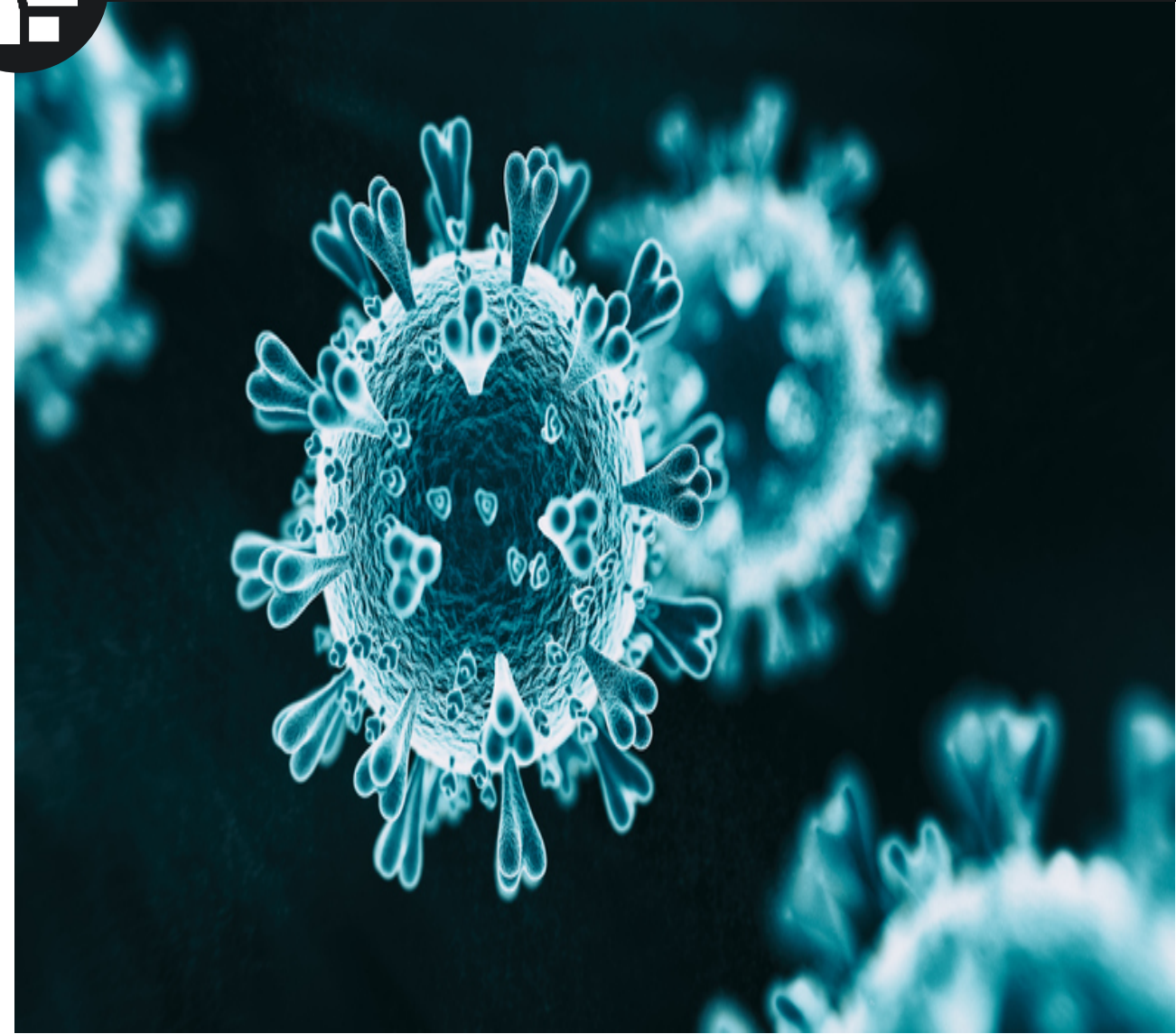




# COVID-19: APRIL 2 UPDATE



April 2, 2020

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## OUTLINE

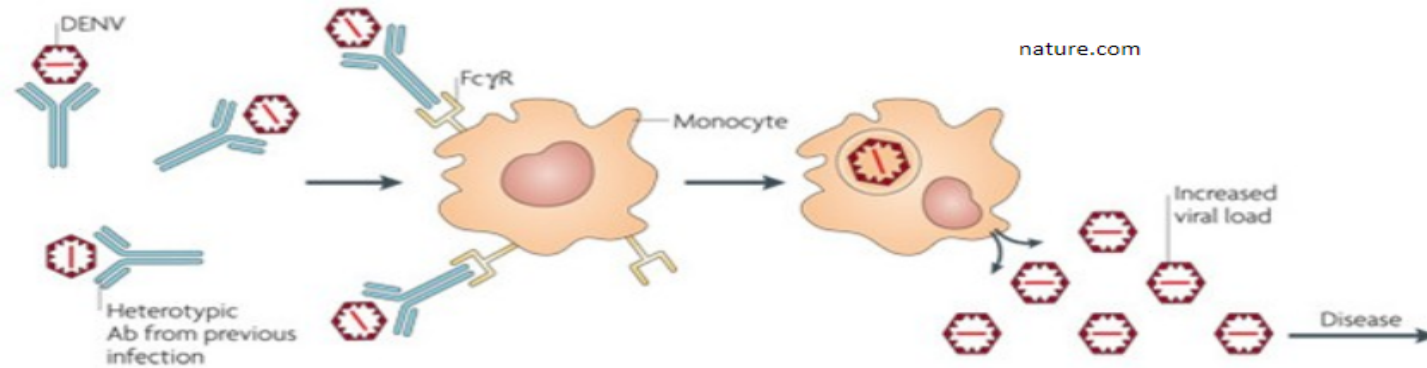
- Overall Observations
- U.S. Economic Indicators; Global Case and Death Count Update; and China Activity
- Will the Real Death Toll Please Stand Up?
- New Near-Term U.S. Projections
- Duration of the Epidemic--Example of 1918 Spanish Influenza Pandemic
- Do Recessions Actually Save Lives?

## OVERALL OBSERVATIONS

- Projections vs. Prints: When will we know how bad the U.S. recession will be?
  - Keep eye on Fed regional surveys & unemp claims; ADP/BLS reflects early in month.
  - Definitive prints will come in late April/early May.
- New Debate Over Epidemic Parameters:  $R_0$ , IFR, and Susceptible Population %
  - “Oxford” researchers hypothesize higher  $R_0$ , lower IFR, and higher infected share.
  - “Imperial College” defend their model; true IFR still seems  $\approx 0.5\%$
- Rise of “second waves” and xenophobia
  - Second waves in China, Hong Kong, Singapore, South Korea, Japan
  - Signaling longer duration and harsher social mood.
- Vitamin D receives new support, from former CDC chief Dr. Tom Frieden
- What is “antibody-dependent enhancement” (ADE)? And why does it matter?

