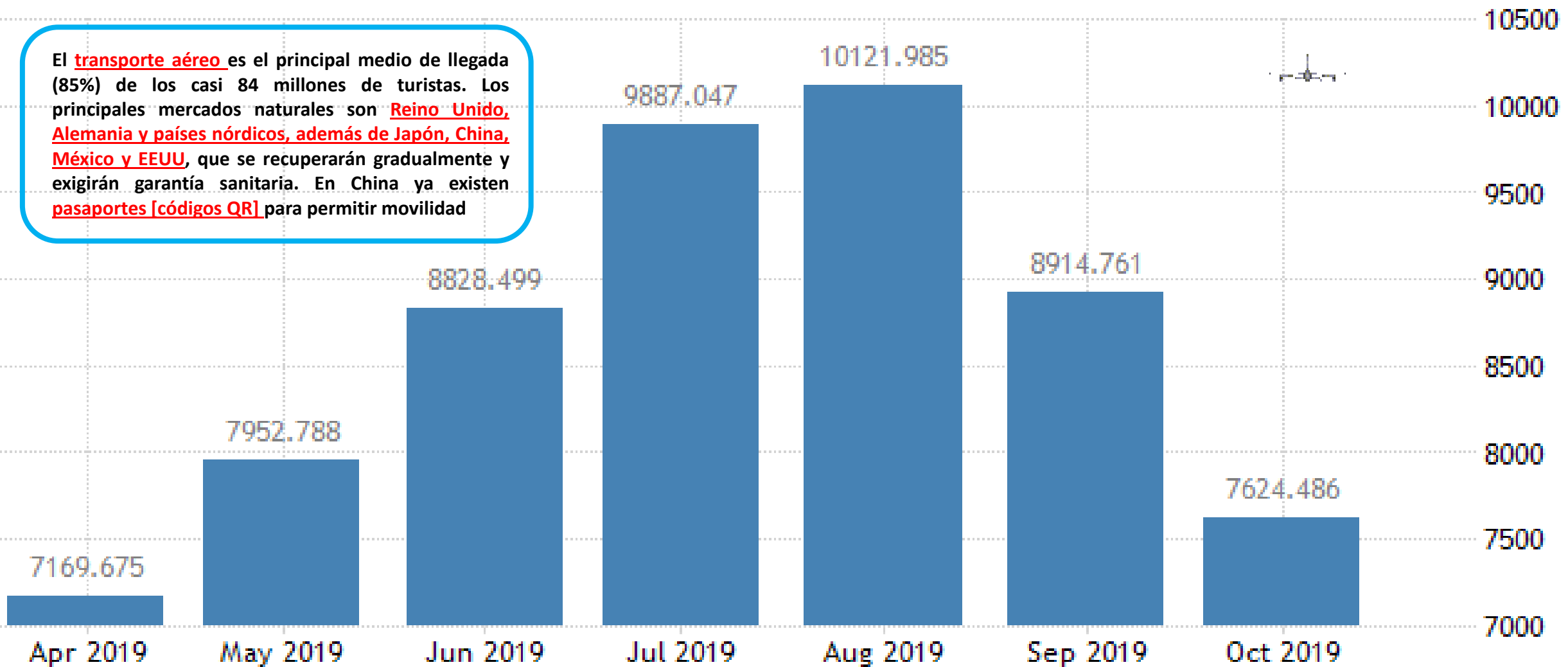
Temporada 2020



COVID-19: ARRIBADES DE TURISTES 2019

Nombre

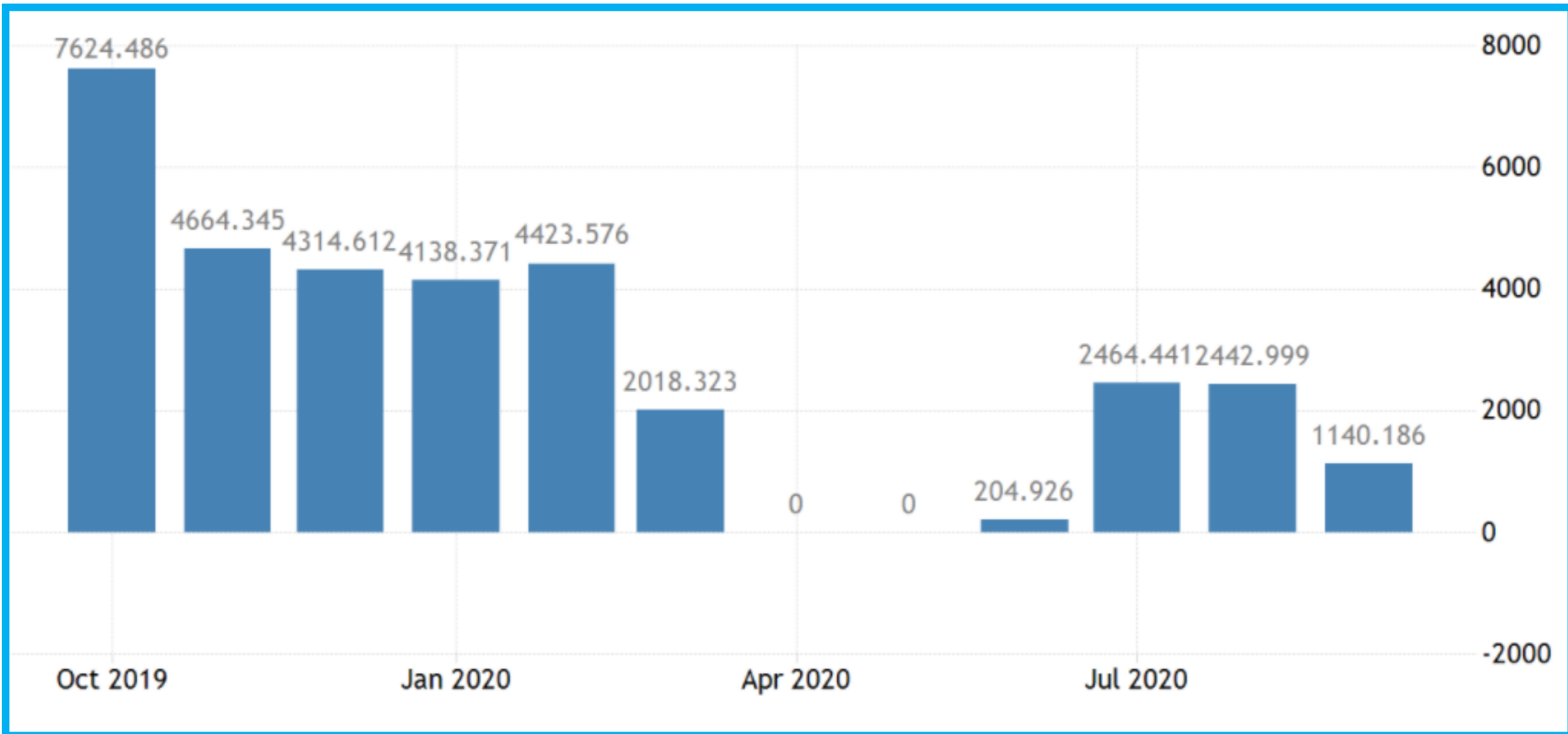
El transporte aéreo es el principal medio de llegada (85%) de los casi 84 millones de turistas. Los principales mercados naturales son Reino Unido, Alemania y países nórdicos, además de Japón, China, México y EEUU, que se recuperarán gradualmente y exigirán garantía sanitaria. En China ya existen pasaportes [códigos QR] para permitir movilidad



SOURCE: TRADINGECONOMICS.COM | NATIONAL STATISTICS INSTITUTE (INE)

COVID-19: ARRIBADES DE TURISTES 2020

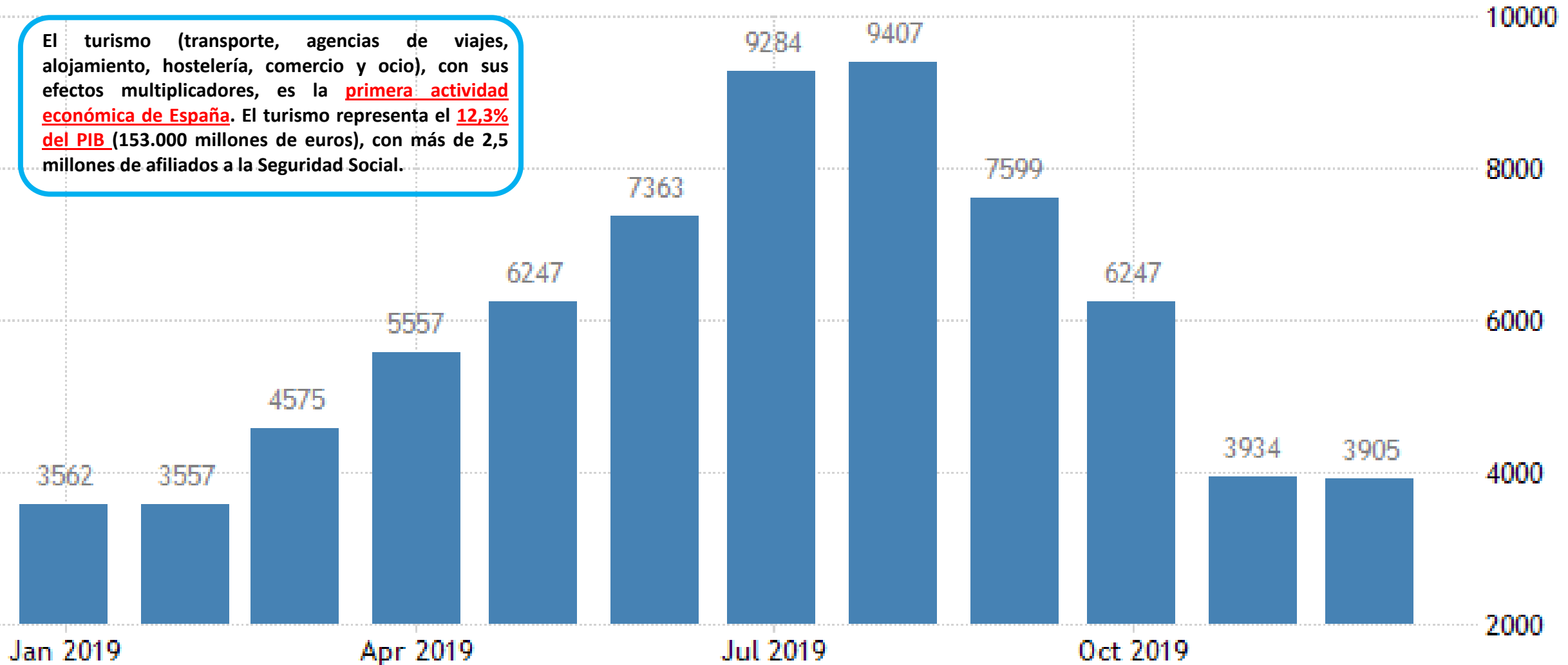
Nombre



COVID-19: INGRESSOS PER TURISME 2019

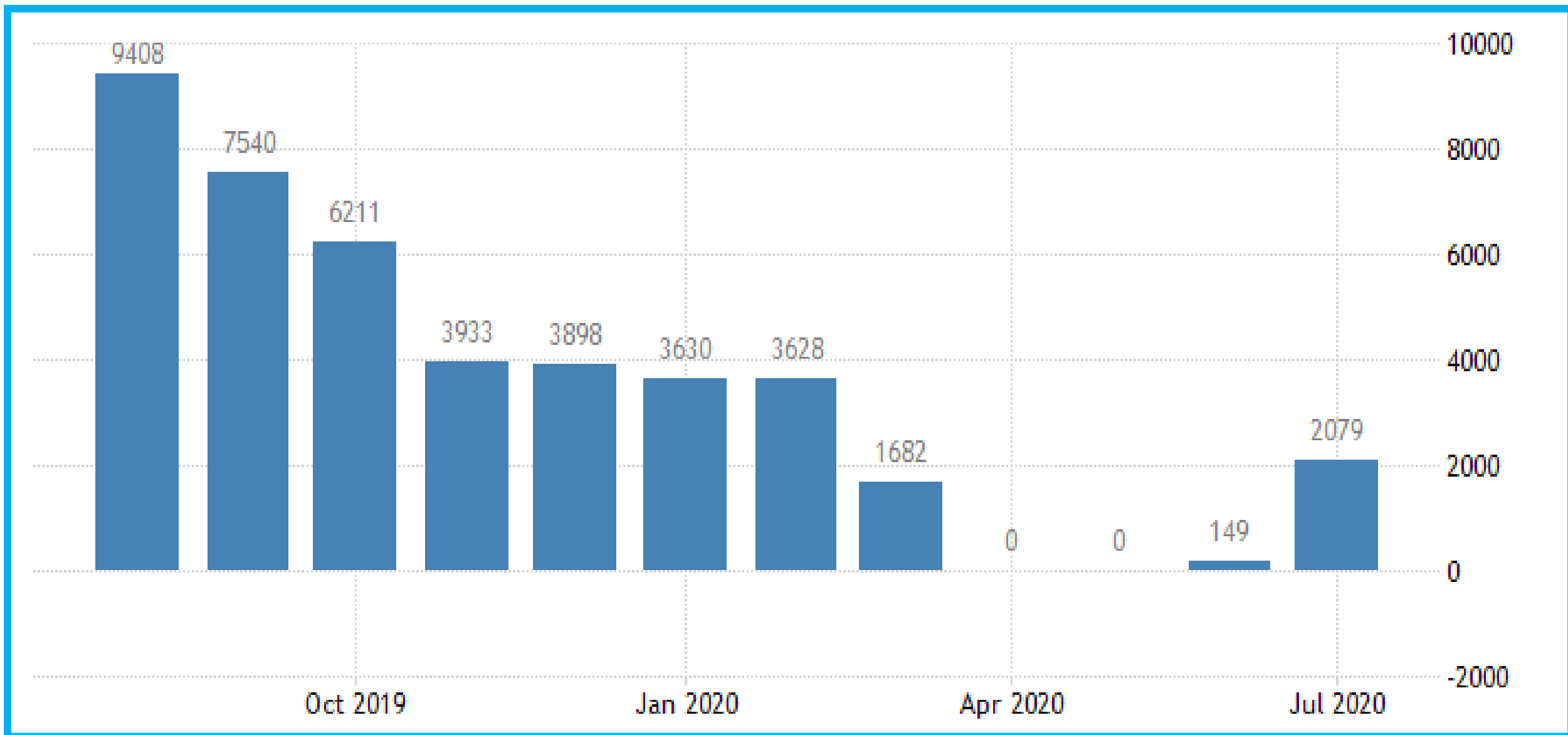
Milions d'euros

El turismo (transporte, agencias de viajes, alojamiento, hostelería, comercio y ocio), con sus efectos multiplicadores, es la primera actividad económica de España. El turismo representa el 12,3% del PIB (153.000 millones de euros), con más de 2,5 millones de afiliados a la Seguridad Social.