# ANTIBODIES ARE GOOD... EXCEPT WHEN THEY AREN'T

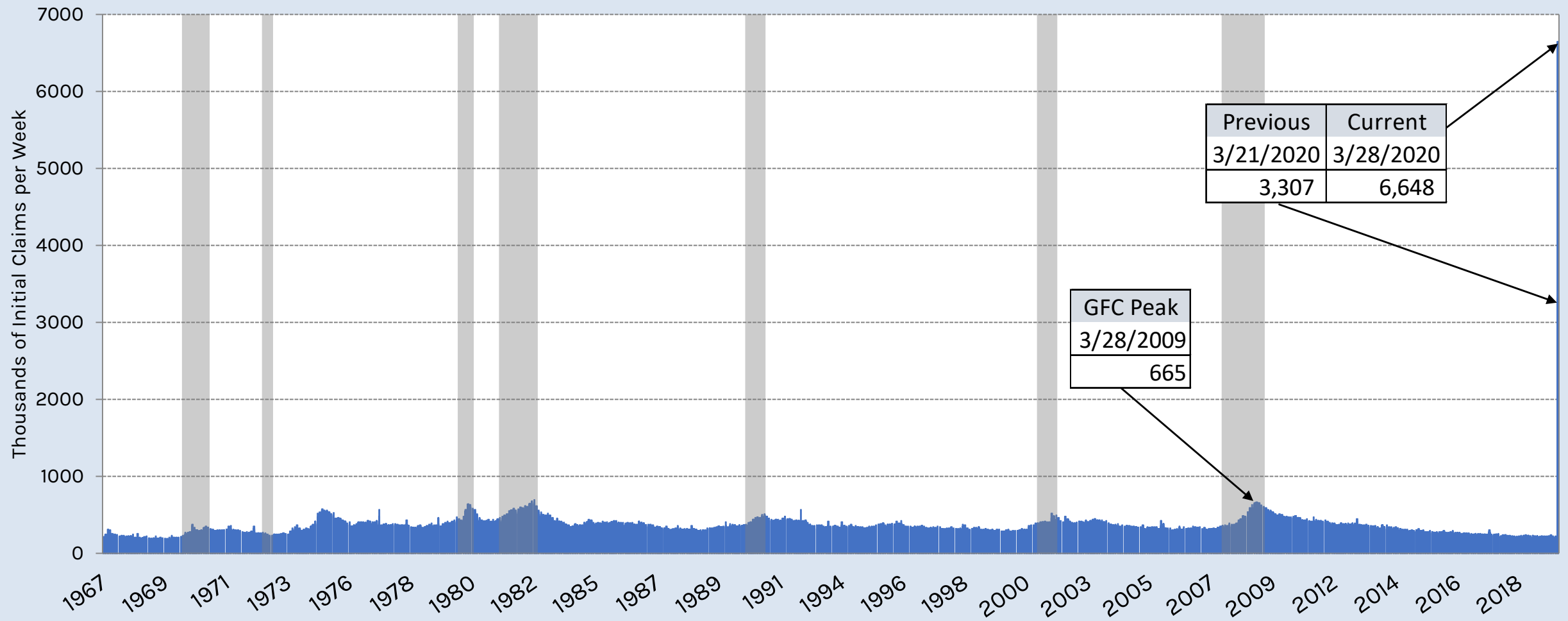
## Antibody-Dependent Enhancement (ADE)



- Antibodies from the first infection are cross-reactive with other DENV serotypes
- But Abs are subneutralizing
- FcγR recognizes Abs and internalizes immunocomplex
- Evidences suggest that the mechanism is associated with both increase in the number of infected cells, a phenomenon called “Extrinsic ADE,” and a subversion of the intracellular innate immune host responses through suppression of a the type I IFN and proinflammatory cytokines production—an event denominated as “Intrinsic ADE”

# NEW UNEMP CLAIMS: POPULAR RECESSION TRIPWIRE

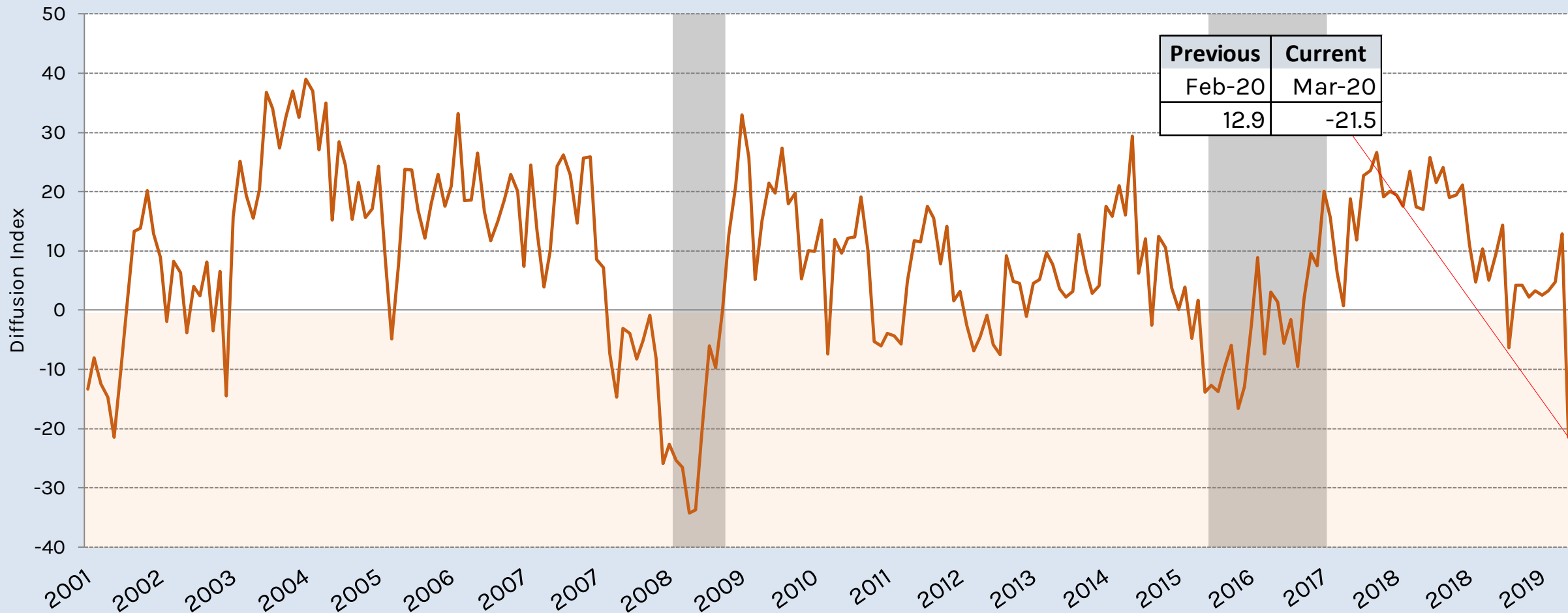
## Initial Unemployment Claims (in thousands), SA, 1967-Mar 28, 2020, weekly