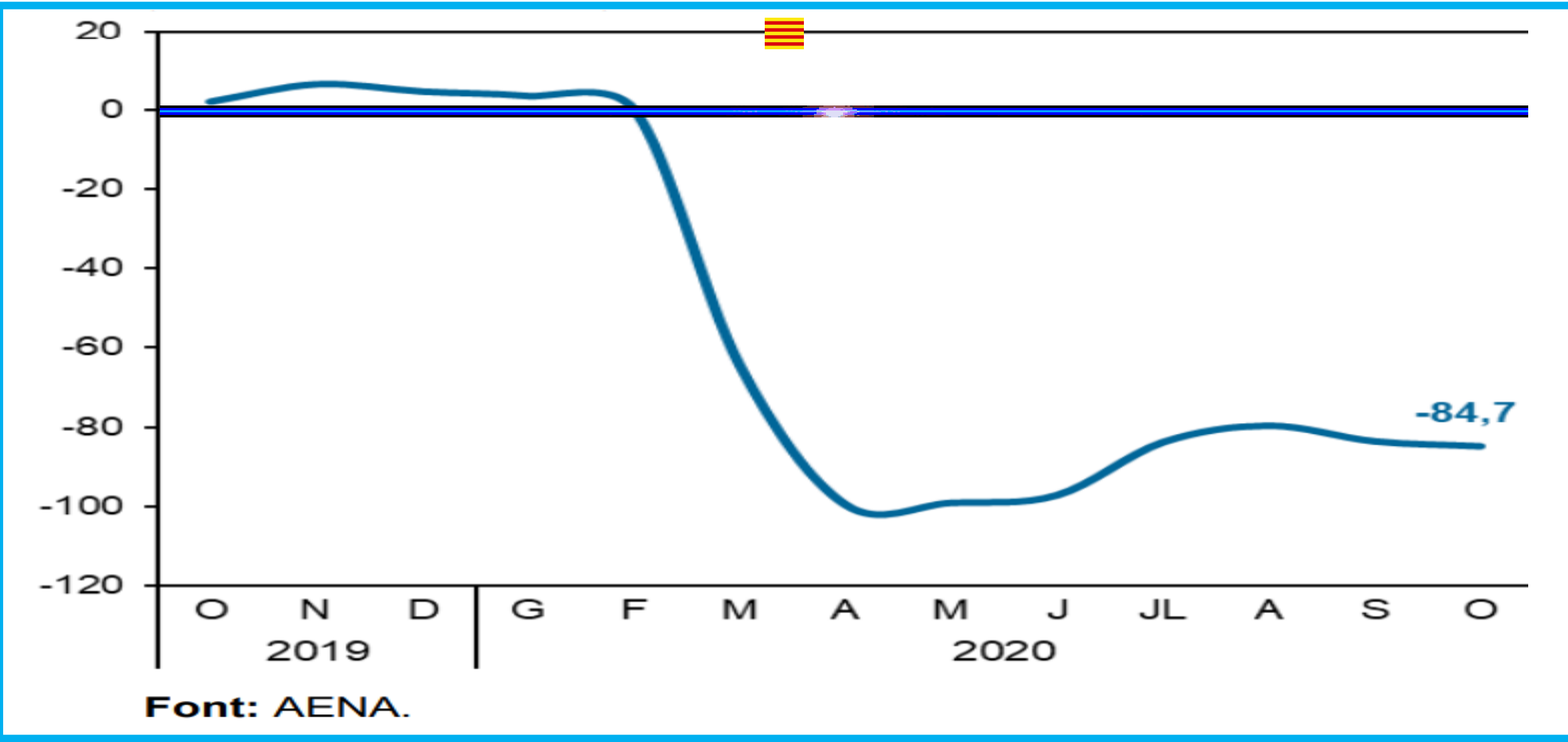
COVID-19: INGRESSOS PER TURISME 2020

Milions d'euros



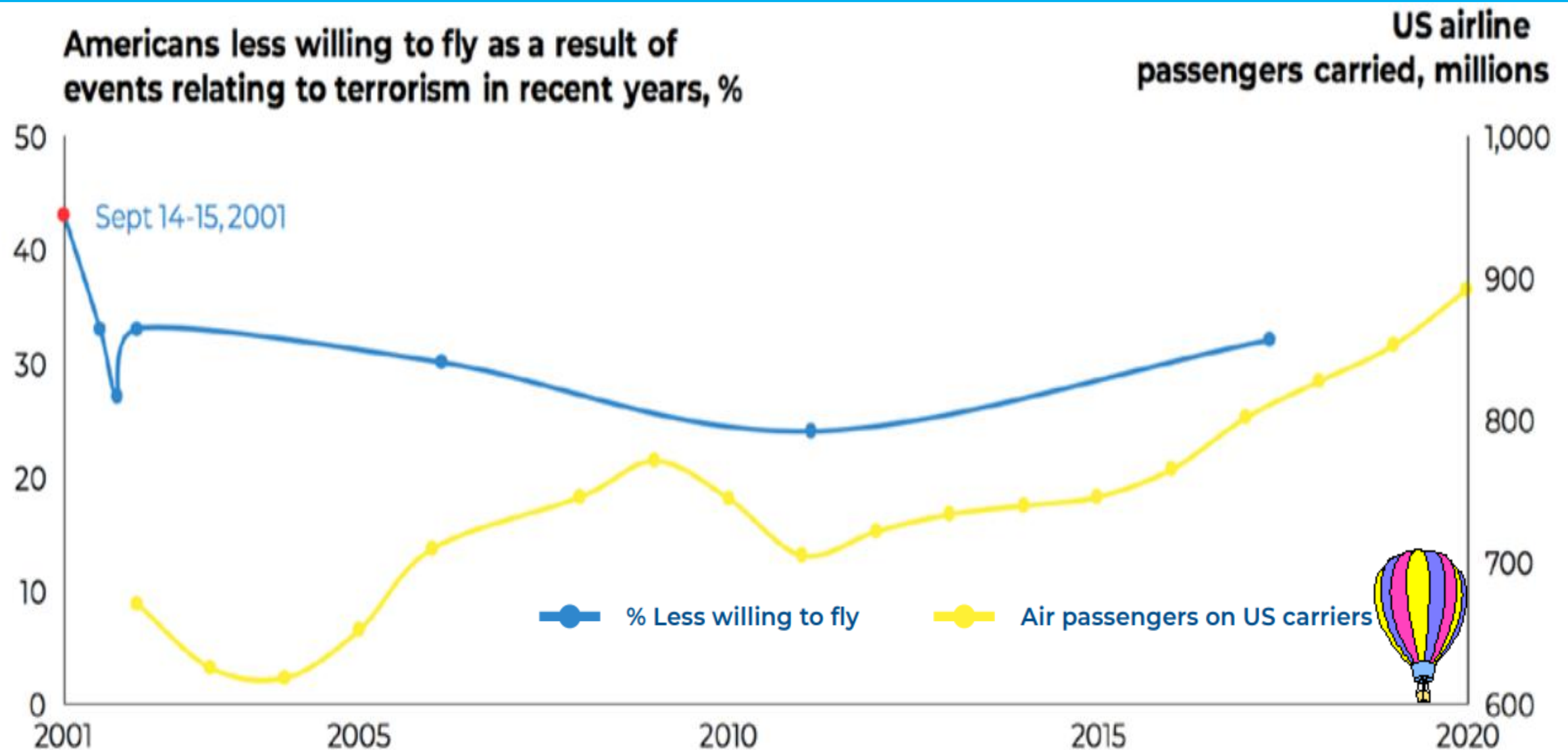
AEROPORT BCN-EL PRAT: MOVIMENT DE PASSATGERS

Taxa de variació interanual (%)



COVID-19: PASSENGER'S WILLING TO FLY

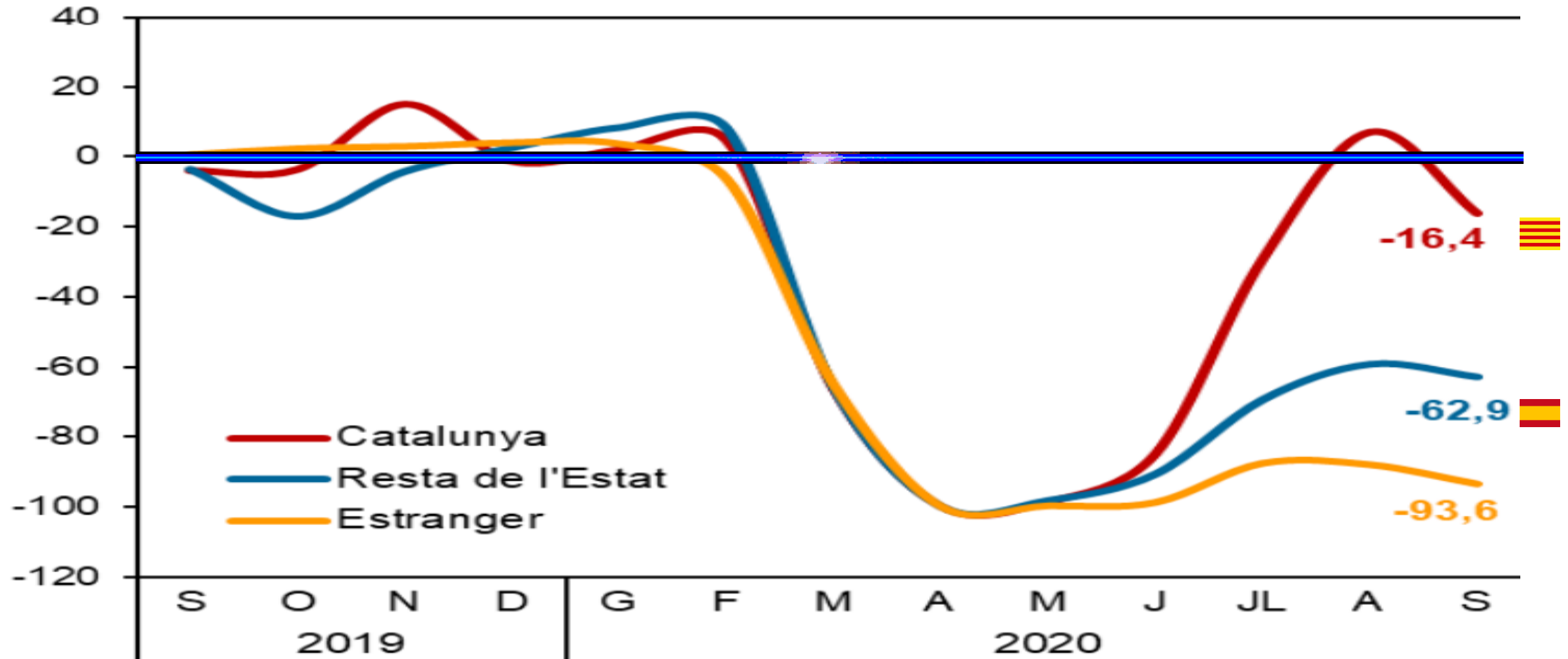
Post-9/11



Source: Skift Research, Gallup, Department of Transportation

CATALUNYA: PERNOCTACIONS HOTELS

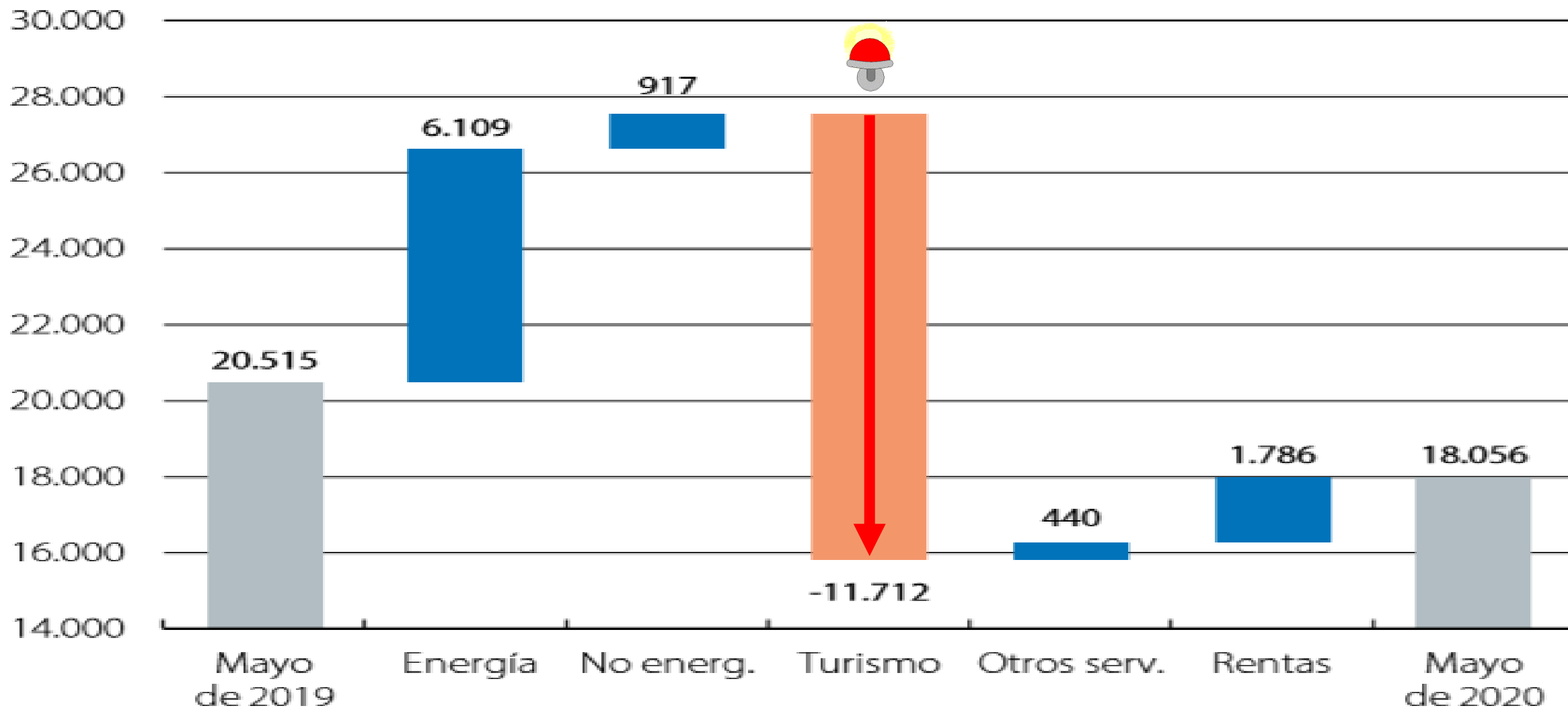
Per procedència. Taxa de variació interanual (%)



Font: Idescat.

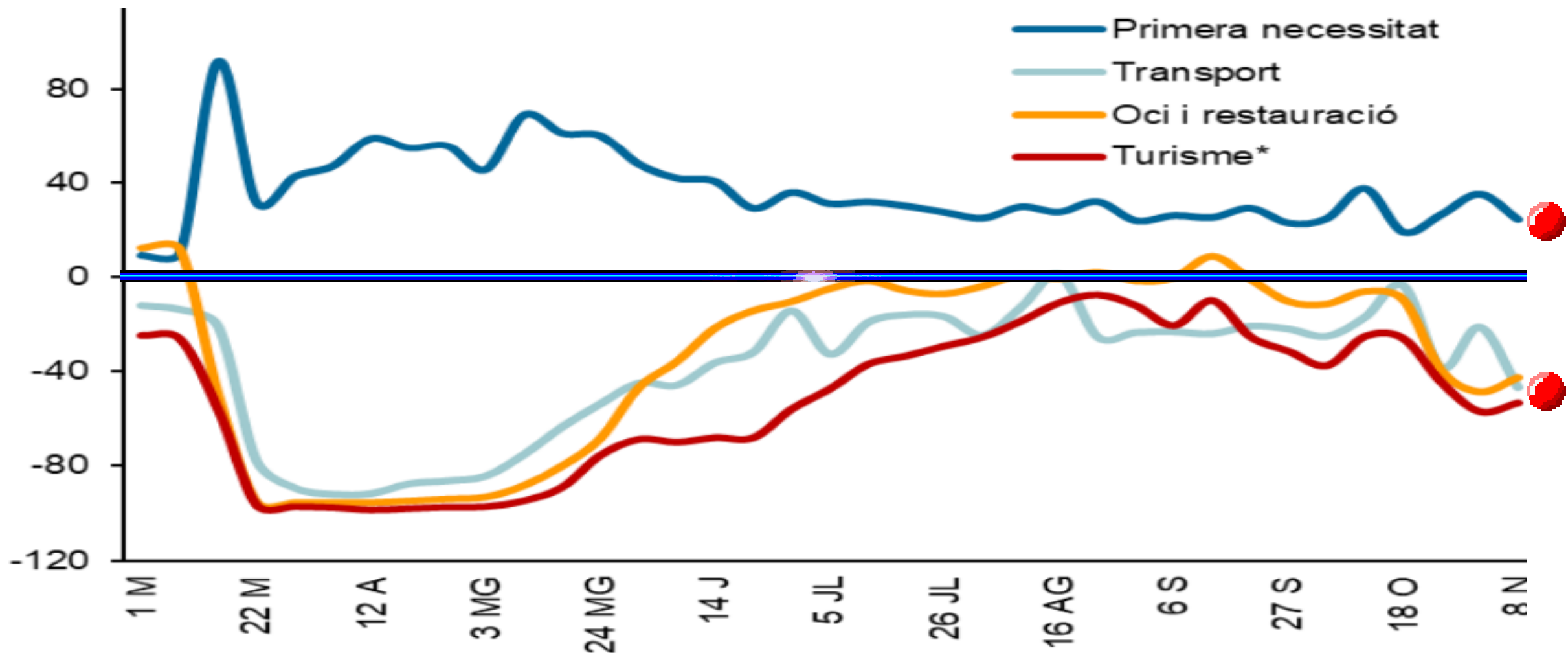
COVID-19: TURISME I BALANÇA DE PAGAMENTS

Balança per Compte Corrent, acumulat 12 mesos en milions €



COVID-19: CONSUM EN TPV

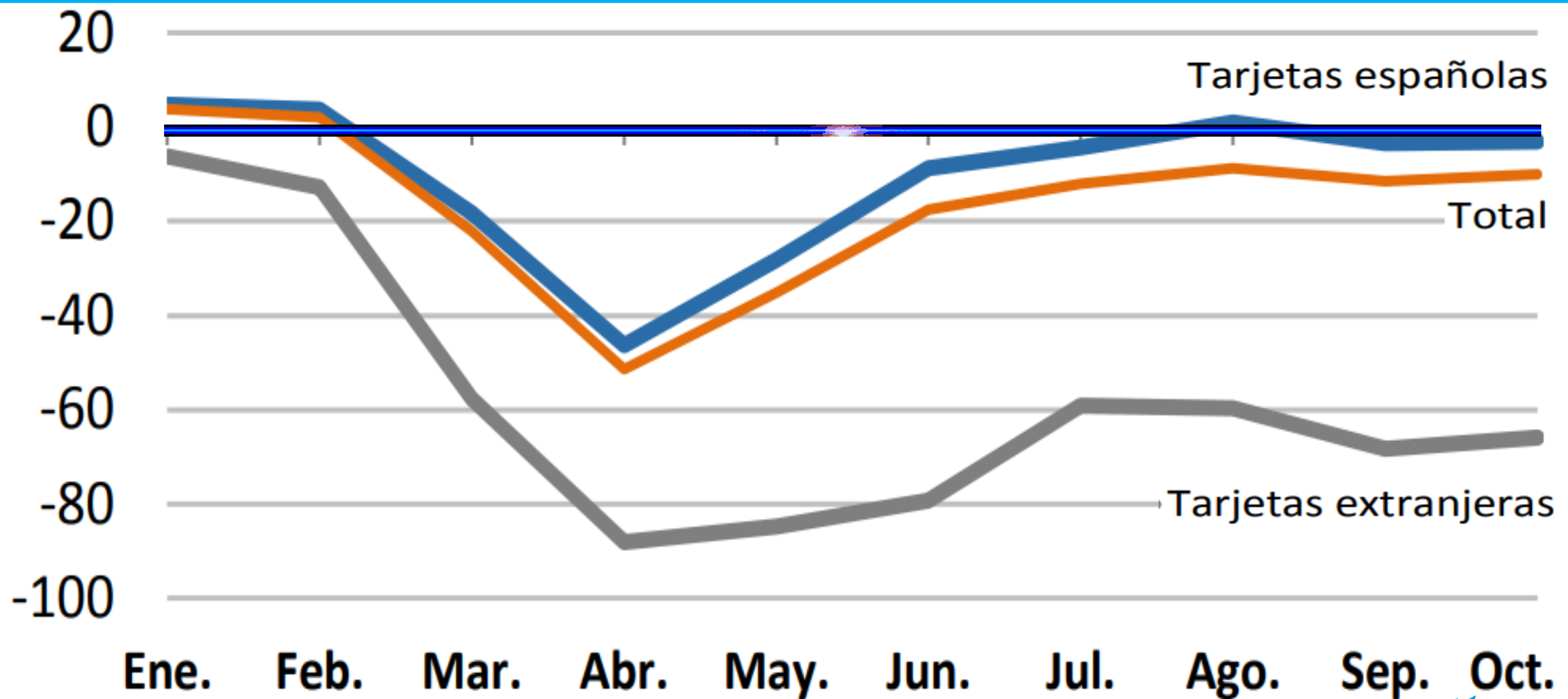
Compra presencial en TPV de 'Caixabank'. Taxa de variació interanual (%)



Font: CaixaBank Research. **Nota:** *Pagaments en allotjament, agències de viatge i botigues de *souvenirs*.

COVID-19: CONSUM AMB TARETA

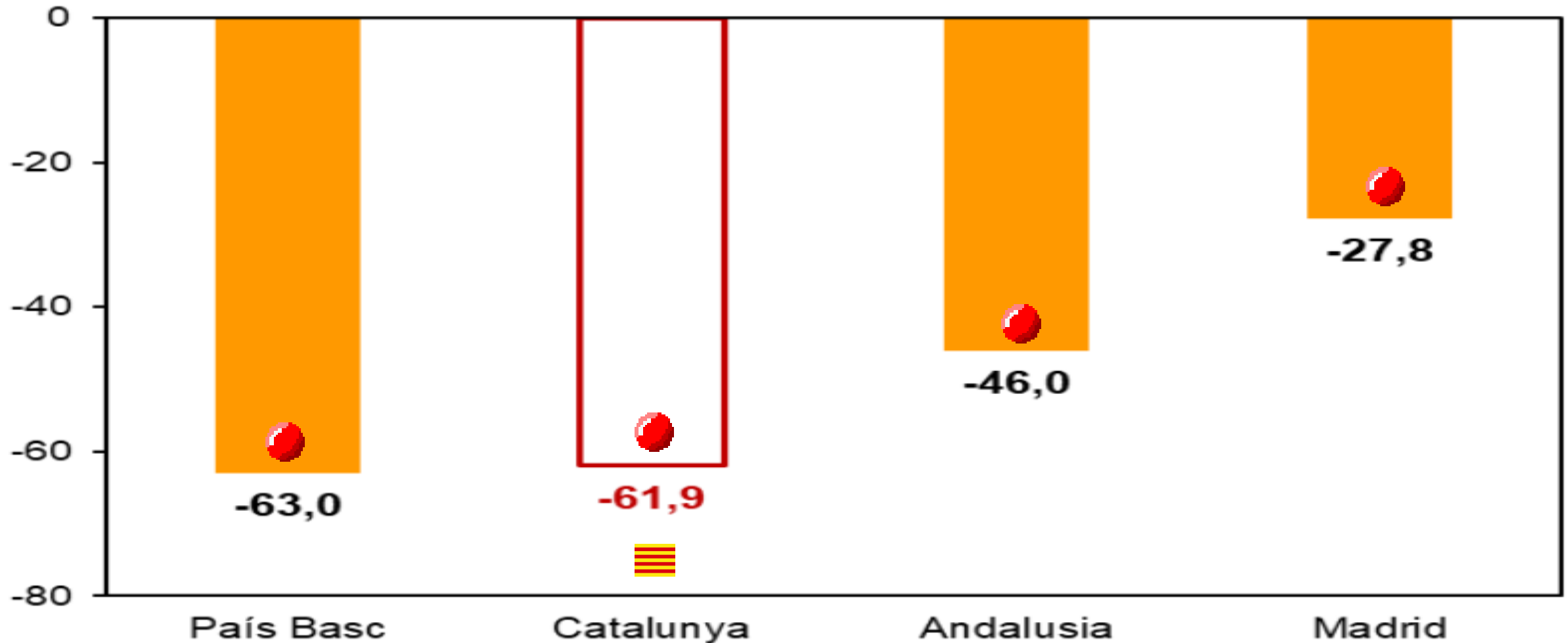
Pagaments en TPV i Retirades d'efectiu. Taxa de variació interanual (%)



Fuente: CaixaBank Research, a partir de datos internos.

CATALUNYA: CONSUM EN RESTAURACIÓ TPV

Compra presencial en TPV de 'BancSabadell'. Taxa de variació interanual (%) (11 oct. - 11 nov.)

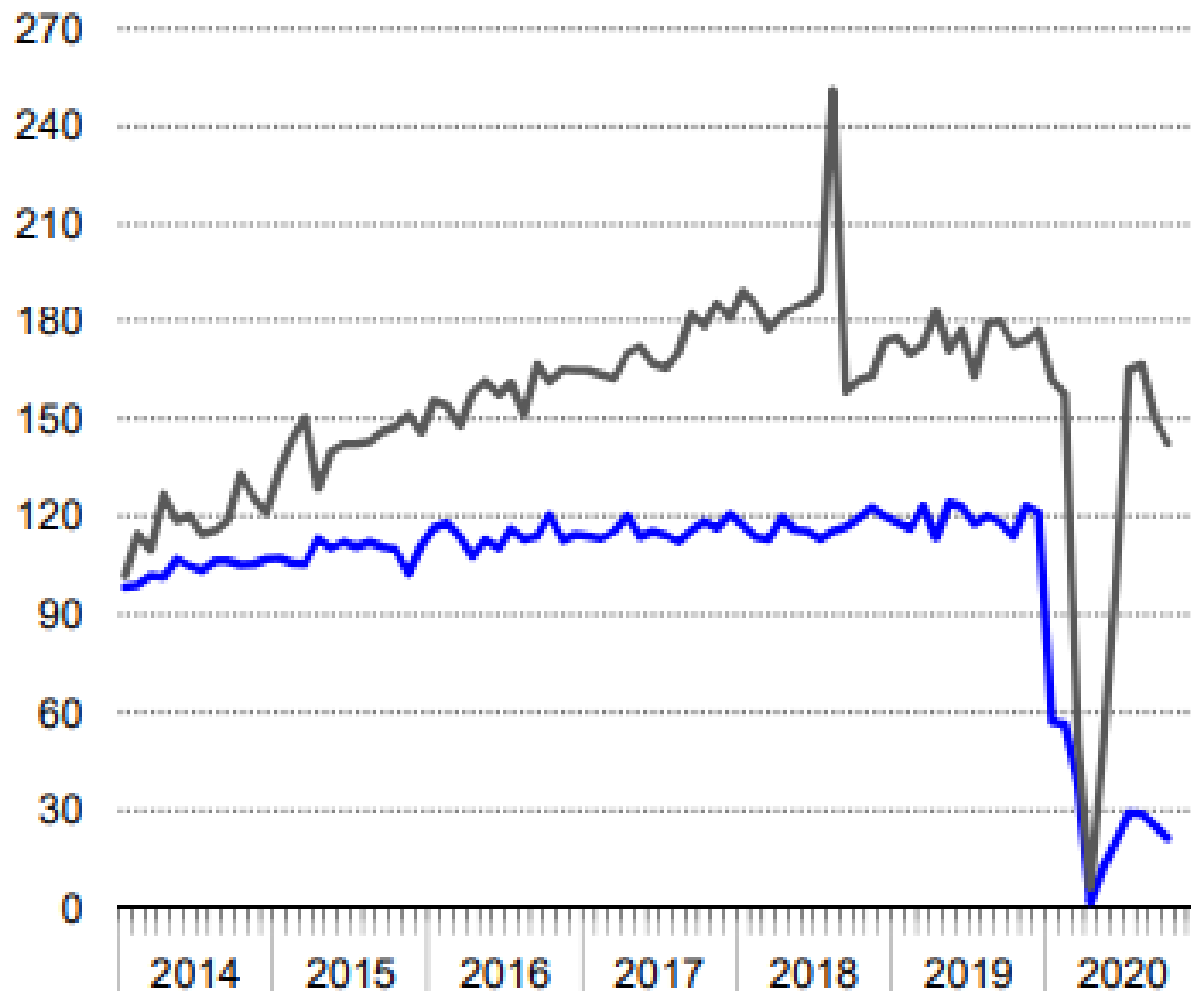


Font: *Indicador de Recuperació Comercial* de Banc Sabadell.

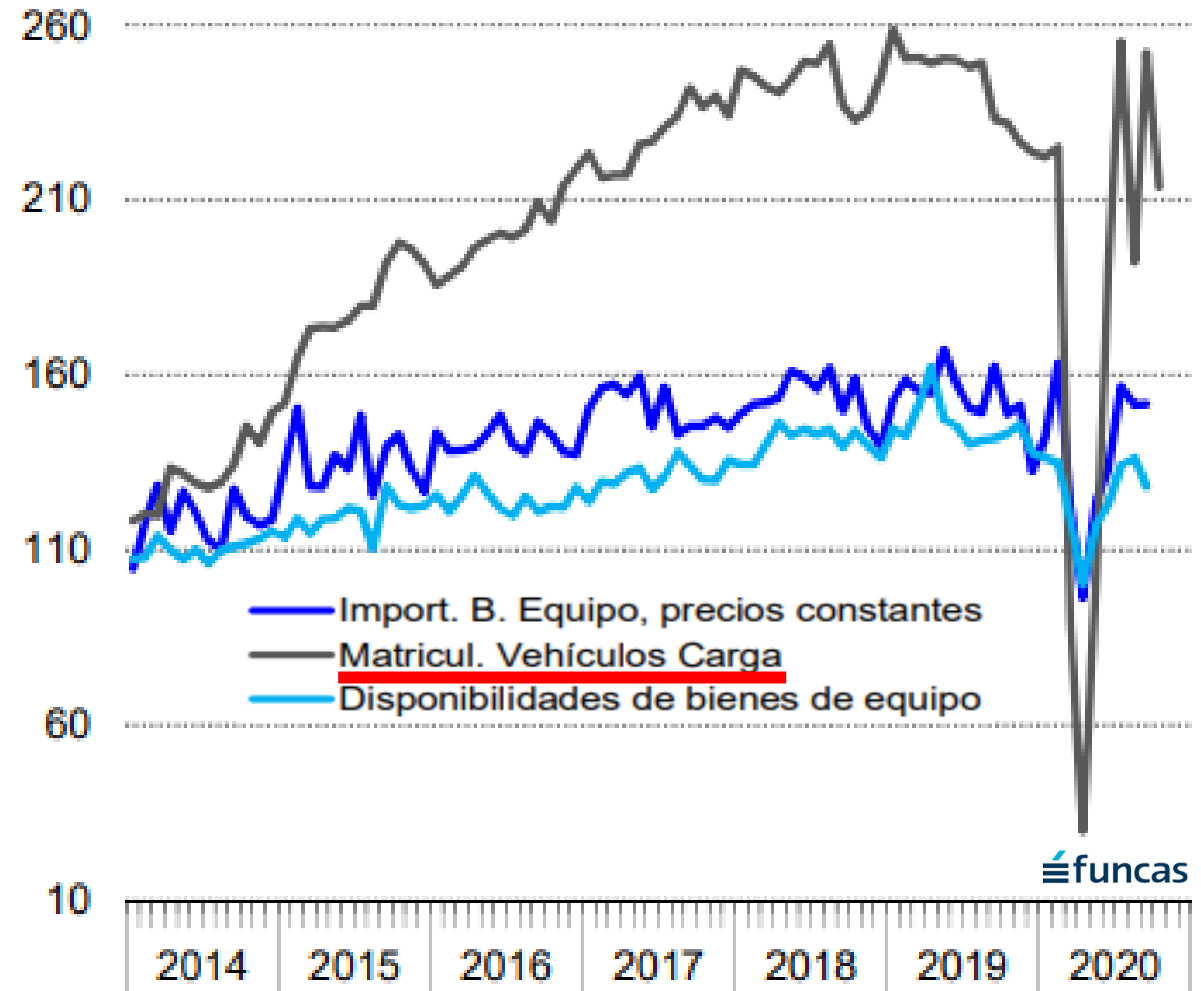
COVID-19: MATRICULACIÓ VEHICLES

Vehicles particulars i de càrrega

Niveles en índices (2013=100),
series c.v.e.c

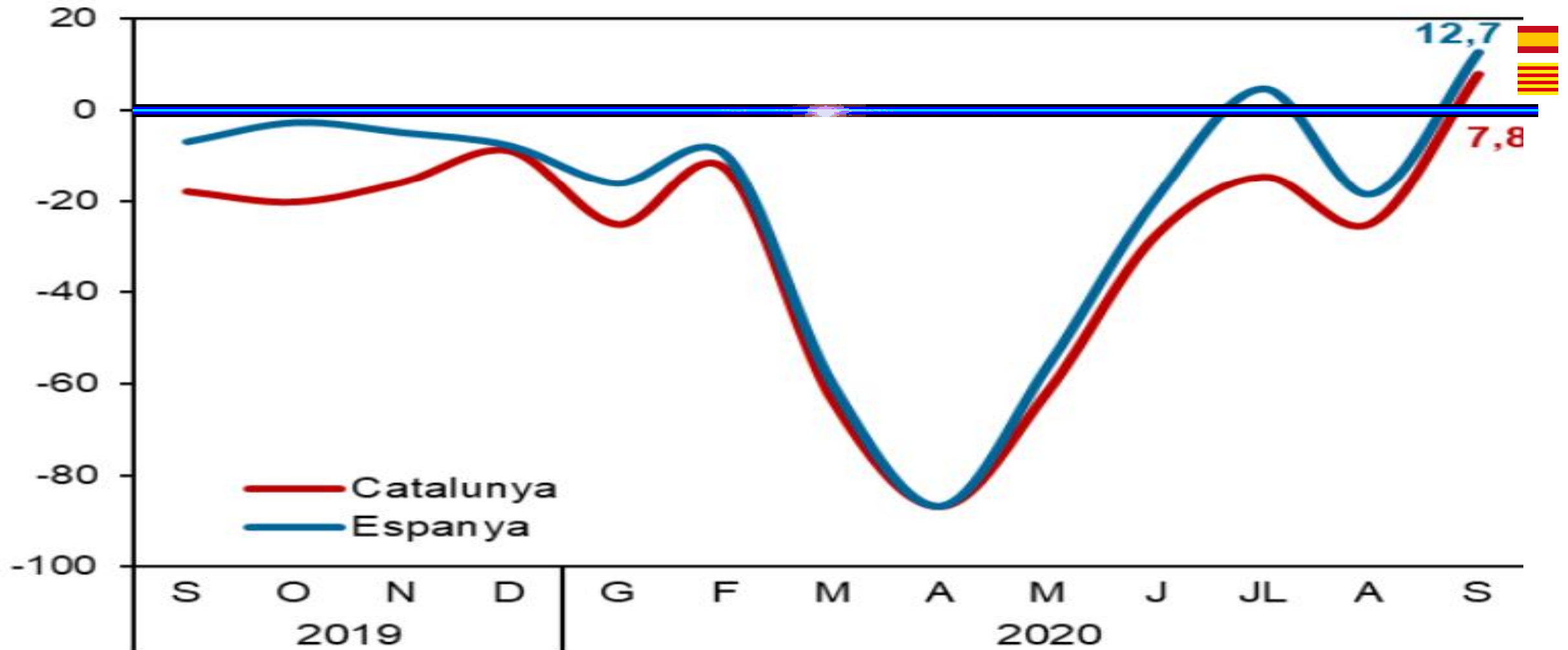


Niveles en índices (2013=100),
series c.v.e.c



CATALUNYA: MATRICULACIÓ VEHICLES INDUSTRIALS

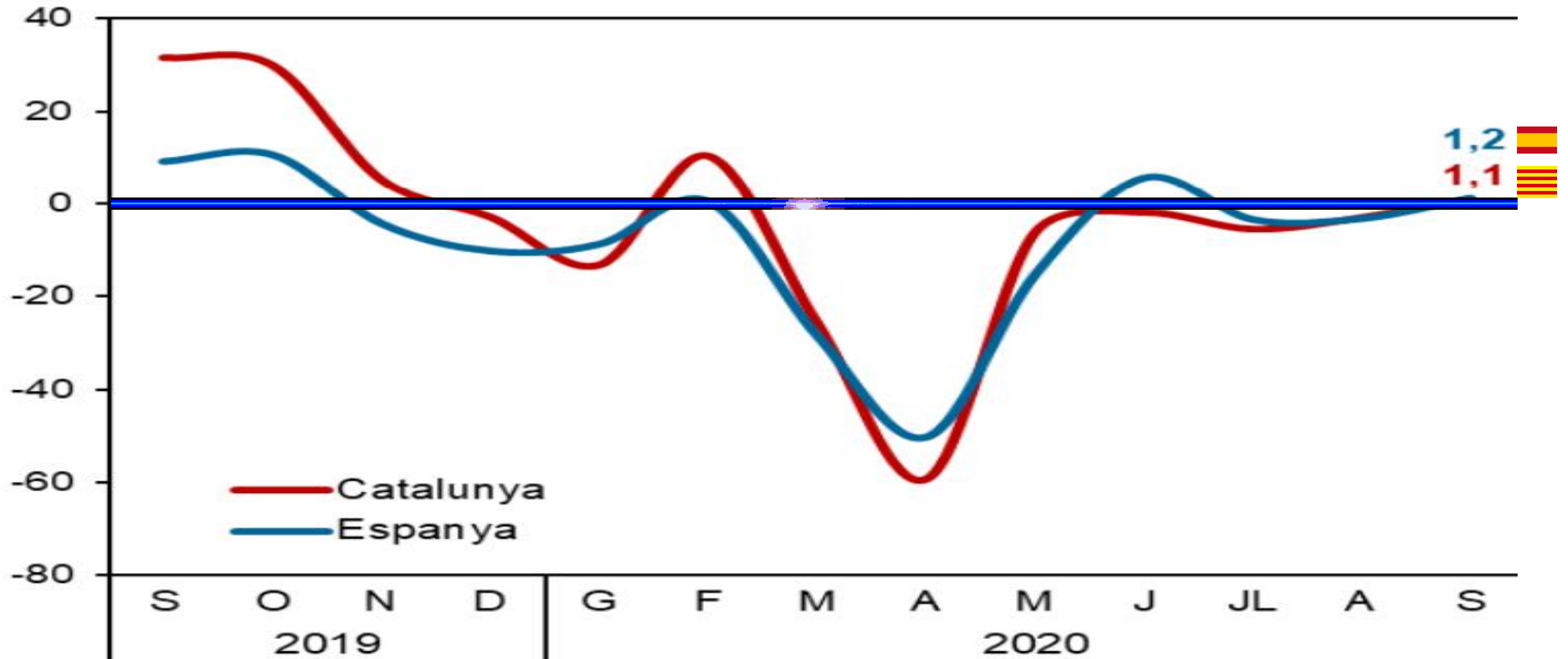
Taxa de variació interanual (%)



Font: Idescat.