# REGIONAL FED: NEW YORK (“EMPIRE STATE”)...

## New York Fed Regional Manf General Conditions

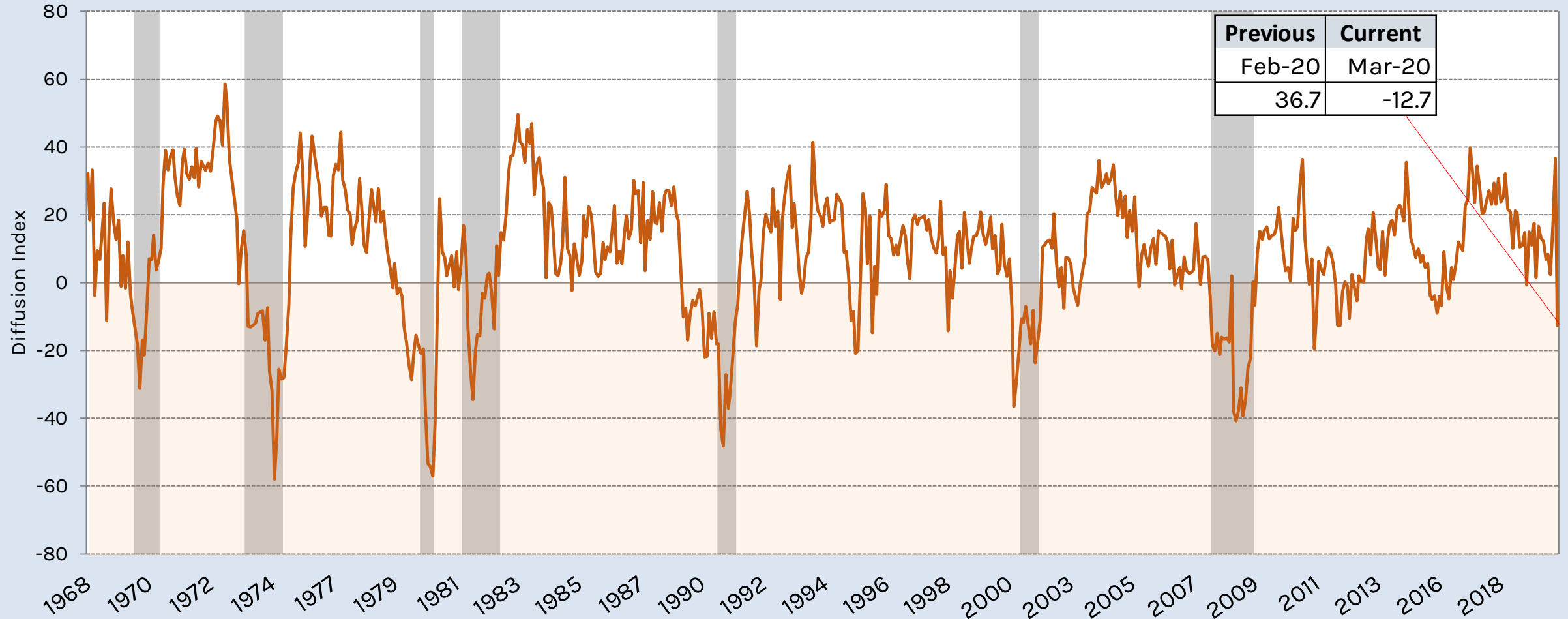
Index: 0=no change, SA, monthly, 1950-Mar 2020



# REGIONAL FED: PHILLY

## Philadelphia Fed Regional Manf General Activity

Index: 0=no change, SA, monthly, 1968-Mar 2020

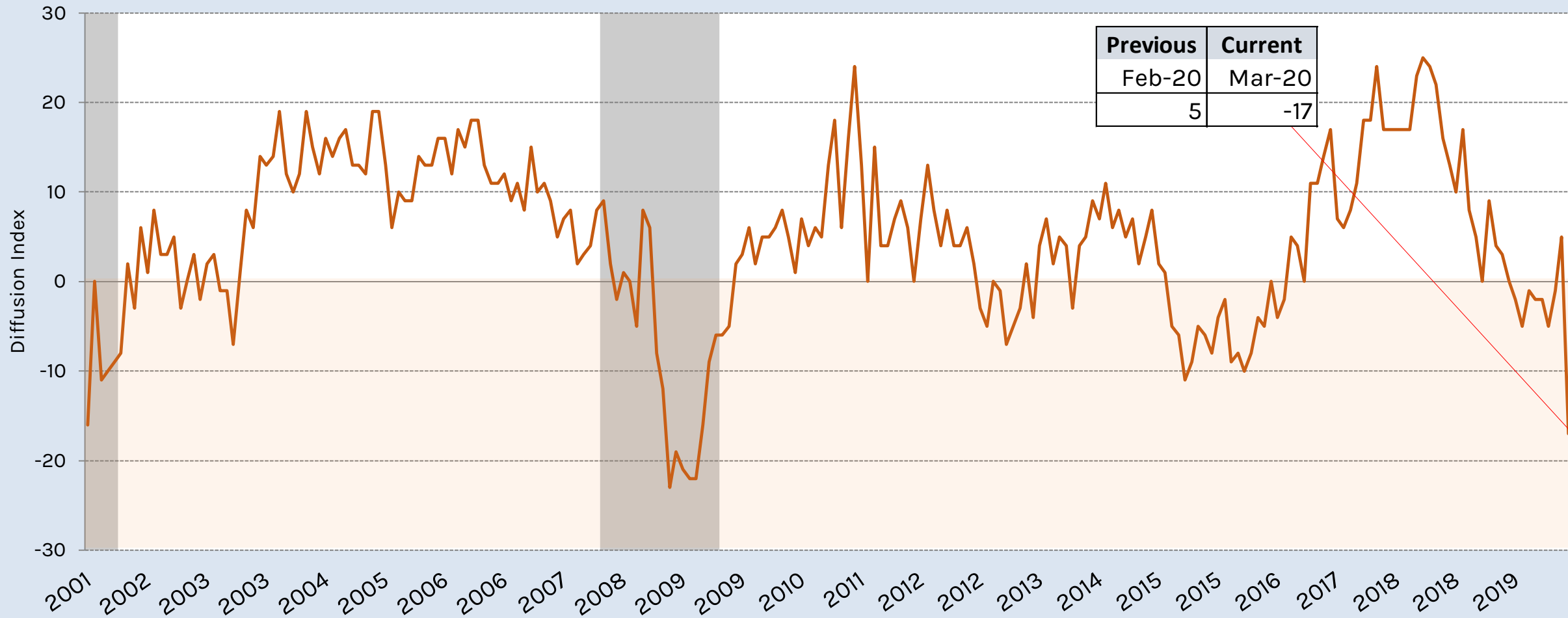




# REGIONAL FED: KANSAS CITY

## Kansas City Fed Regional Manf General Conditions

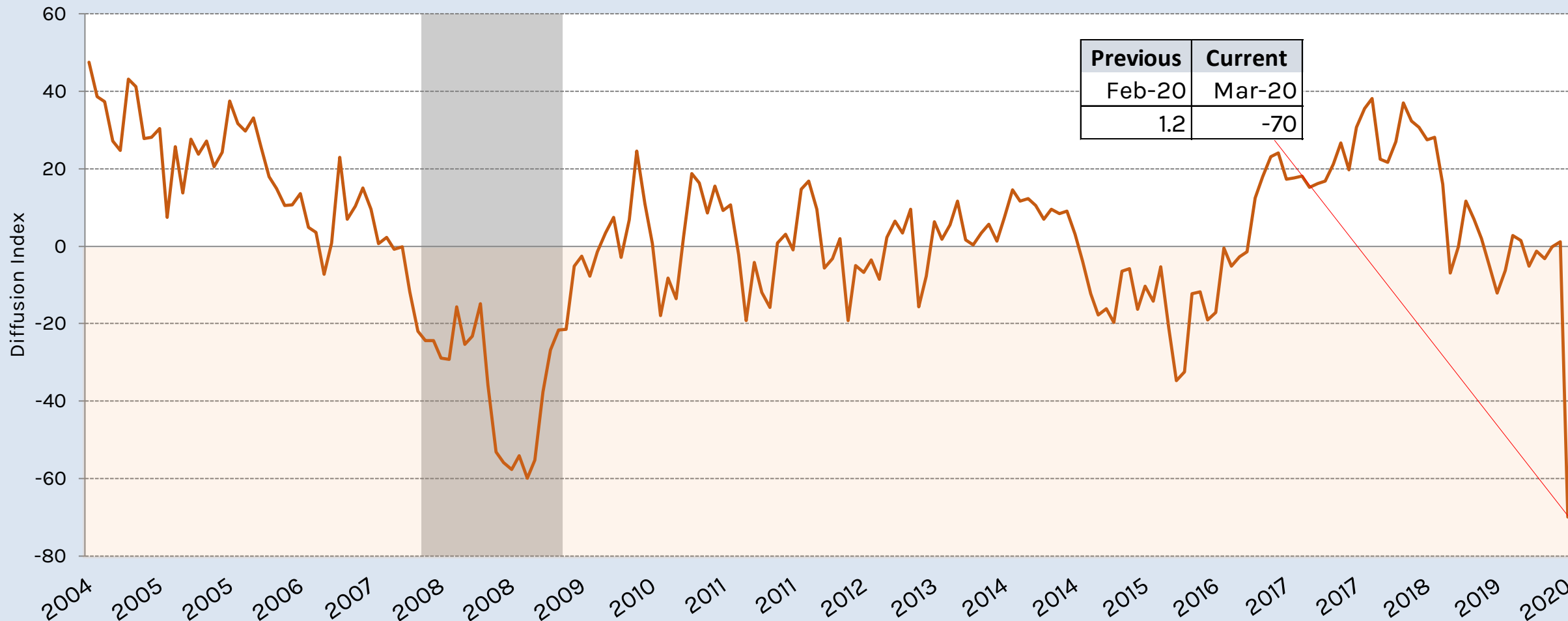
Index: 0=no change, SA, monthly, 1950-Mar 2020