CATALUNYA: CONSUM DE CIMENT

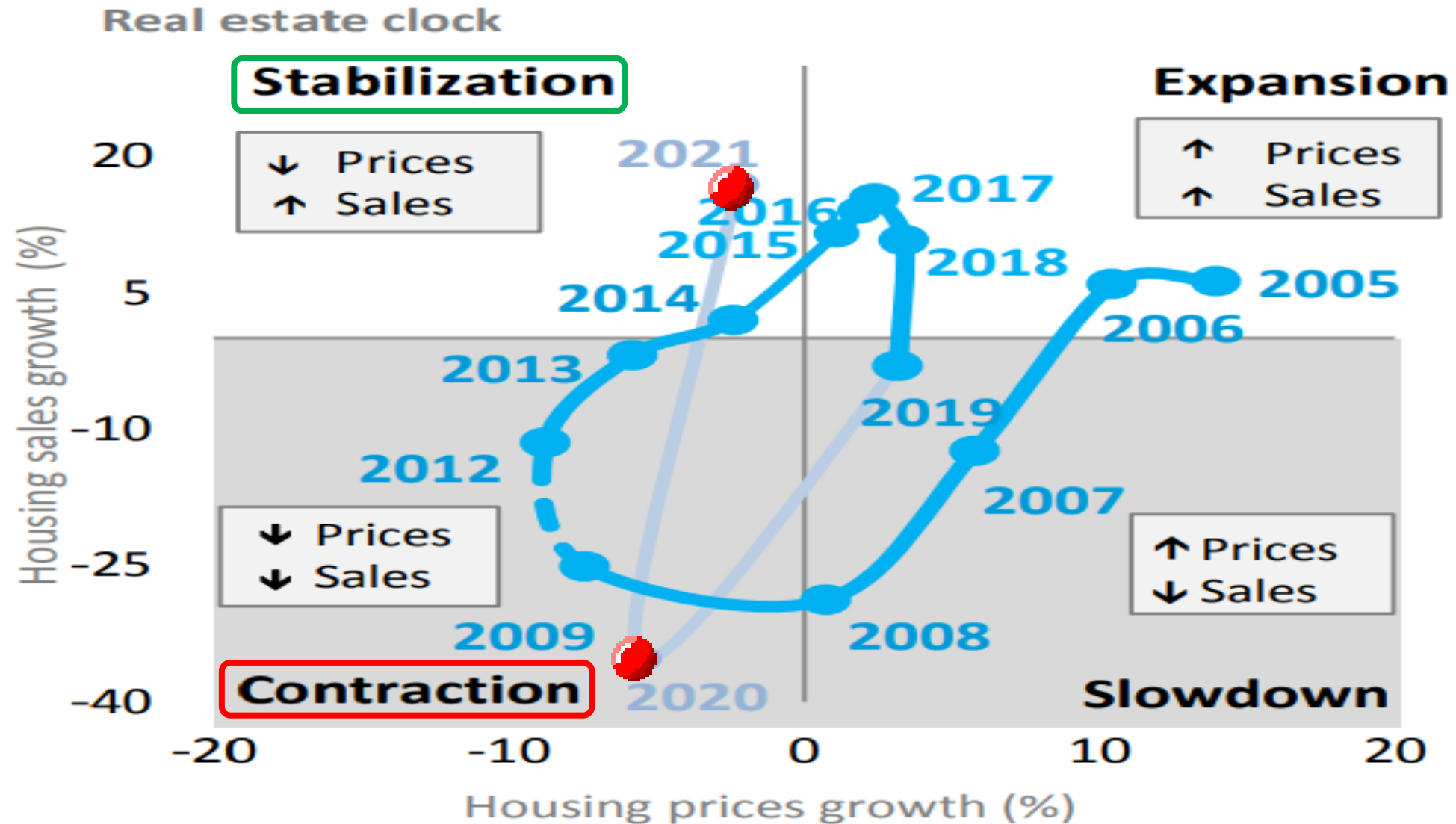
Taxa de variació interanual (%)



Font: Idescat.

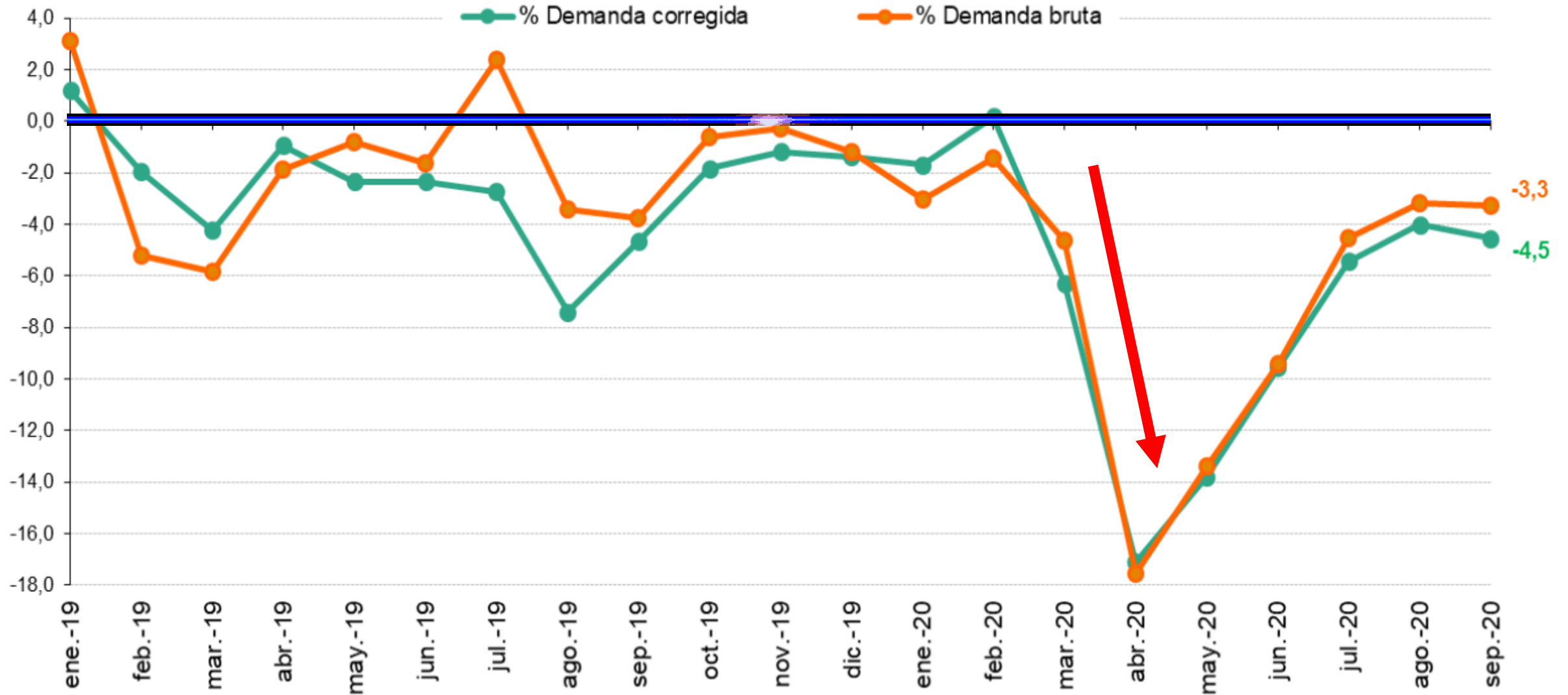
COVID-19: SECTOR IMMOBILIARI

Mercat d'habitatge residencial: Caiguda de vendes i preus



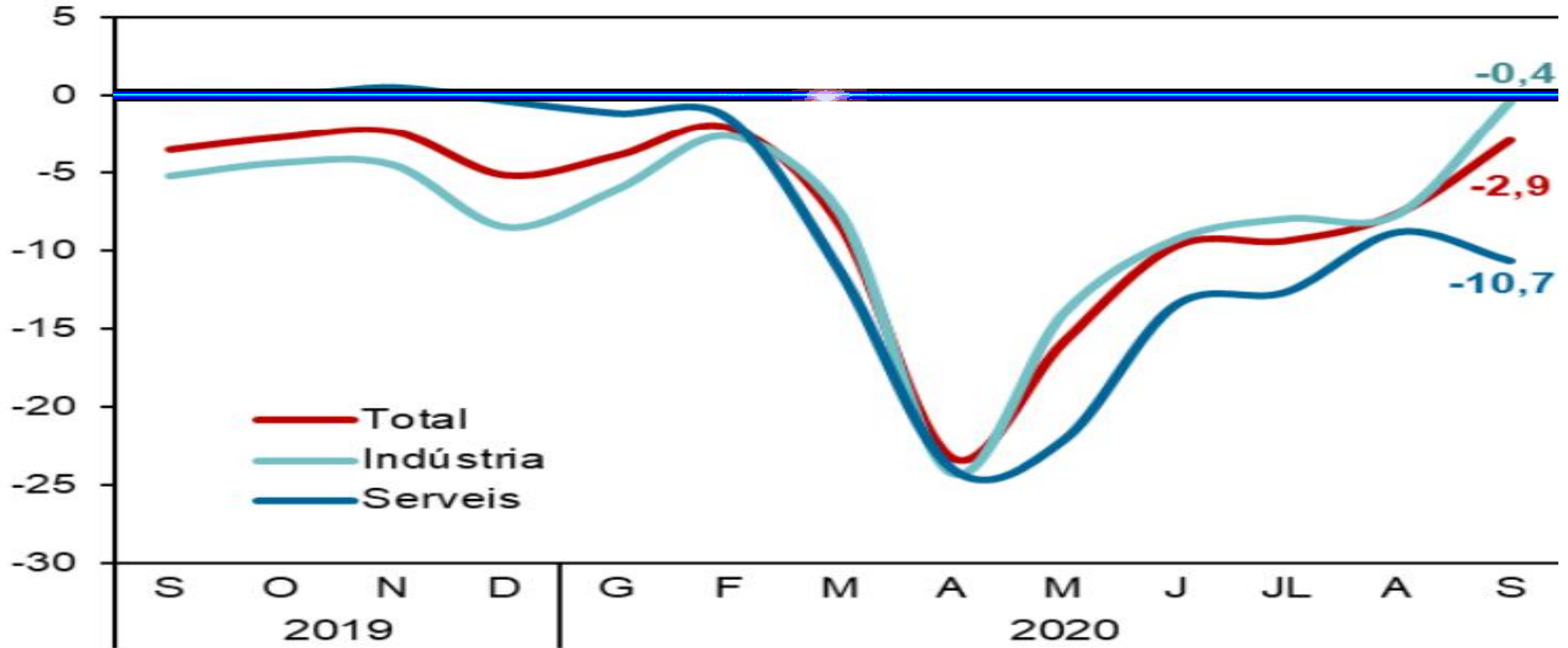
COVID-19: CONSUM ENERGIA ELÈCTRICA

Gener 2020 - Setembre 2020



COVID-19: CONSUM ENERGIA ELÈCTRICA

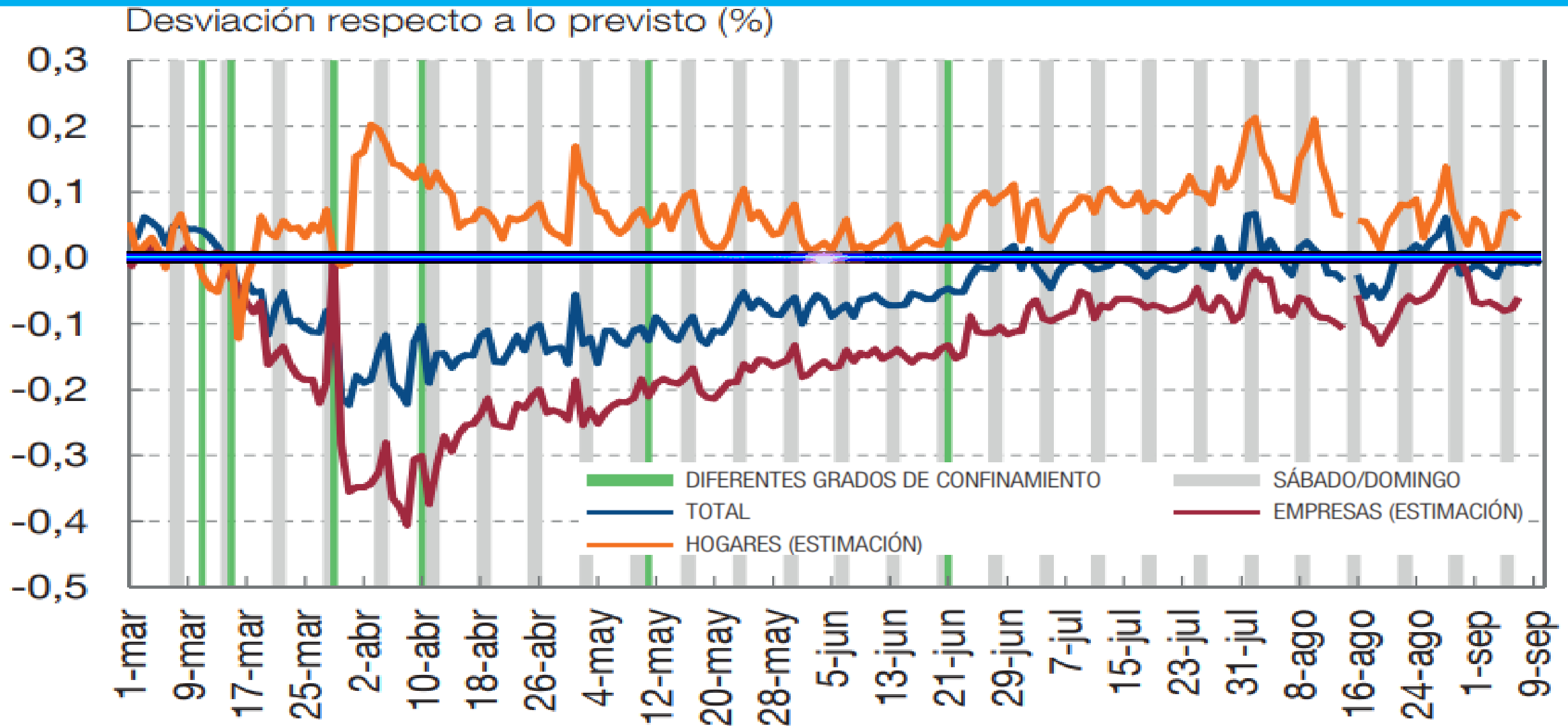
Índex Red Elèctrica (Base 2010=100). Taxa de variació interanual (%)



Font: Red Eléctrica de España.

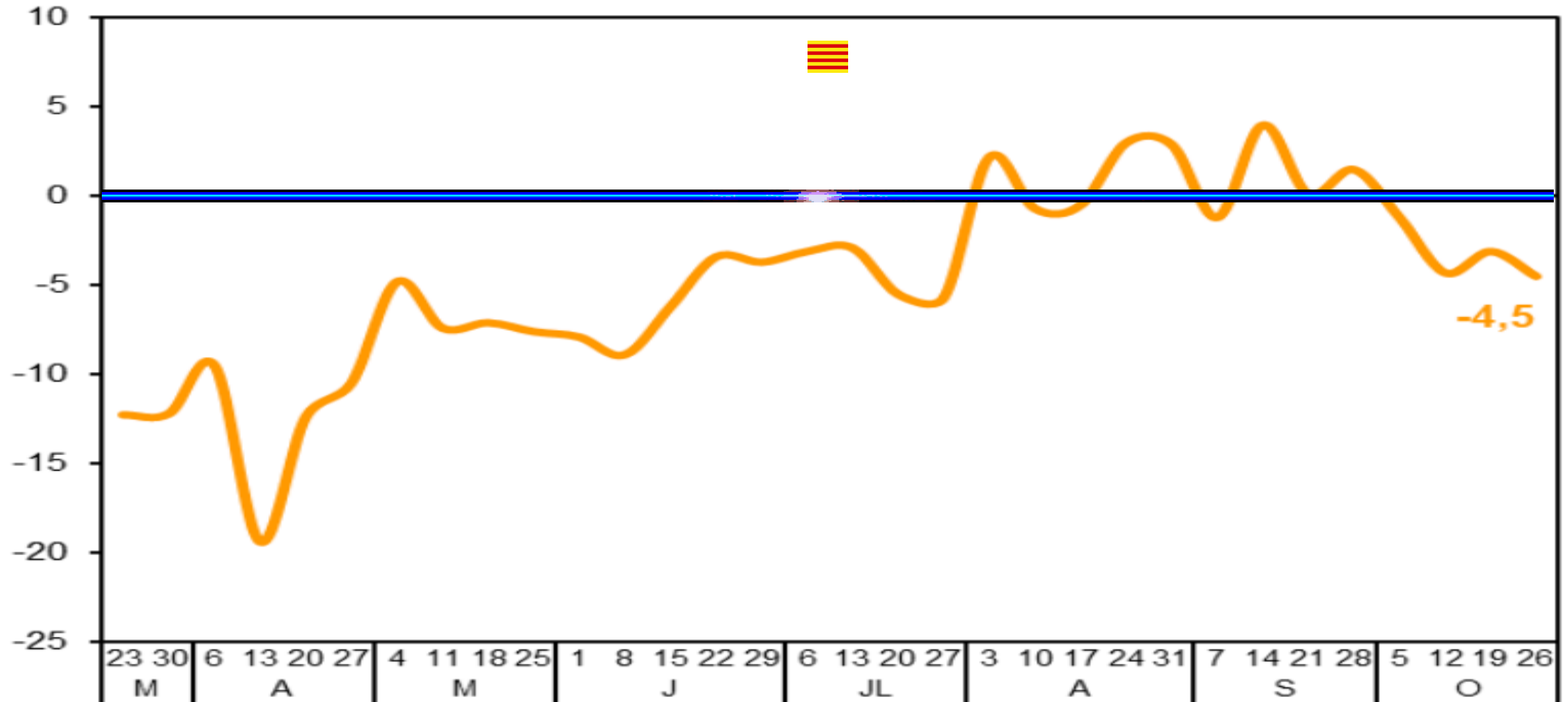
COVID-19: CONSUM ENERGIA ELÈCTRICA

Març 2020 - Setembre 2020



CATALUNYA: CONSUM AIGUA

Taxa de variació respecte al volum mitjà d'un dia laborable en període de normalitat. Agbar-ATLL



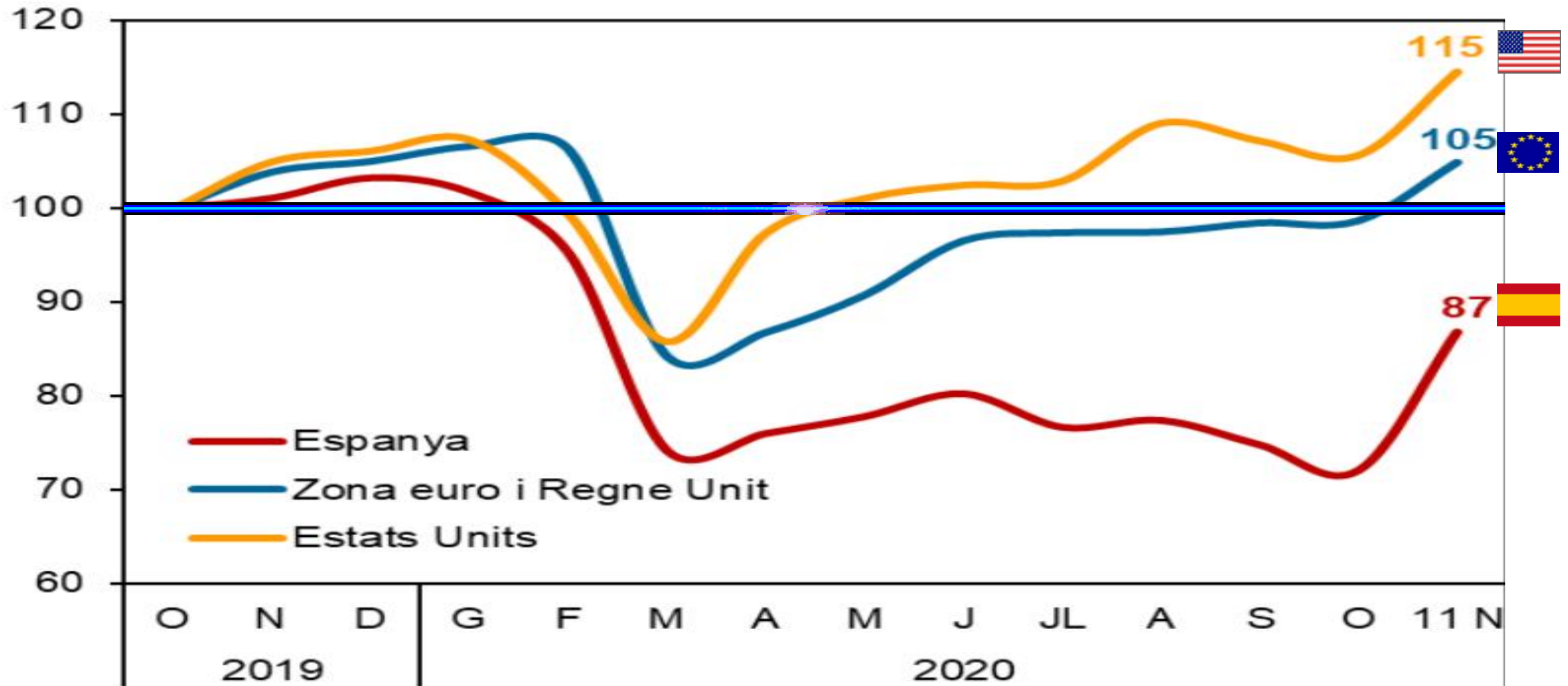
COVID-19: ÍNDEX DE BORSA

Espanya: IBEX-35, 1 desembre 2020



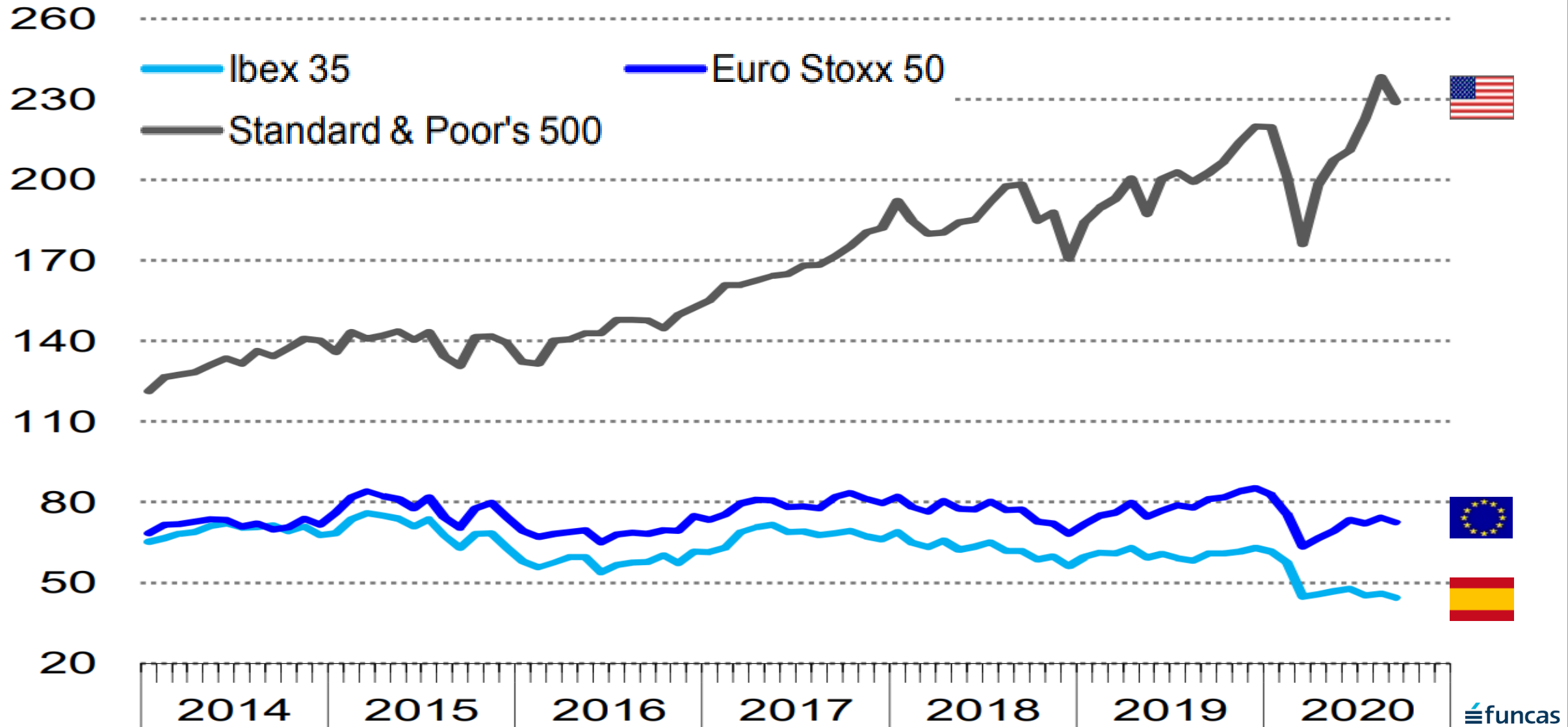
COVID-19: ÍNDEX DE BORSA (MSCI)

Octubre 2019 = 100



COVID-19: ÍNDEX DE BORSA

Desembre 2007 = 100

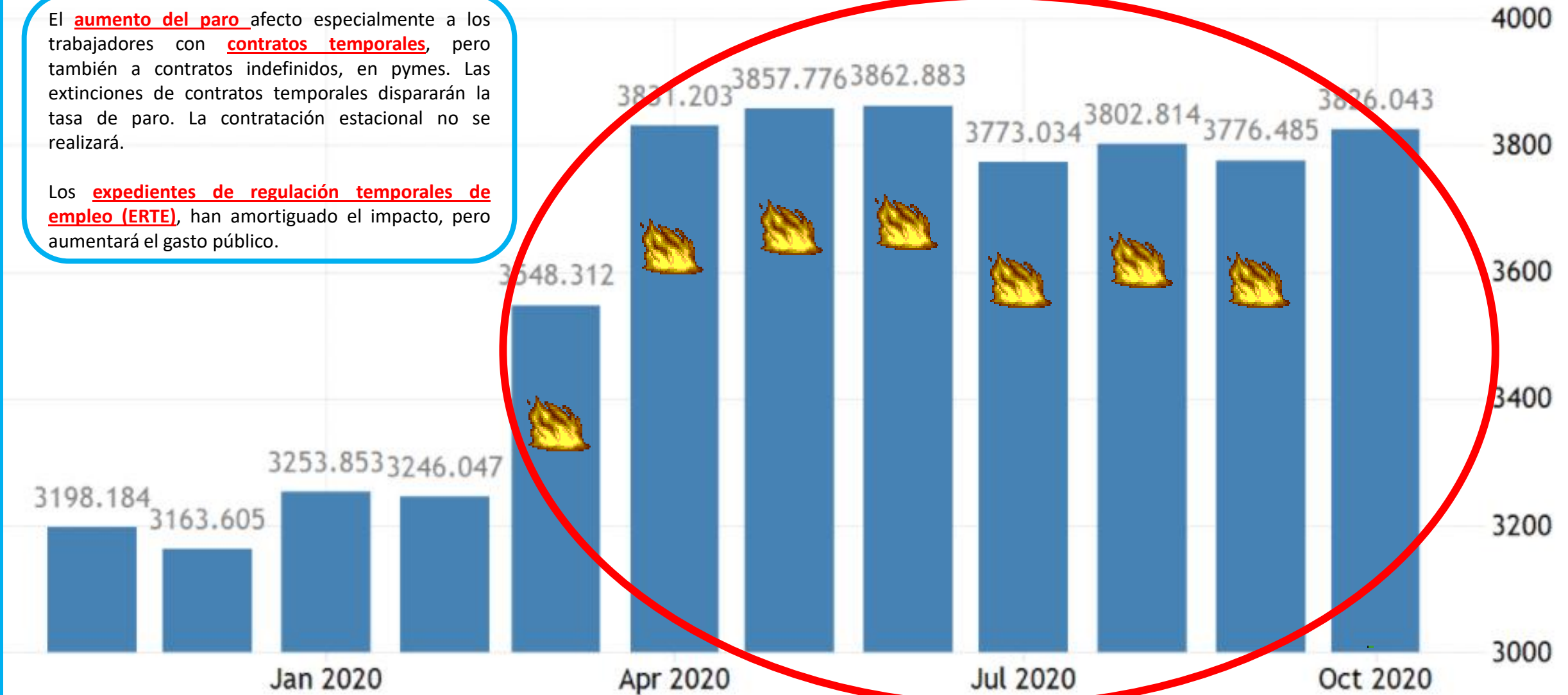


COVID-19: ATUR

Nombre de personas

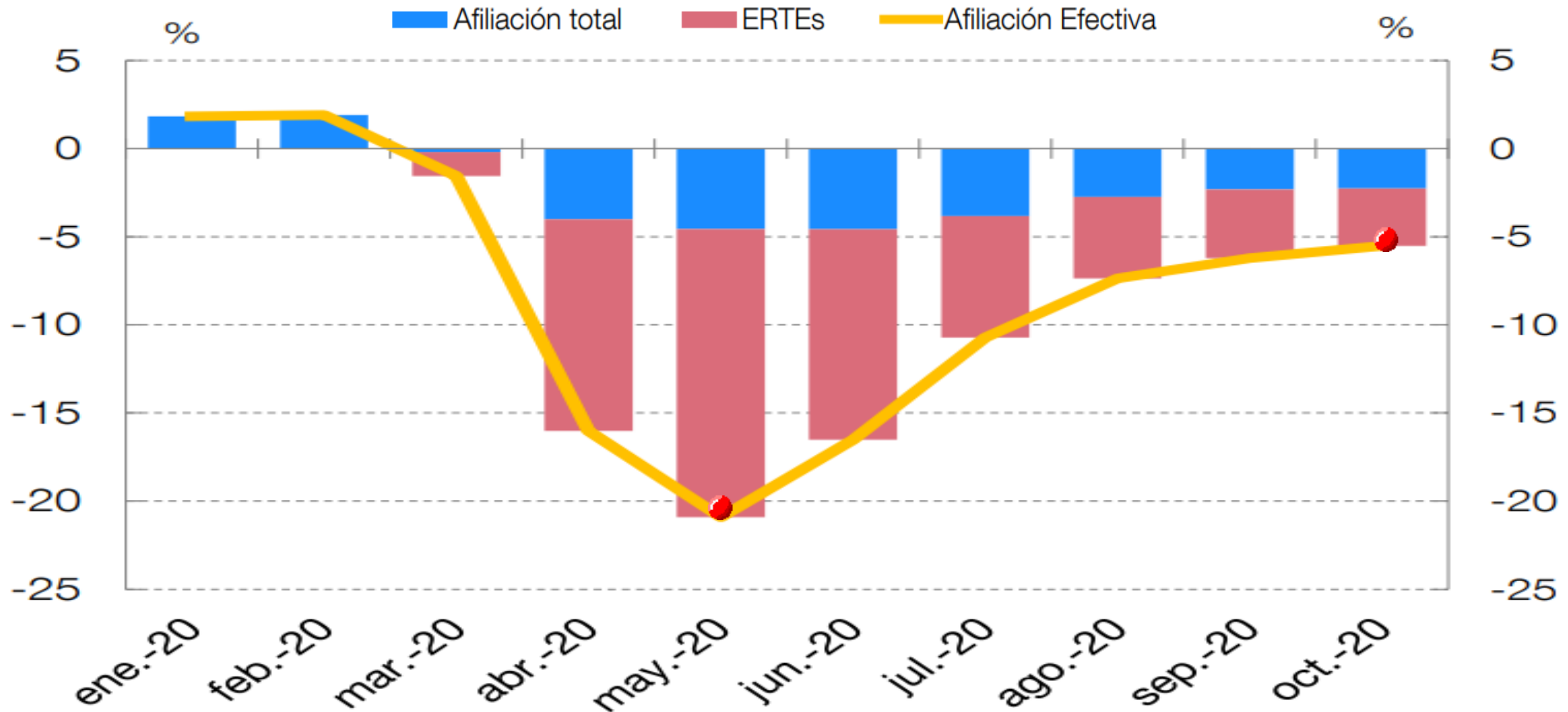
El aumento del paro afecto especialmente a los trabajadores con contratos temporales, pero también a contratos indefinidos, en pymes. Las extinciones de contratos temporales dispararán la tasa de paro. La contratación estacional no se realizará.

Los expedientes de regulación temporales de empleo (ERTE), han amortiguado el impacto, pero aumentará el gasto público.



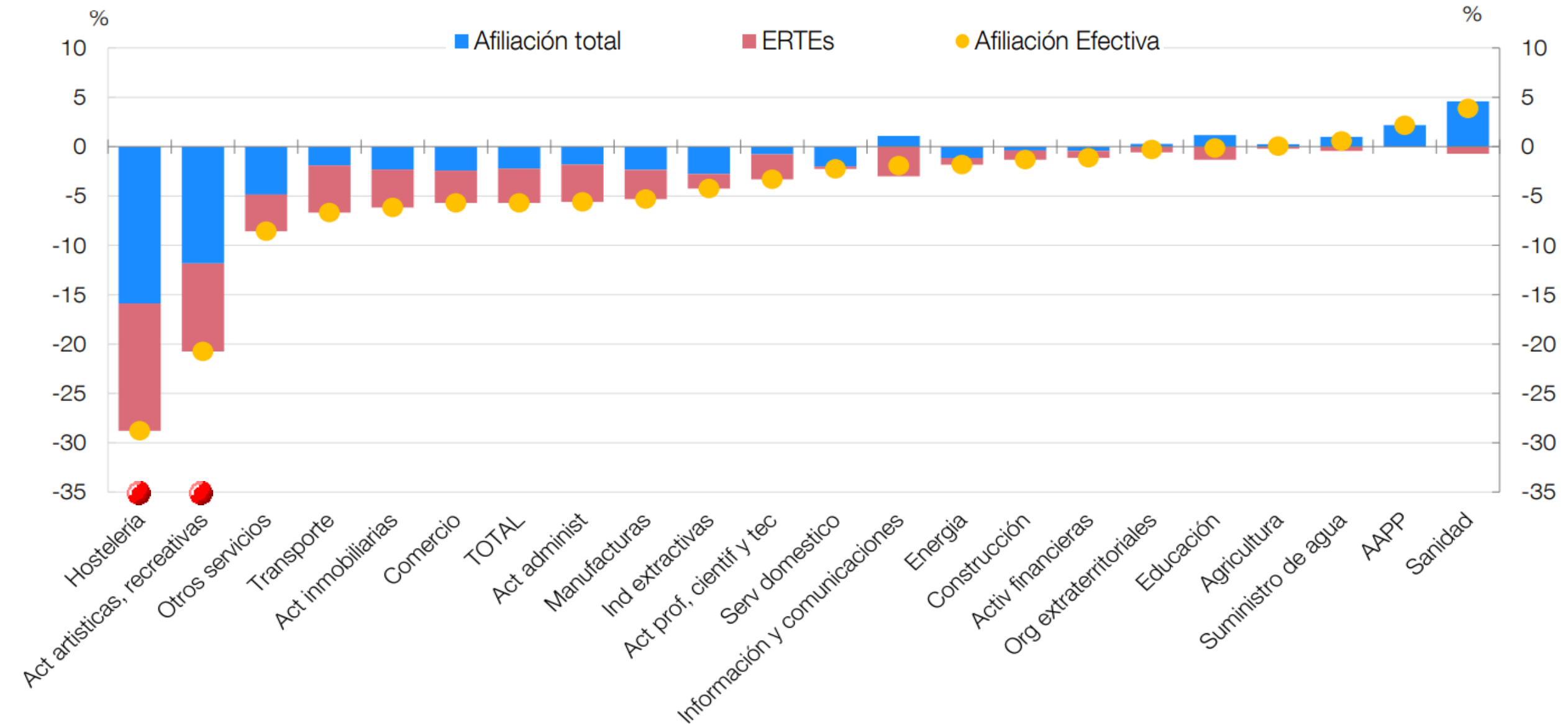
COVID-19: AFILIATS A LA SEGURETAT SOCIAL

Taxa de variació interanual (%)



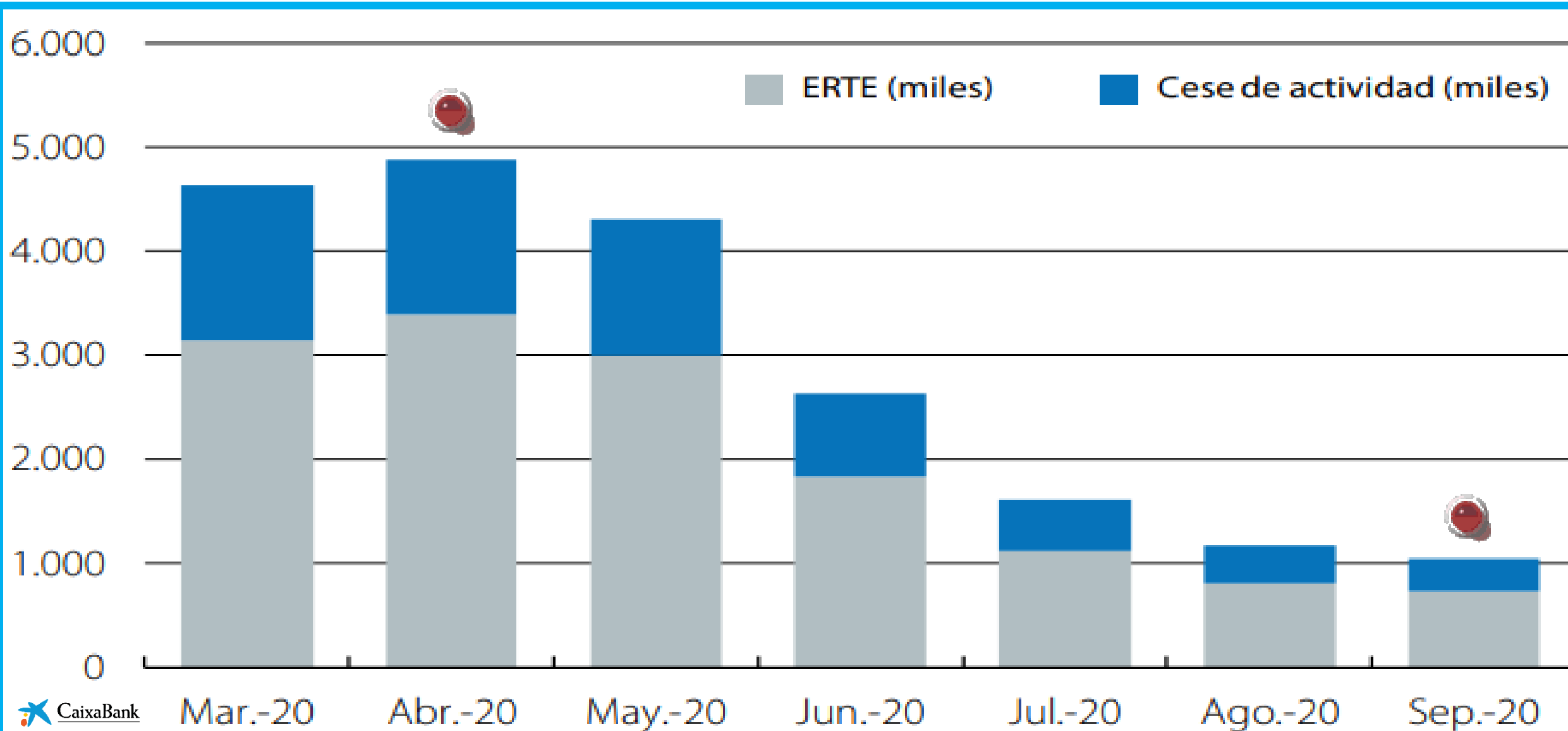
COVID-19: AFILIATS A LA SEGURETAT SOCIAL