# REGIONAL FED: DALLAS

## Dallas Fed Regional Manf General Conditions

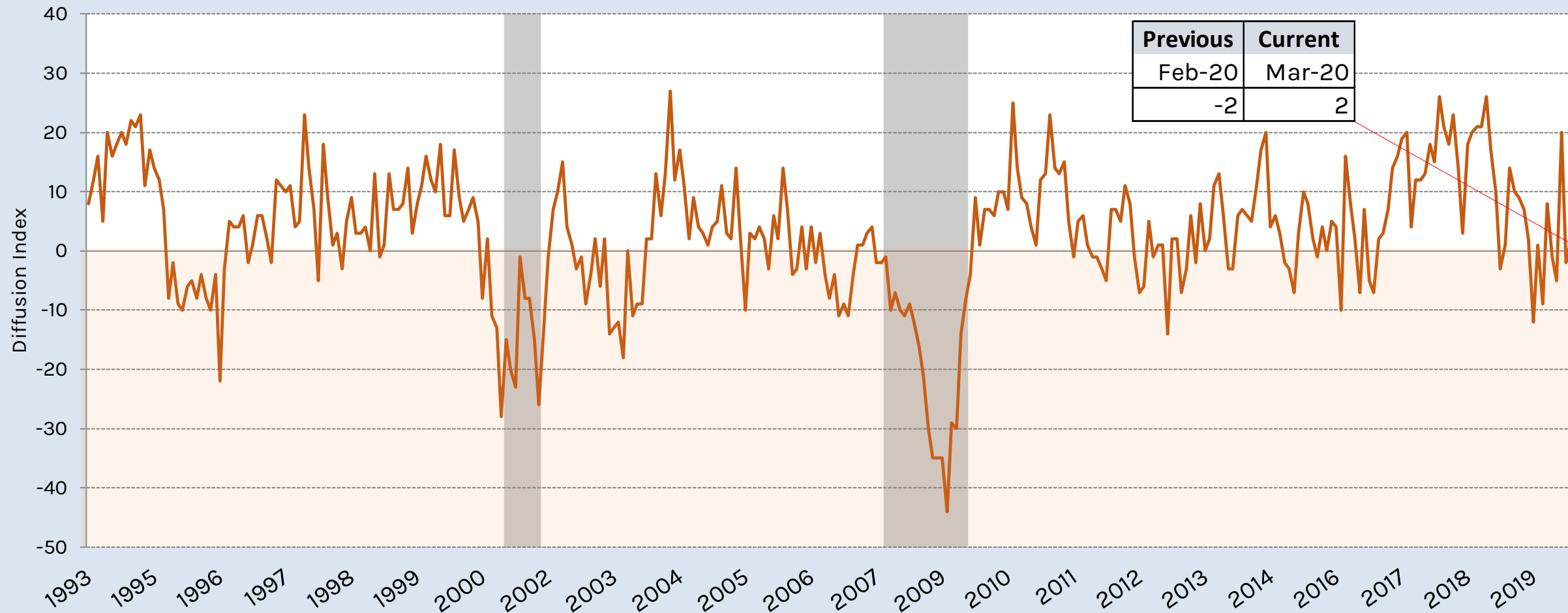
Index: 0=no change, SA, monthly, 1950-Mar 2020



# REGIONAL FED: RICHMOND

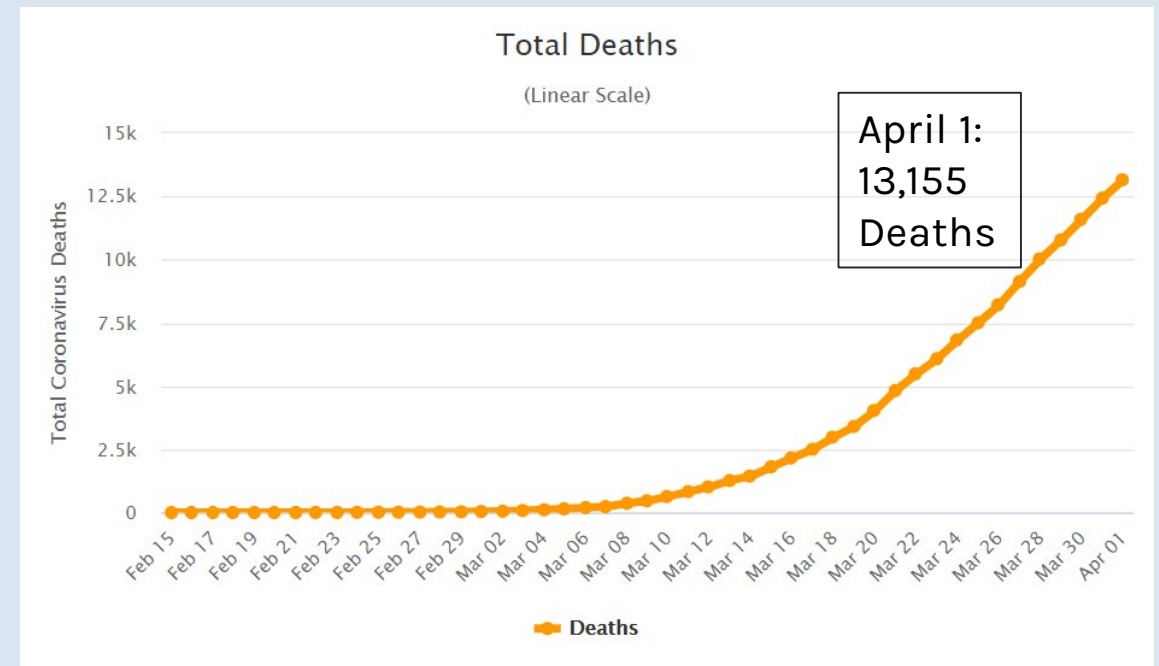
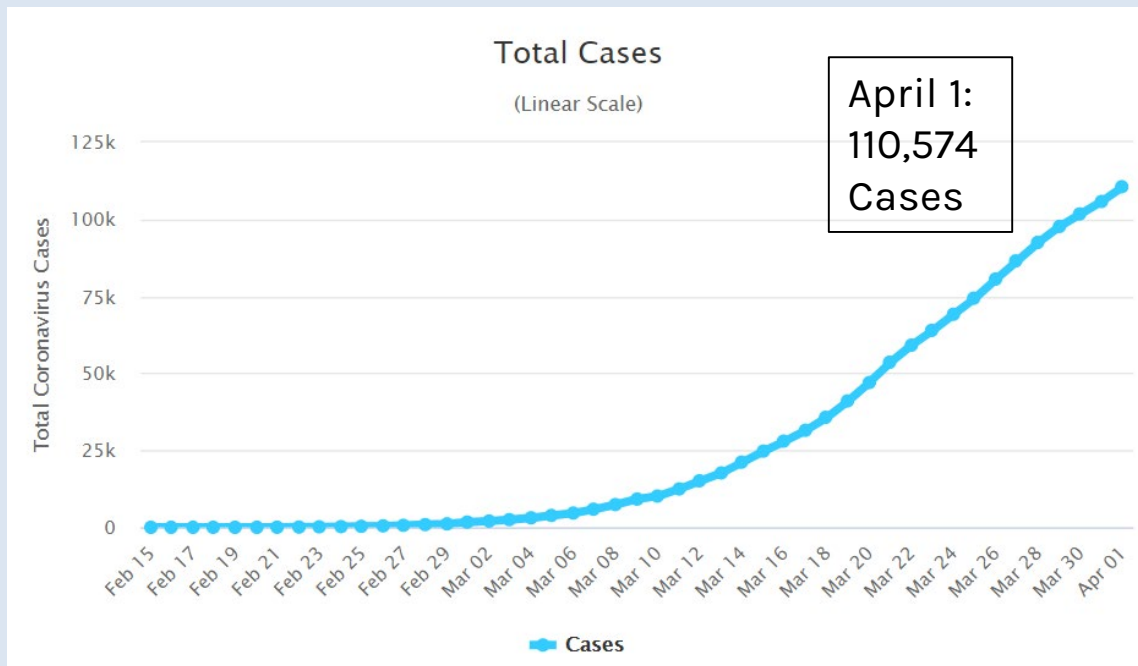
## Richmond Fed Regional Manf General Conditions