Per branques d'activitat. Taxa de variació interanual (%). Octubre 2020



COVID-19: ERTOS/CESSAMENT ACTIVITAT AUTÒNOMS

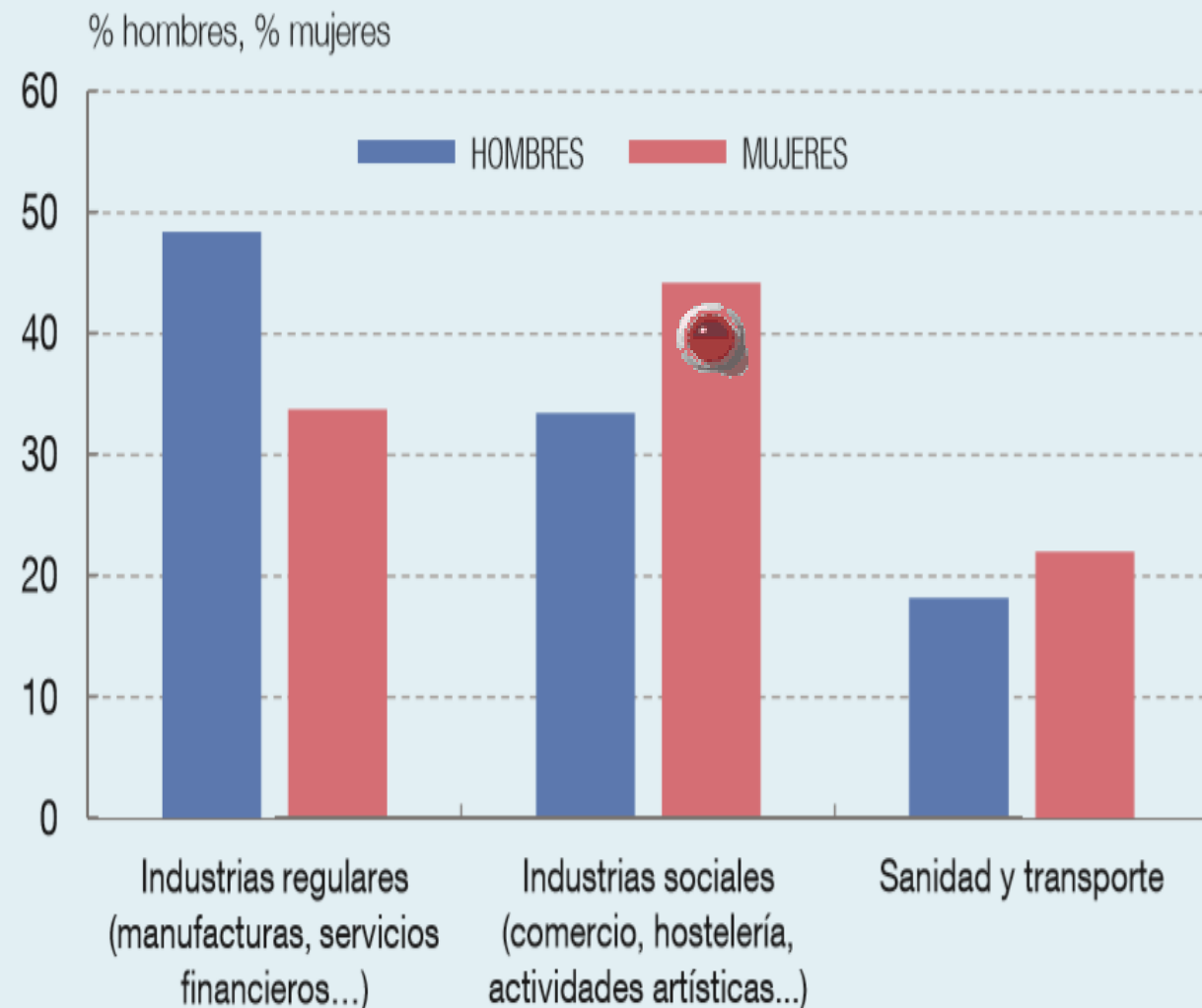
Milers de persones



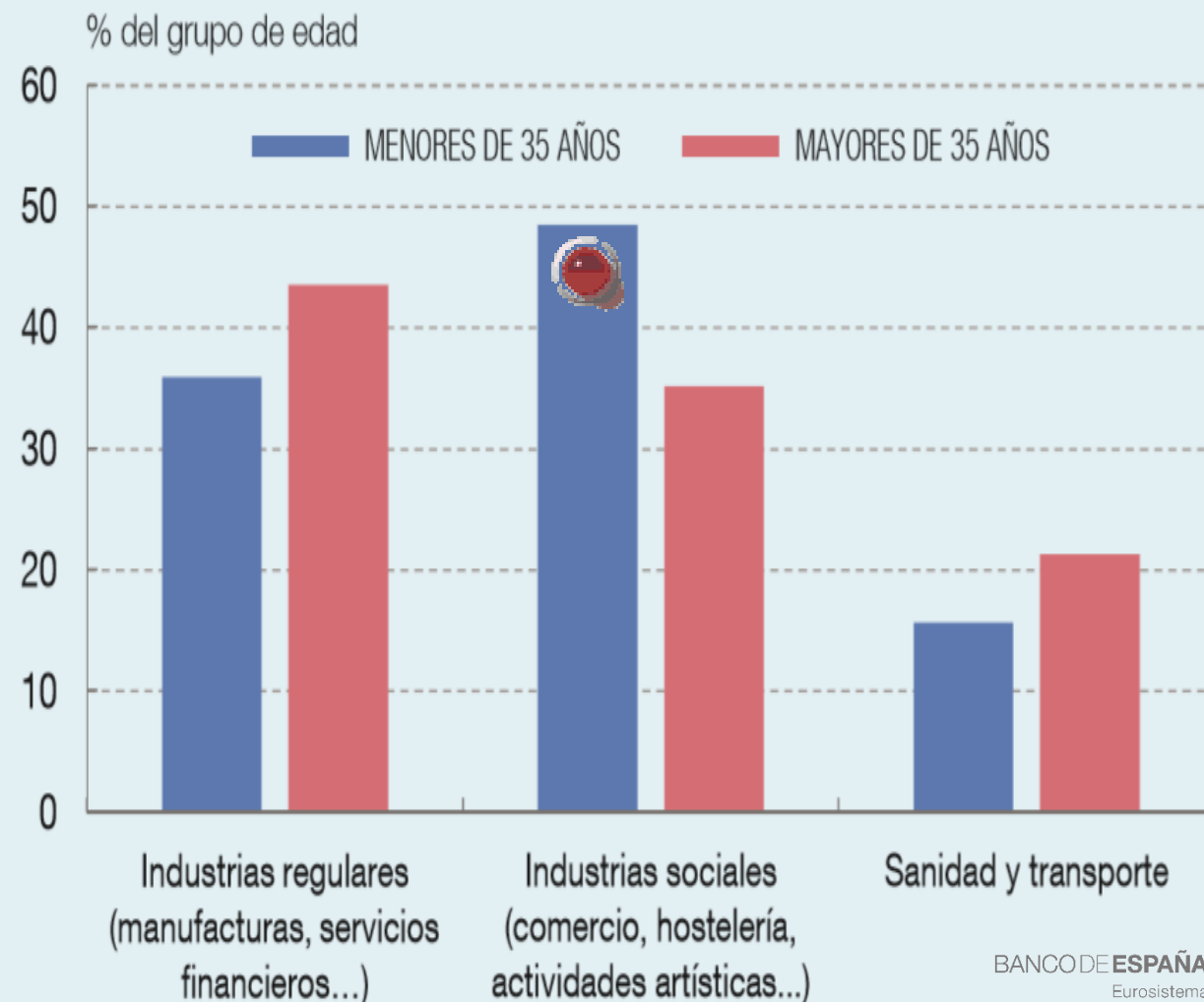
COVID-19: DONES / MENORS DE 35 ANYS

Banc d'Espanya. Enquesta Financera de les Famílies

PROPORCIÓN DE TRABAJADORES HOMBRES Y MUJERES, POR SECTOR DE ACTIVIDAD

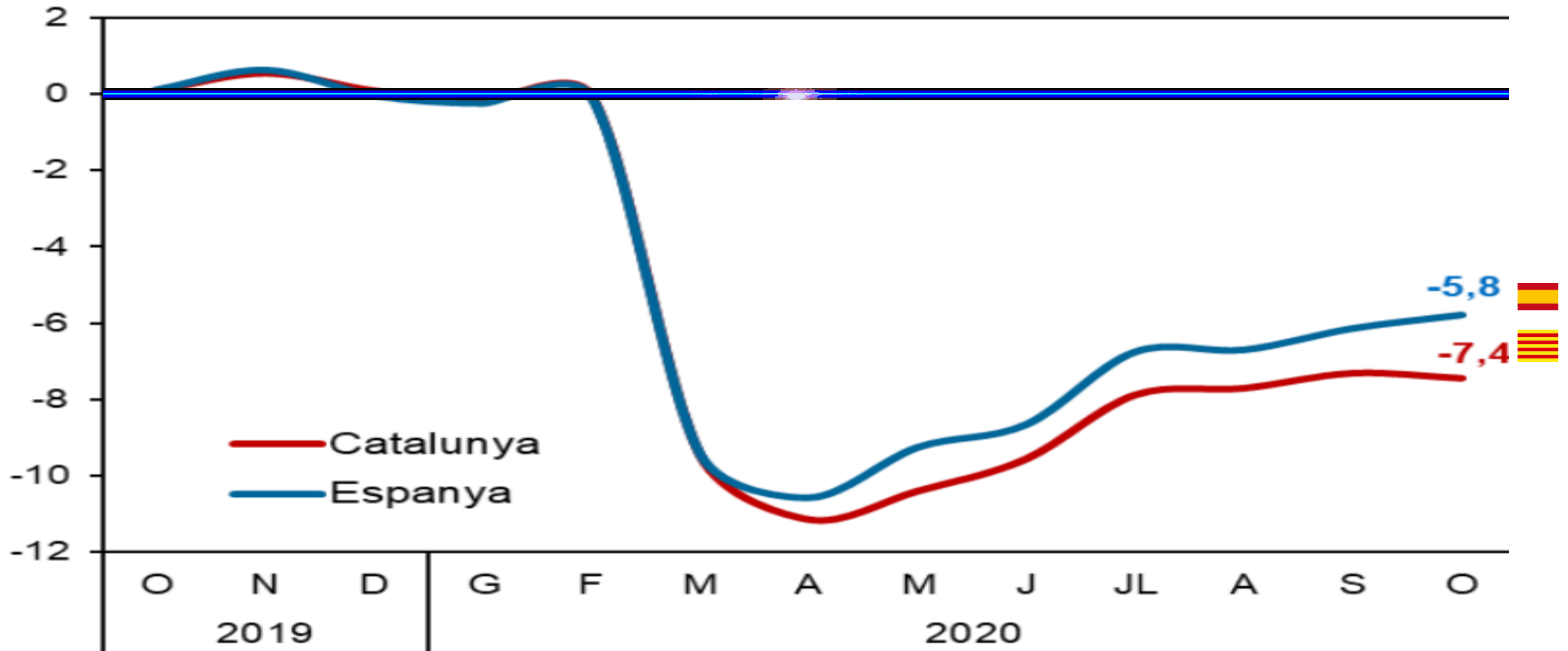


PORCENTAJE DE TRABAJADORES POR SECTOR DE ACTIVIDAD Y POR GRUPOS DE EDAD



CATALUNYA: EMPRESES REGISTRADES A LA S.S.

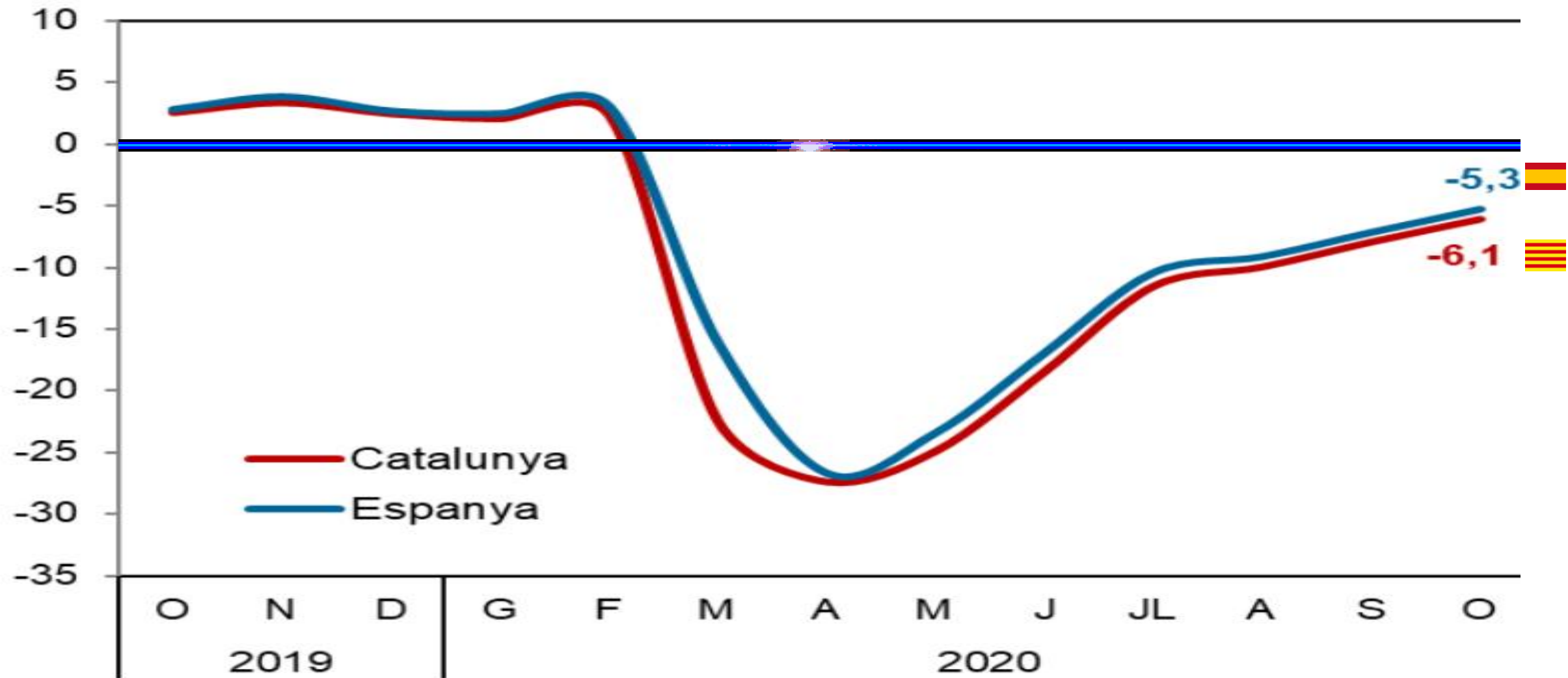
Taxa de variació interanual (%)



Font: Ministeri d'Inclusió Social i la SS.

CATALUNYA: ASSALARIATS AFILIATS A LA S.S.

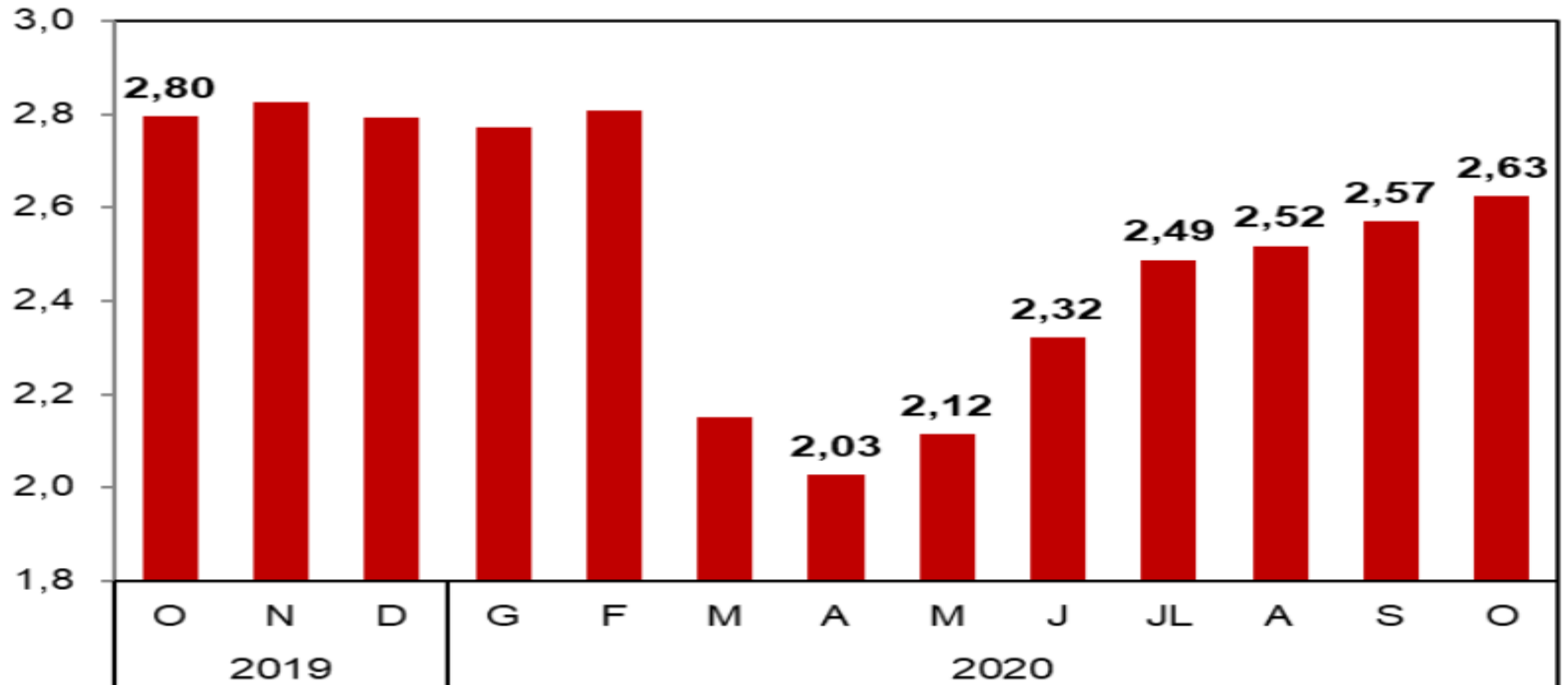
Règim General de la S. S. (sense ERTOS). Taxa de variació interanual (%)



Font: Ministeri d'Inclusió Social i la SS i Observatori del Treball.

CATALUNYA: ASSALARIATS AFILIATS A LA S.S.

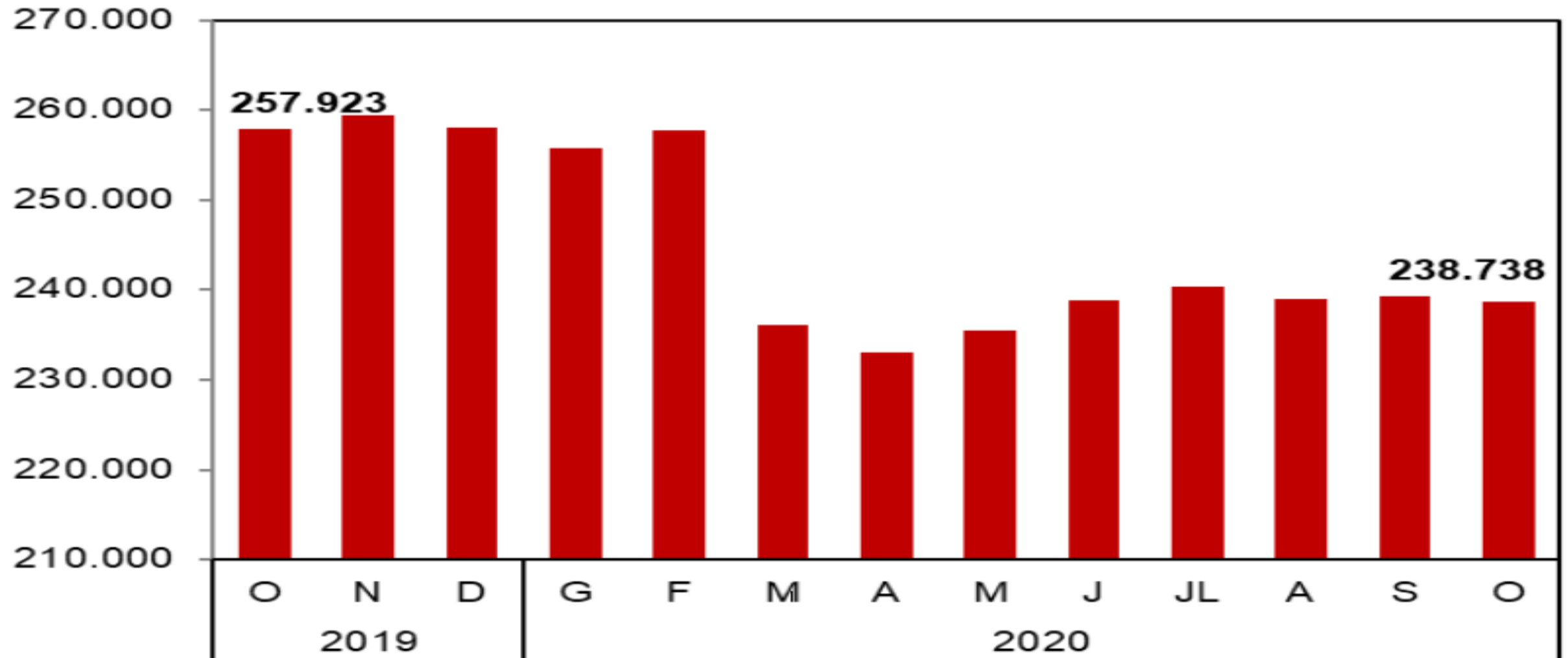
Règim General de la S. S. (sense ERTOS). Milions de treballadors



Font: Ministeri d'Inclusió Social i la SS i Observatori del Treball.

CATALUNYA: EMPRESES REGISTRADES A LA S.S.

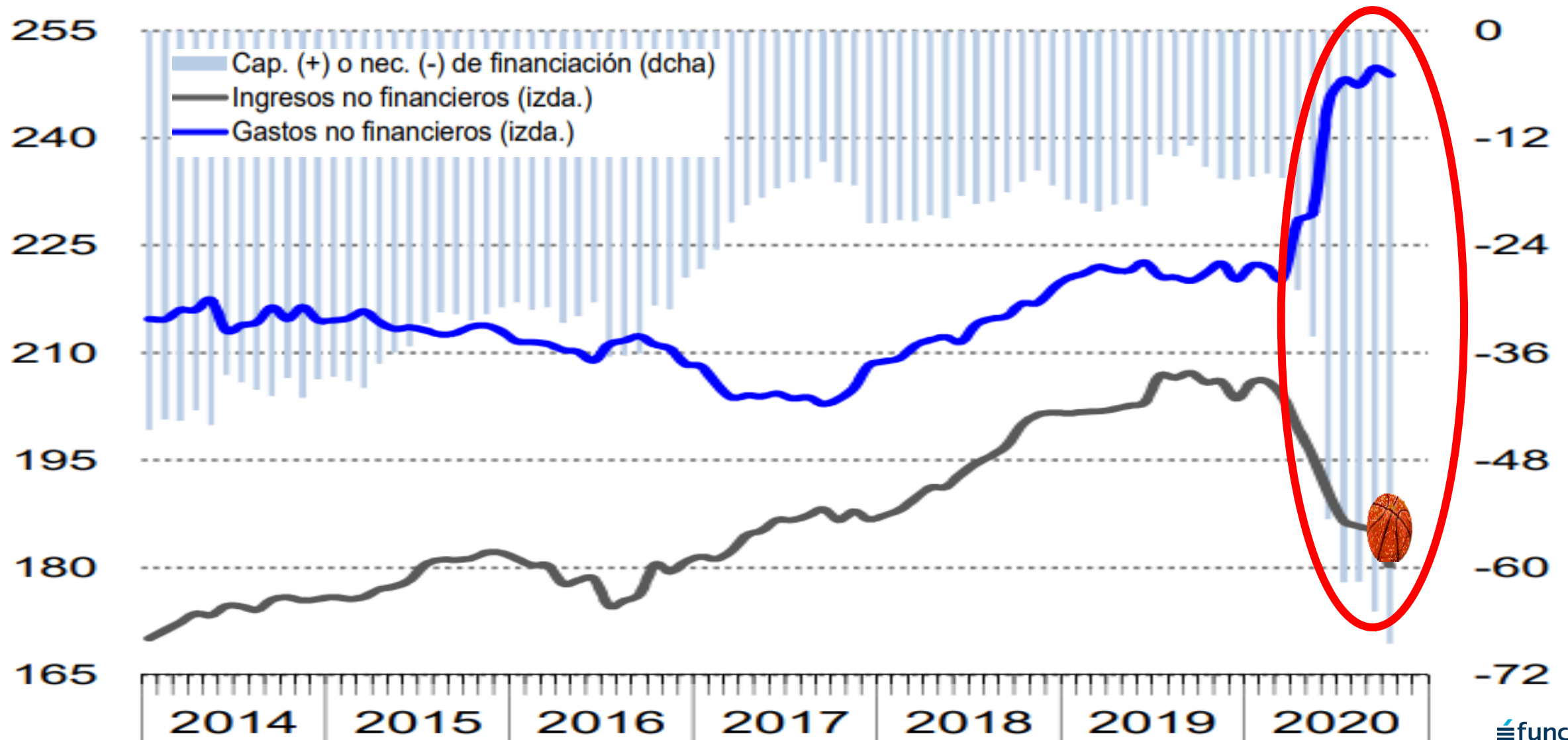
Nombre



Font: Ministeri d'Inclusió Social i la SS.

COVID-19: DÈFICIT PÚBLIC

Estat. Milers milions €, suma mòbil 12 mesos



COVID-19: DÉFICIT PÚBLIC

Ministeri d'Hisenda / Tesor del 'Reino de España'

DÉFICIT PRESUPUESTARIO

*Ministerio
de
Hacienda*

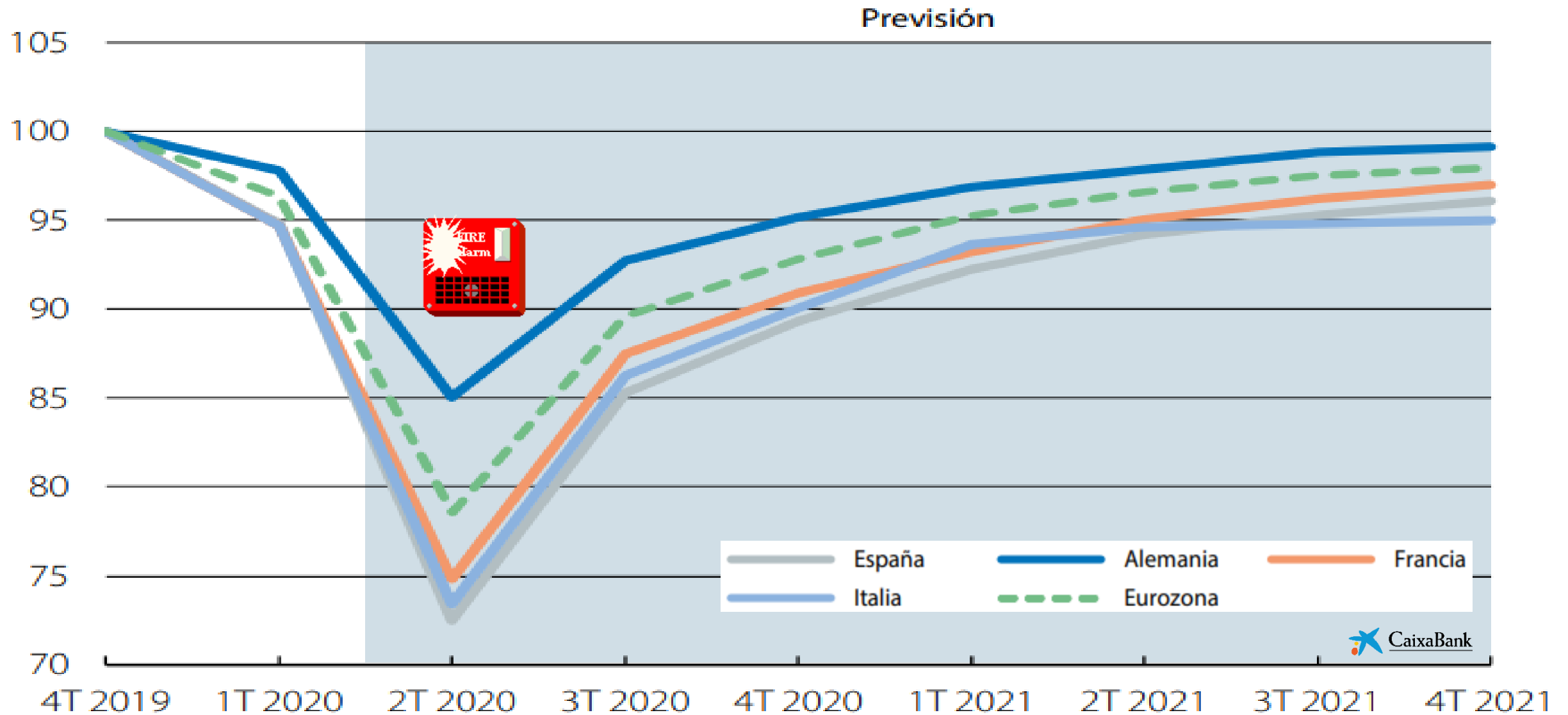
COVID-19: DEUTE PÚBLIC

Generacions futures



COVID-19: ESCENARIOS ECONOMIA ESPANYOLA

PIB real (nivell) (IV TR 2019 = 100)



COVID-19: ESCENARIOS ECONOMIA ESPANYOLA

Banc d'Espanya, setembre 2020

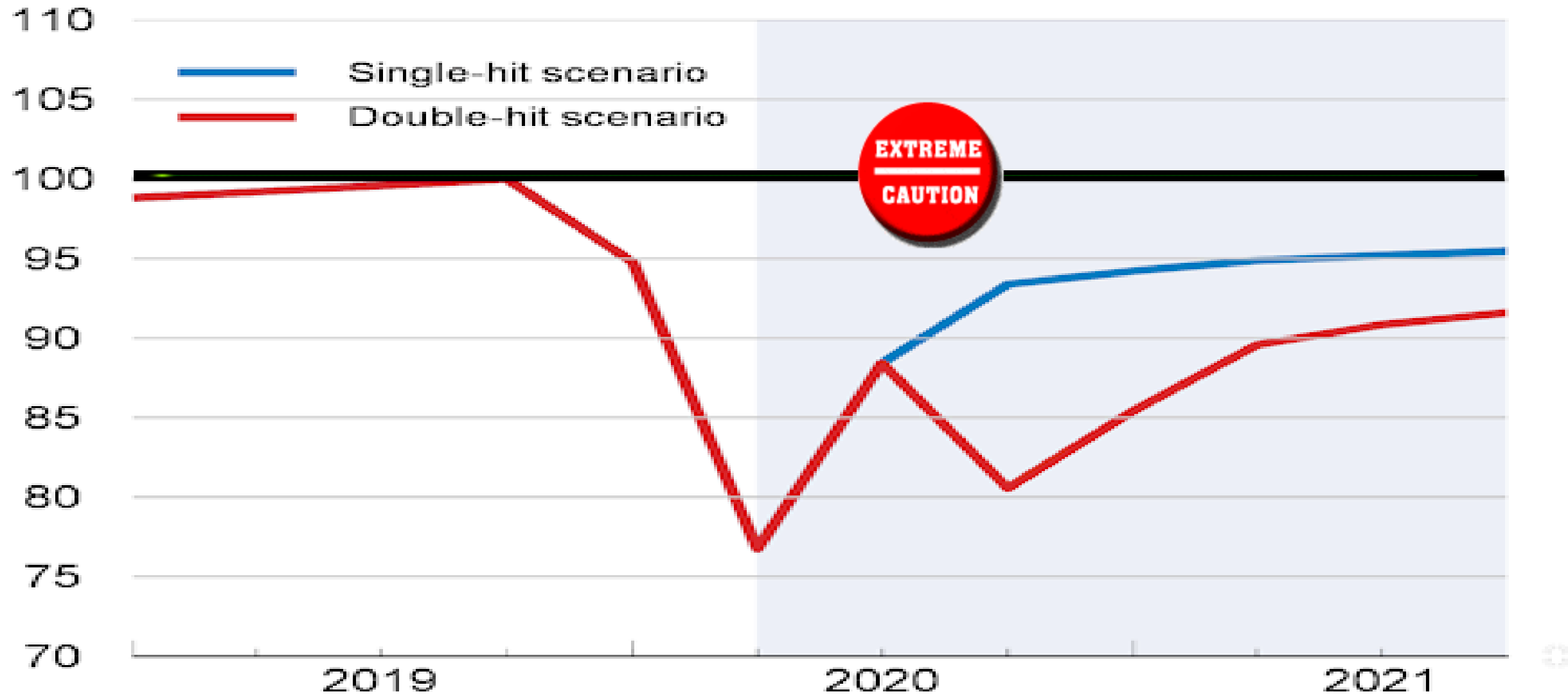
Tasas de variación anual sobre el volumen y el porcentaje del PIB

	2019	Proyecciones de septiembre de 2020						Previsiones de junio de 2020		
		Escenario 1			Escenario 2			Recuperación gradual		
		2020	2021	2022	2020	2021	2022	2020	2021	2022
PIB	2,0	-10,5	7,3	1,9	-12,6	4,1	3,3	-11,6	9,1	2,1
Consumo privado	1,1	-11,2	9,4	1,7	-13,1	5,5	3,2	-11,2	11,2	1,6
Consumo público	2,3	5,4	-1,3	-0,1	5,6	-1,2	-0,5	4,6	-1,5	0,8
Formación bruta de capital fijo	1,8	-19,5	6,0	5,3	-21,9	2,4	6,5	-26,5	7,4	7,1
Exportación de bienes y servicios	2,6	-20,7	11,5	6,2	-25,2	7,4	8,0	-21,9	18,5	7,7
Importación de bienes y servicios	1,2	-18,7	8,4	6,6	-22,0	4,9	7,3	-21,5	14,0	9,1
Demanda nacional (contribución al crecimiento)	1,5	-9,3	6,2	1,8	-10,9	3,3	2,9	-10,8	7,4	2,2
Demanda exterior neta (contribución al crecimiento)	0,5	-1,2	1,1	0,1	-1,7	0,8	0,4	-0,8	1,7	-0,1
Índice armonizado de precios de consumo (IAPC)	0,8	-0,2	1,0	1,2	-0,3	0,8	1,1	-0,2	1,2	1,5
Índice armonizado de precios de consumo, sin energía ni alimentos	1,1	0,7	0,8	1,0	0,6	0,5	0,8	0,8	1,0	1,1
Empleo (horas trabajadas)	1,5	-11,9	7,0	1,6	-14,1	3,8	2,7	-12,6	8,5	2,3
Tasa de paro (% de la población activa) (b)	14,1	17,1	19,4	18,2	18,6	22,1	20,2	19,6	18,8	17,4
Capacidad (+) / necesidad (-) de financiación de la nación (% del PIB)	2,3	1,7	2,1	2,1	1,1	1,3	1,5	2,3	3,5	3,0
Capacidad (+) / necesidad (-) de financiación de las AAPP (% del PIB)	-2,8	-10,8	-7,0	-5,8	-12,1	-9,9	-8,2	-11,2	-6,8	-6,1
Deuda de las AAPP (% del PIB)	95,5	116,8	115,4	118,0	120,6	125,6	128,7	119,3	115,9	118,7

COVID-19: CAIGUDA DEL PIB

Real GDP

Index 2019Q4 = 100, s.a.