Index: 0=no change, SA, monthly, 1950-Mar 2020



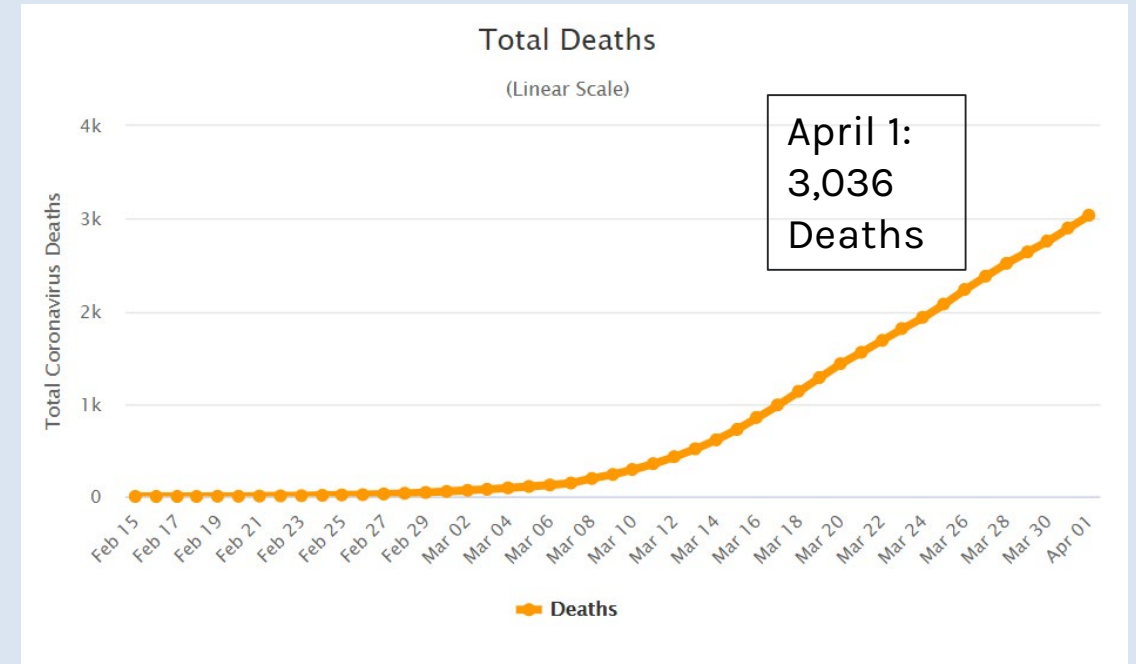
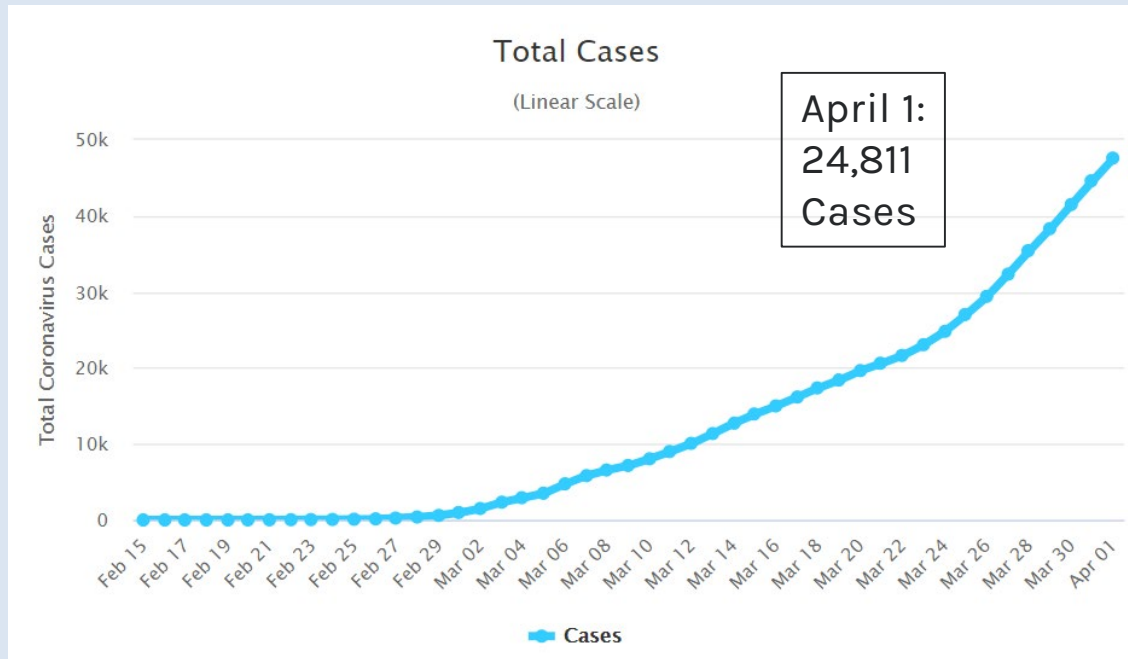
# THE SITUATION IN... ITALY