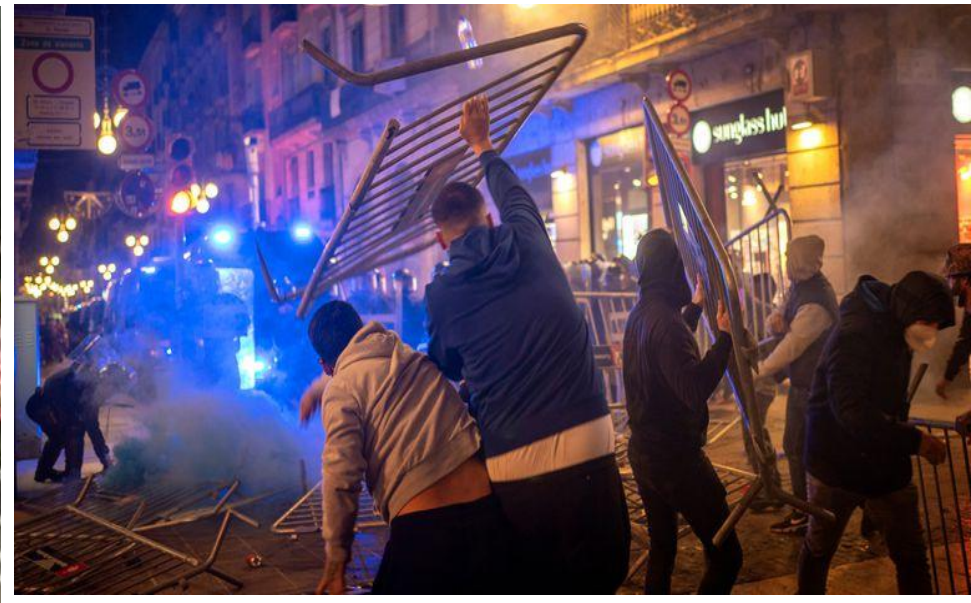
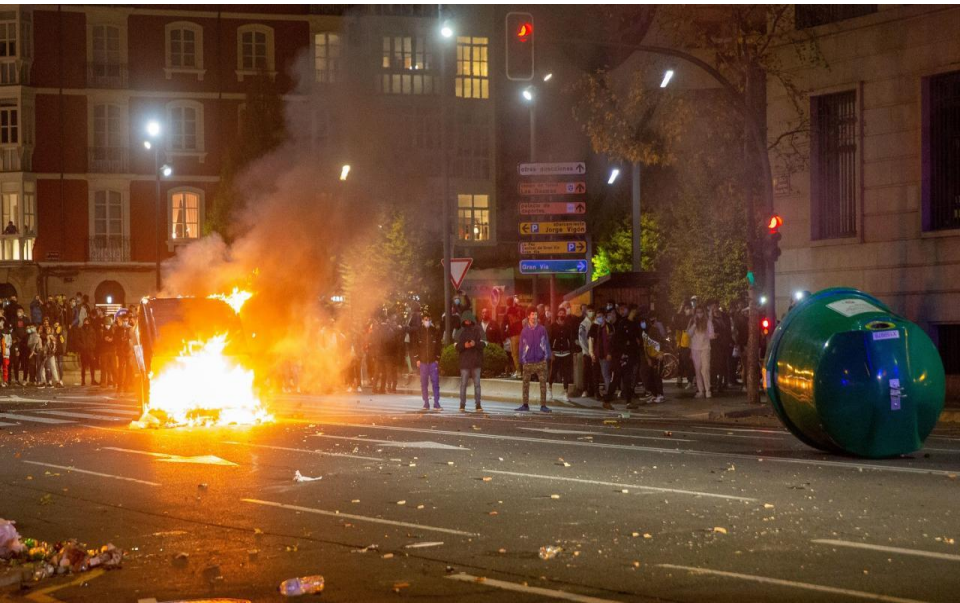
COVID-19: ESTALVI A ESPANYA

Taxa d'estalvi (%) de les famílies en relació a la seva Renda Disponible Bruta (RFDB)



COVID-19: ALDARULLS A ESPANYA

Madrid - Barcelona - Burgos - Logroño - León - Málaga - Granada



COVID-19: GOBIERNO DE ESPAÑA

Consell de Ministres



COVID 19: POLÍTICA ECONÓMICA I SOCIAL

Mesures urgents: Sistema sanitari - Persones vulnerables - Treballadors - Empreses i Autònoms

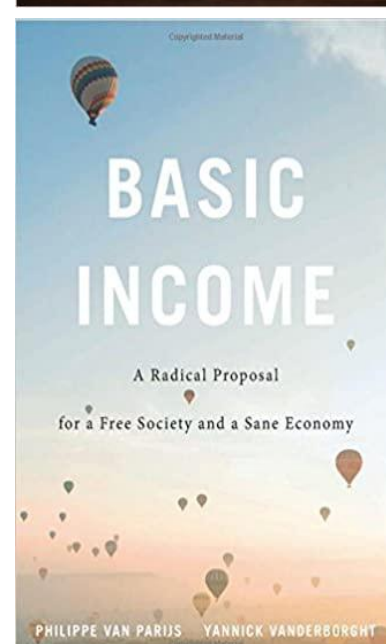
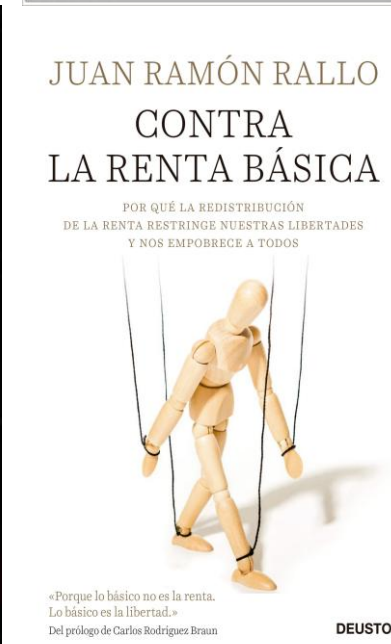
1. Aumentar el gasto extraordinario en el sistema sanitario, manteniendo la actividad de los centros sanitarios y de cuidado de mayores y dependientes.
2. Proteger a las personas vulnerables ('nadie se quede atrás').
3. Cobertura de los trabajadores, evitando la destrucción de empleo mediante expedientes de regulación de empleo (ERE).
4. Apoyo a las empresas y autónomos, manteniendo su actividad y:
 - a) Las relaciones laborales entre empresas y trabajadores.
 - b) Las relaciones comerciales entre clientes y proveedores.
 - c) Las relaciones crediticias entre prestamistas y prestatarios.

COVID-19: RENDA BÀSICA UNIVERSAL

'Ingres mínim vital': Justícia i eficiència



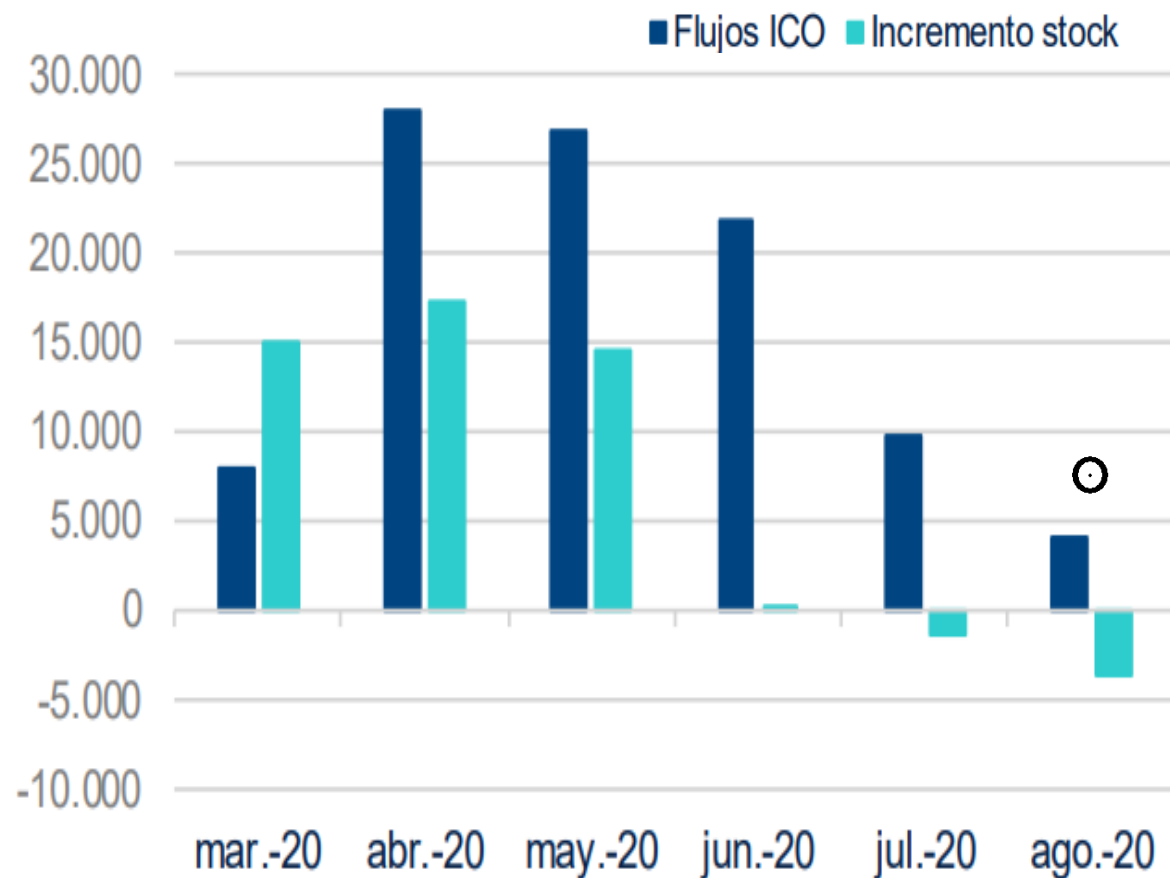
Basic Income: And How We Can Make It Happen Guy Standing



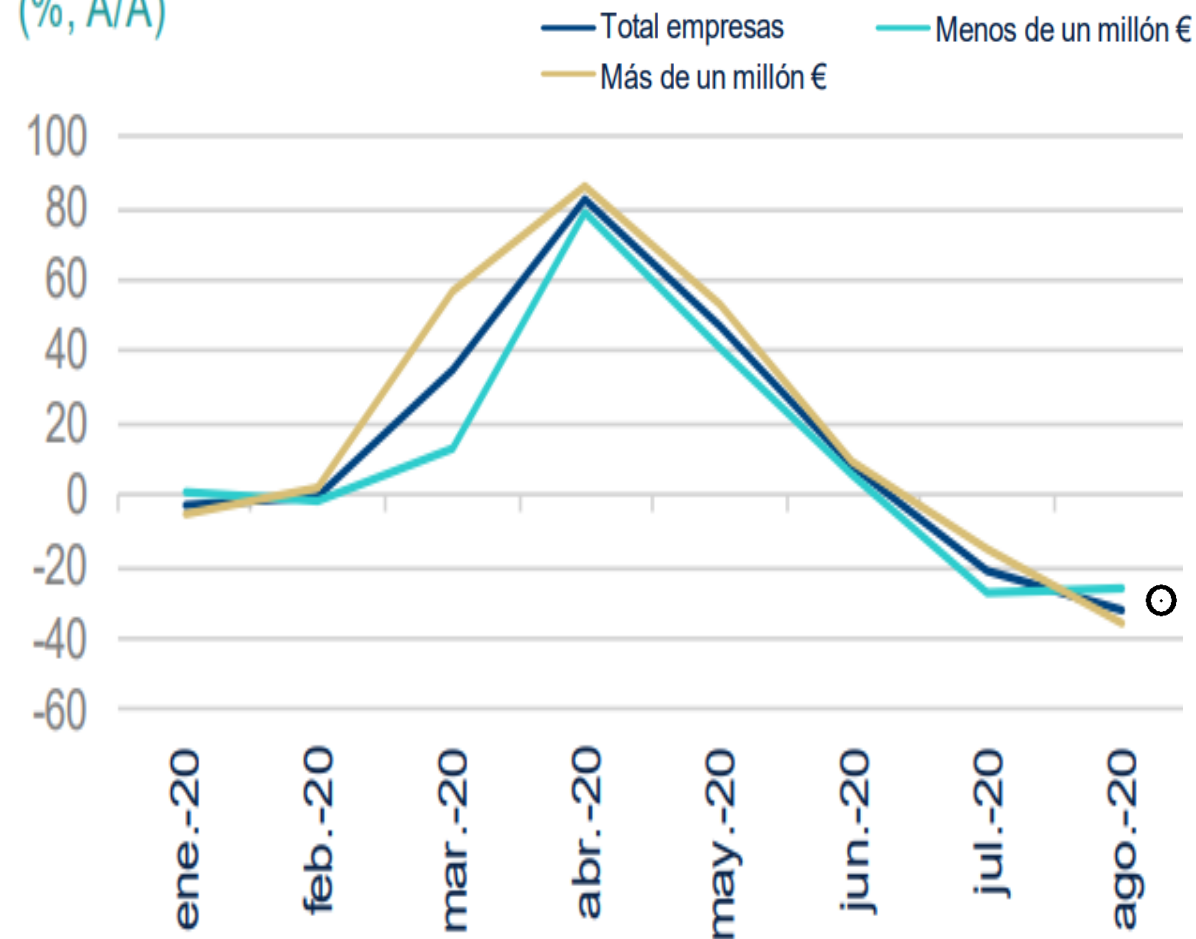
COVID 19: FINANCIACIÓ A LES EMPRESES

Taxa de variació (%)

CRÉDITO A EMPRESAS NO FINANCIERAS (MILLONES DE EUROS)



NUEVAS OPERACIONES DE CRÉDITO (%, A/A)



BBVA

COVID 19: FINANCIACIÓ A LES EMPRESES

'Zombies'



CATALUNYA: 'CHANGE THE GAME'

Estat i Institucions de Catalunya



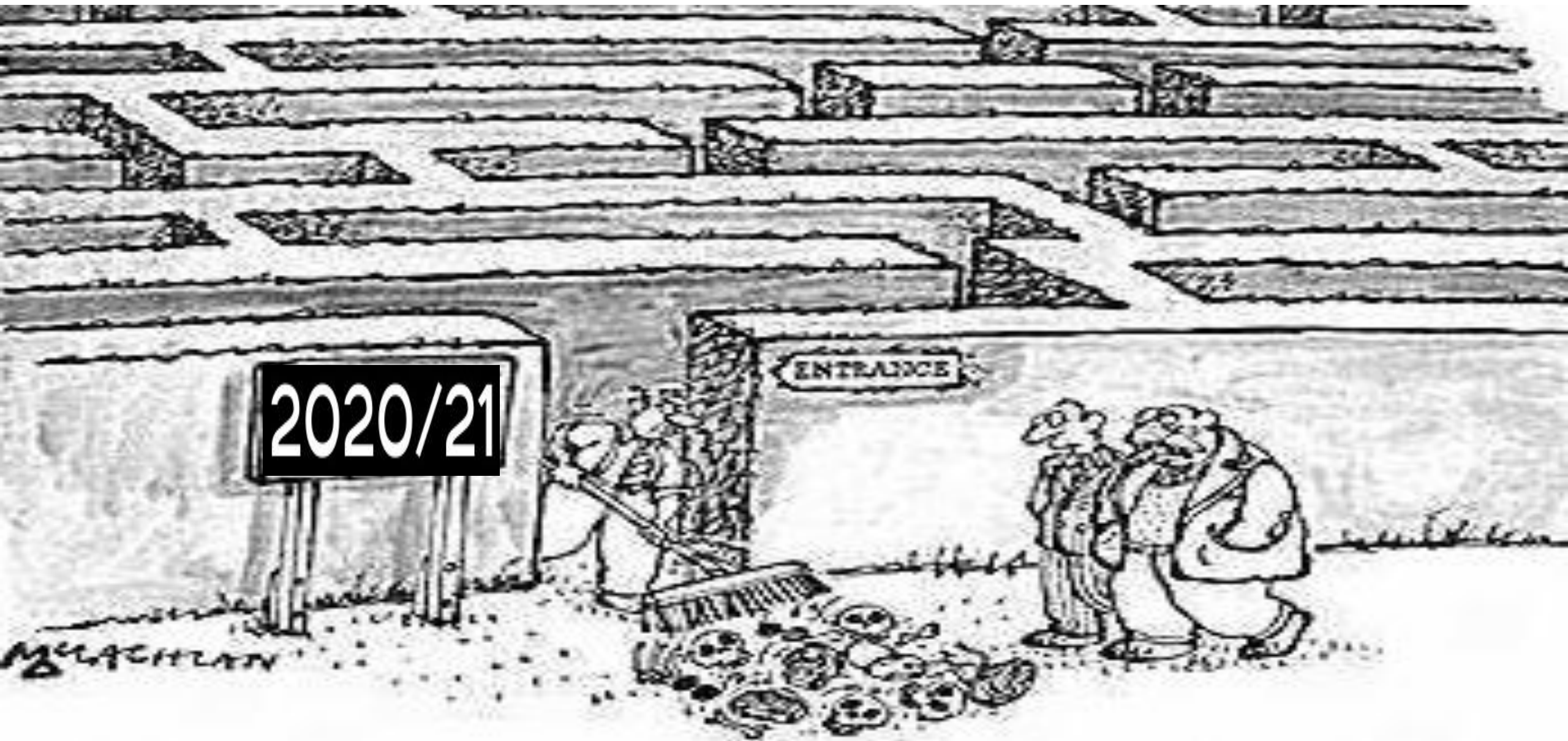
COVID-19: 'WORLD ON THE EDGE'

El món davant el penya-segat



COVID-19: PERSPECTIVES ECONÒMIQUES 2020-21

Cercant la sortida del laberint



COVID-19: PERSPECTIVES ECONÒMIQUES 2020-21

Encertar amb els canvis d'eixos i evitar les vies mortes



2020

COVID-19: NO HI HA MIRACLES EN ECONOMIA

Els Reis d'Orient nomès venen el 6 de gener



COVID-19: LA RECEPTE PER A GUANYAR EL FUTUR

"Llevar-se d'hora pel matí i treballar dur la resta del dia"



COVID-19: ANTICIPACIÓ PROACTIVA

"Someone's sitting in the shade today because someone planted a tree a long time ago" (W. Buffet)



COVID-19: CANVI D'ENTORN ECONÒMIC

Meteorits, canvi d'atmosfera i desaparició dels dinosaures



COVID-19: TRANSFORMACIÓ

De crisàlide a papallona



Dimecres, 2 desembre 2020 (18.00 h.,

'Zoom')

Aula d'Extensió Universitària – XVIè curs

2020-21
Conferència
(**'webinar'**)

Perspectives econòmiques a tancament d'exercici 2020 i escenaris 2021

L'any que vam viure perillosament

Prof. F. Xavier Mena
Catedràtic d'Economia, ESADE-URL
fxavier.mena@esade.edu

Dimecres, 2 desembre 2020 (18.00 h.,

'Zoom')

Aula d'Extensió Universitària – XVIè curs

~~2020-21~~
Conferència
(~~'webinar'~~)

Perspectives econòmiques a tancament d'exercici 2020 i escenaris 2021

L'any que vam viure perillosament

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