## COVID-19 Cases and Deaths in Italy Updated April 2, 2020



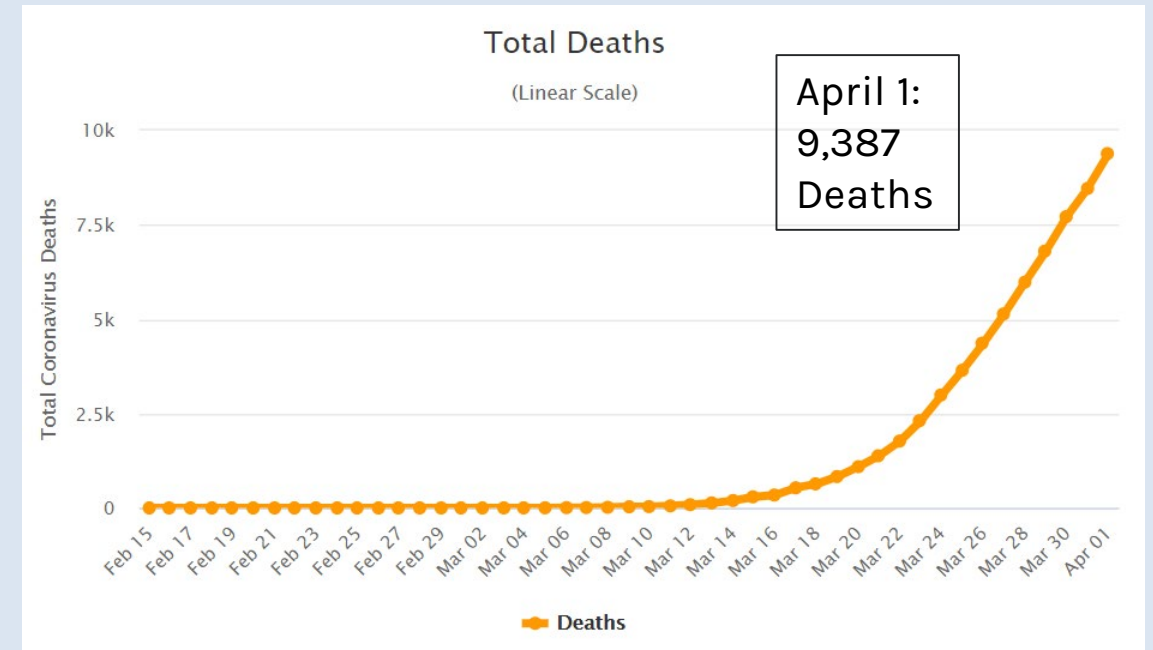
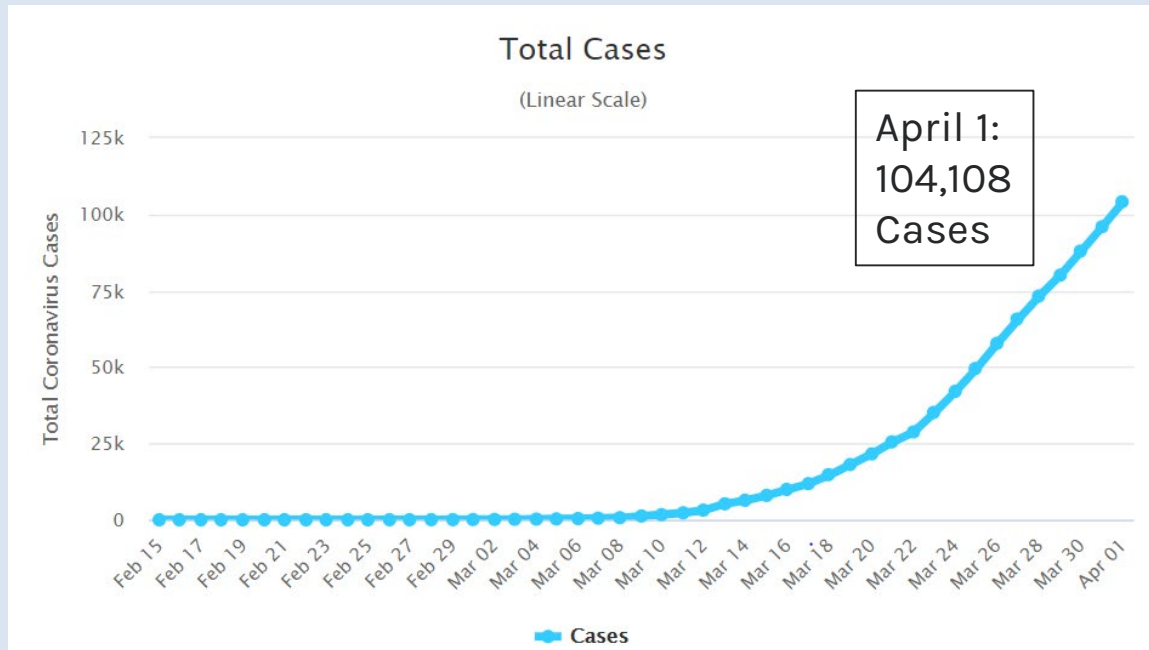
# THE SITUATION IN... IRAN

## COVID-19 Cases and Deaths in Iran Updated April 2, 2020



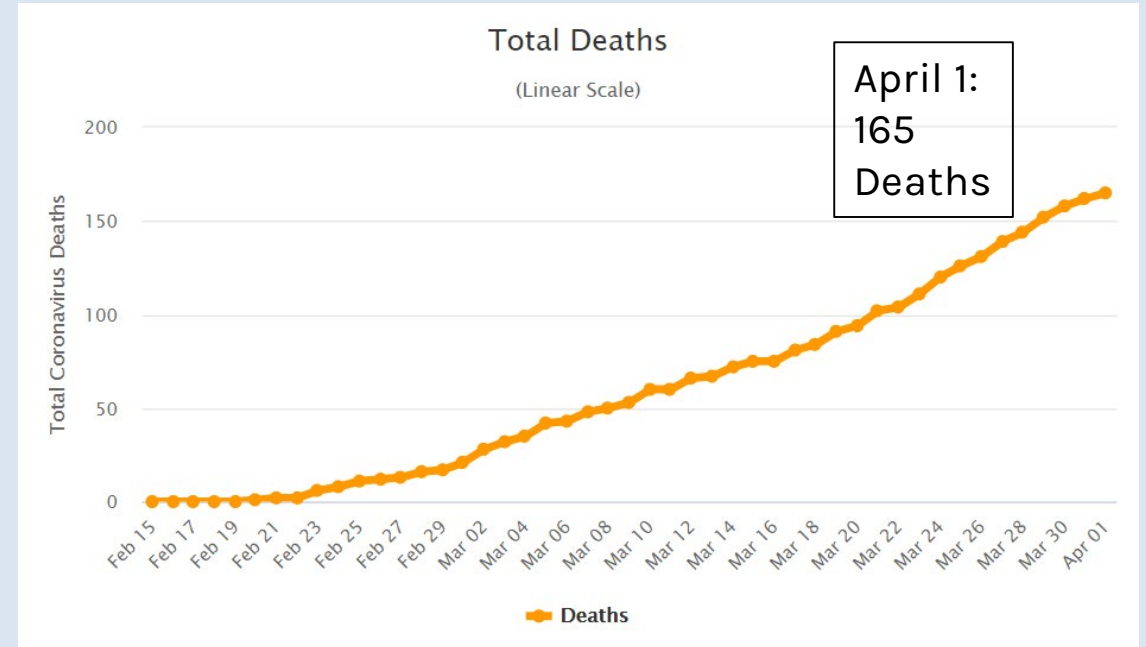
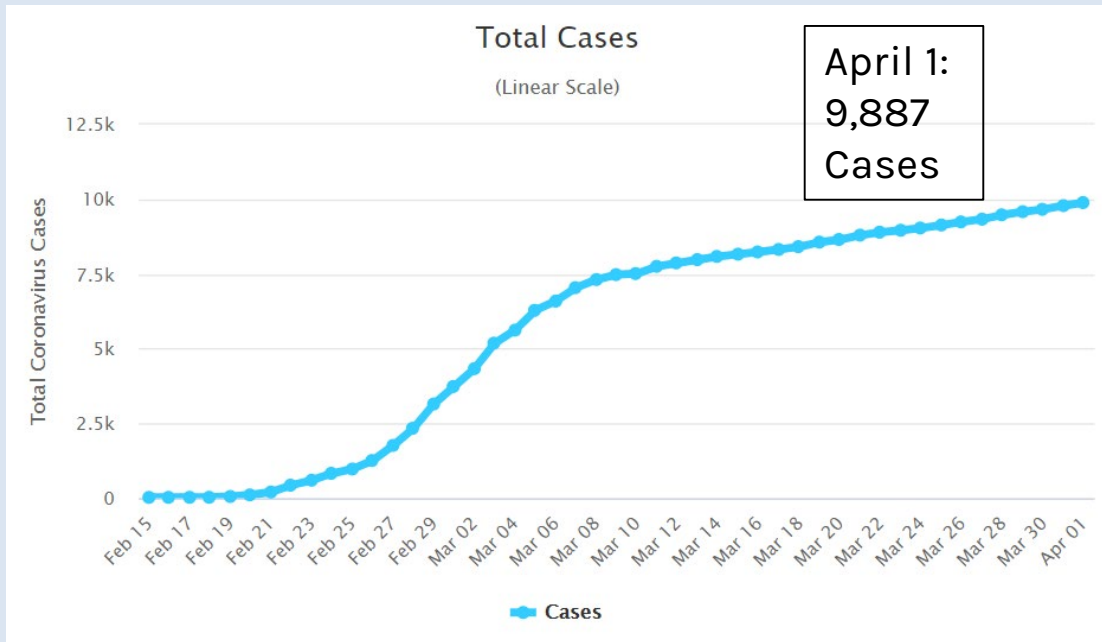
# THE SITUATION IN... SPAIN

## COVID-19 Cases and Deaths in Spain Updated April 2, 2020



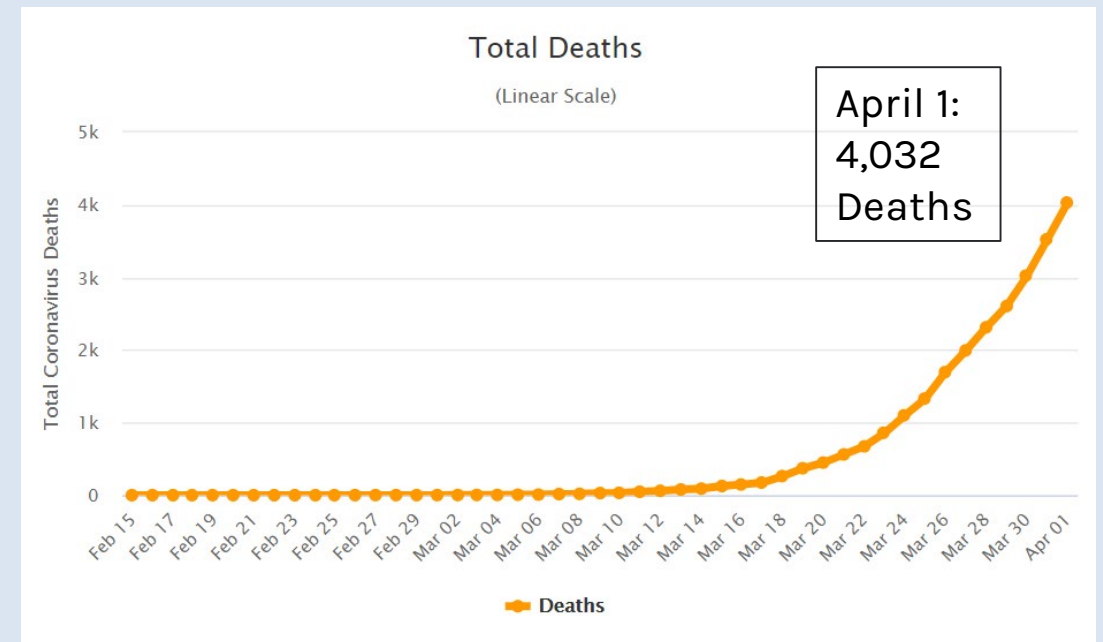
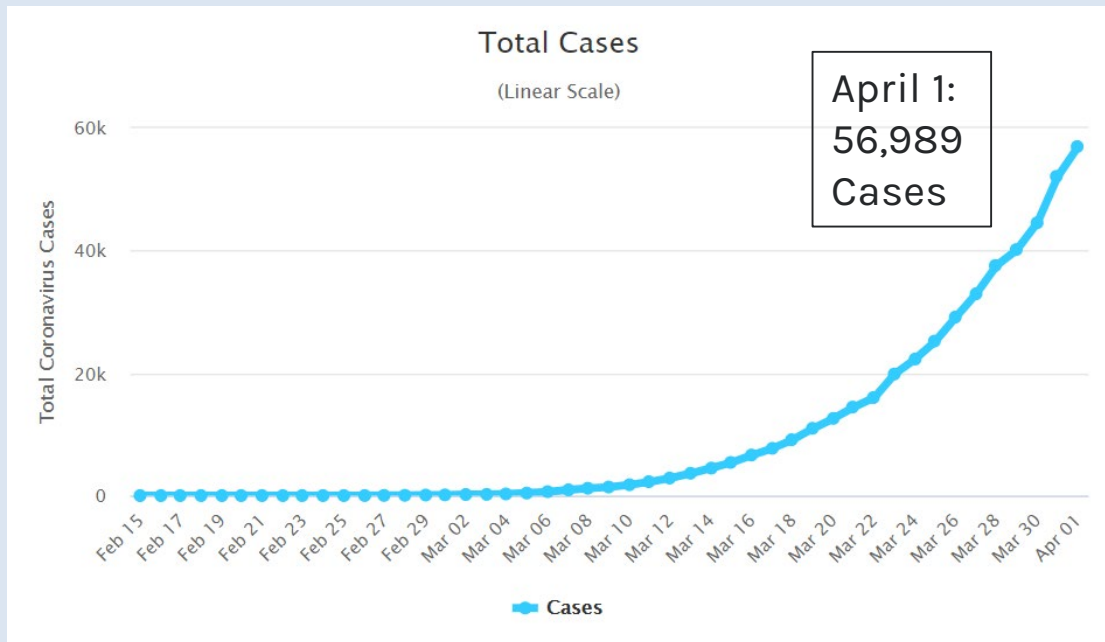
# THE SITUATION IN... SOUTH KOREA

## COVID-19 Cases and Deaths in South Korea Updated April 2, 2020



# THE SITUATION IN... FRANCE

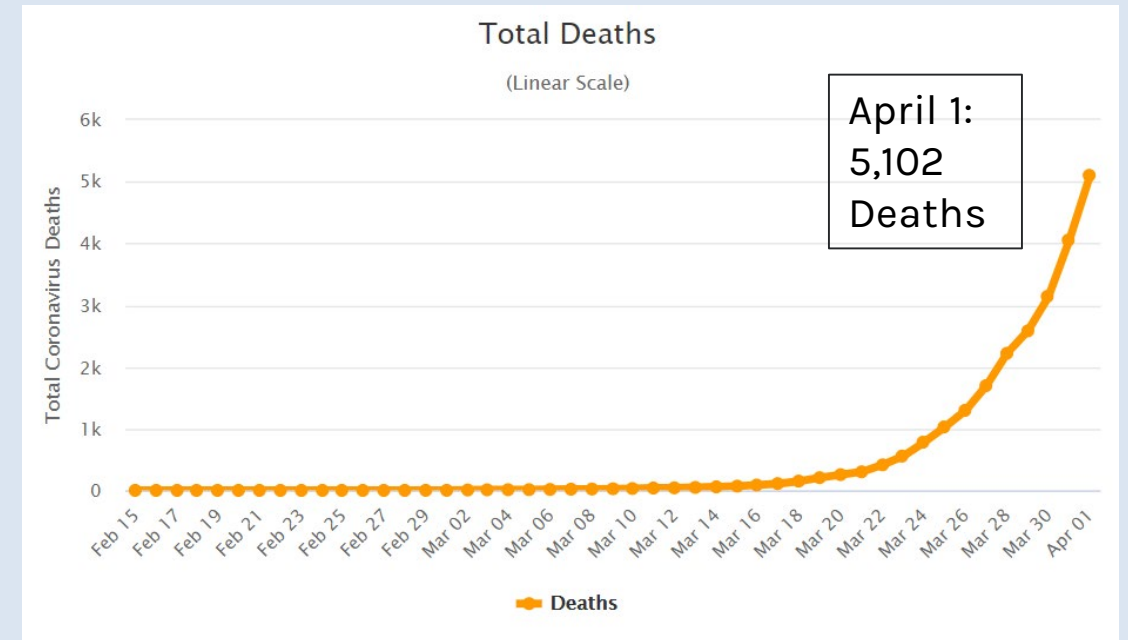
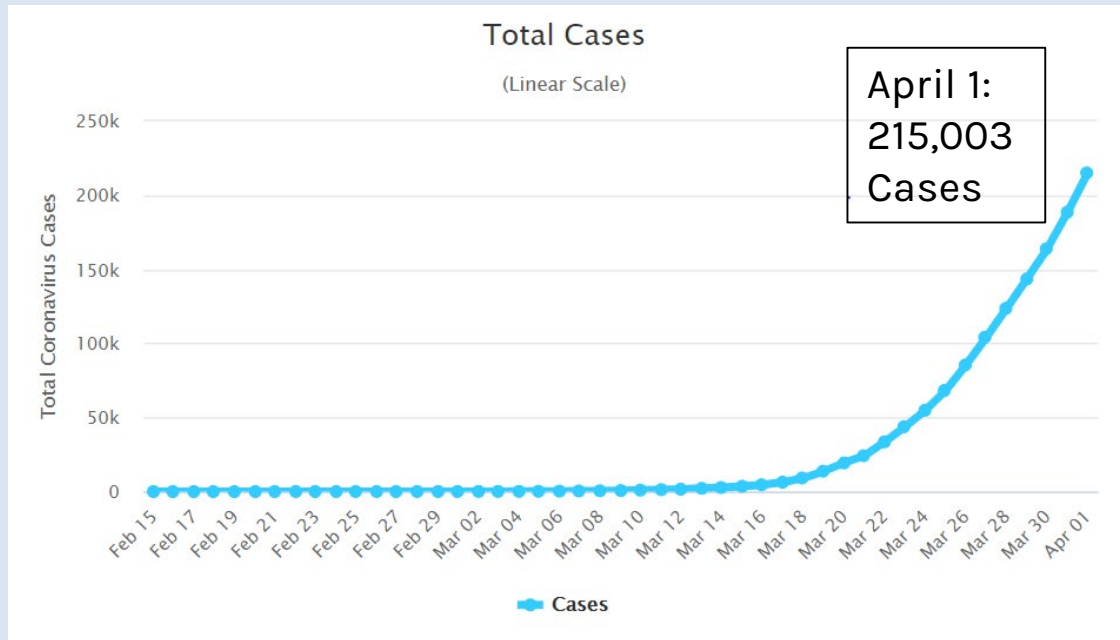
## COVID-19 Cases and Deaths in France Updated April 2, 2020





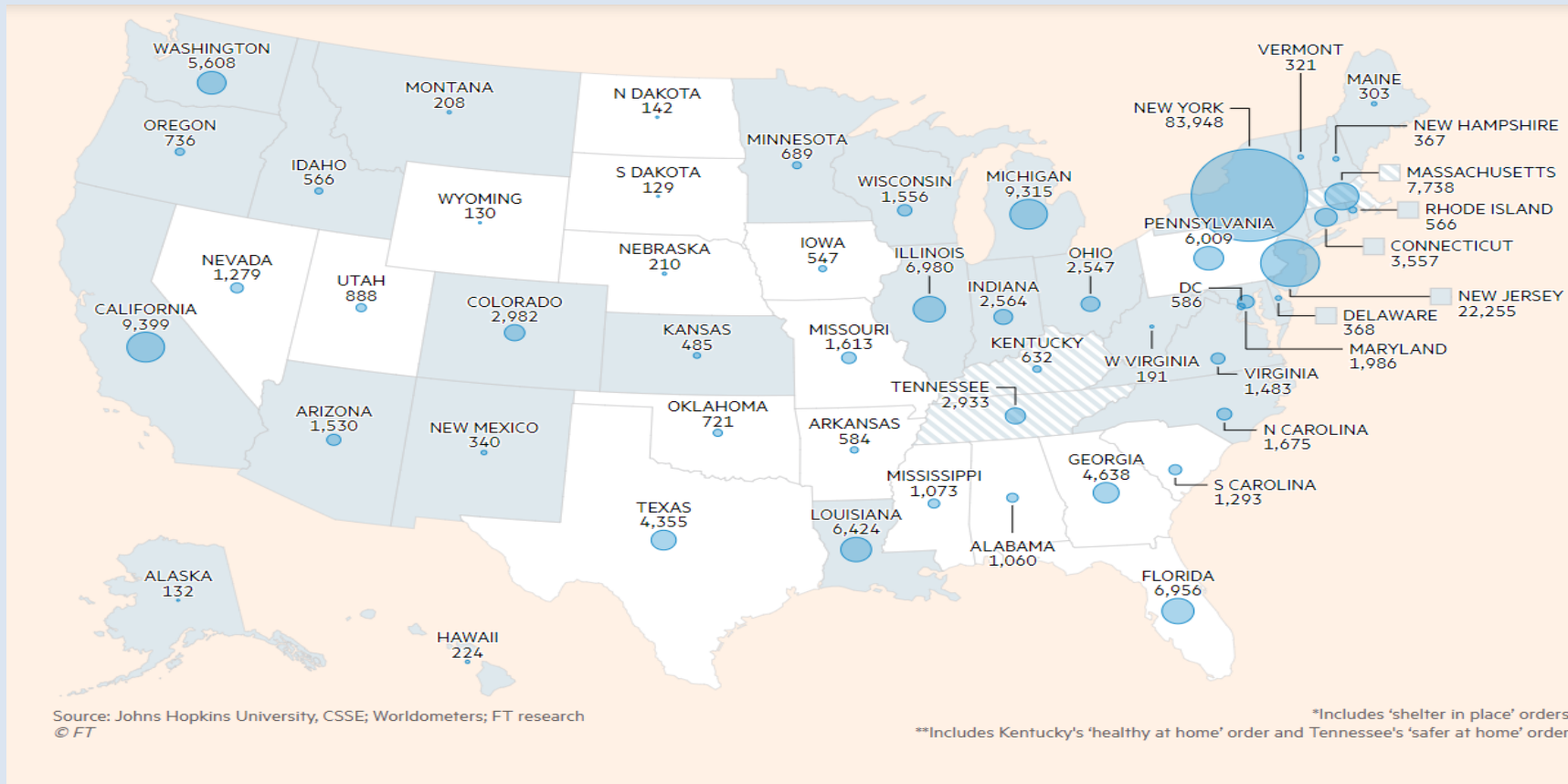
# THE SITUATION IN... USA

## COVID-19 Cases and Deaths in USA Updated April 2, 2020



# NEW YORK IS NOW THE EPICENTER

## Total COVID-19 Cases Confirmed in Each State, Updated April 2, 2020



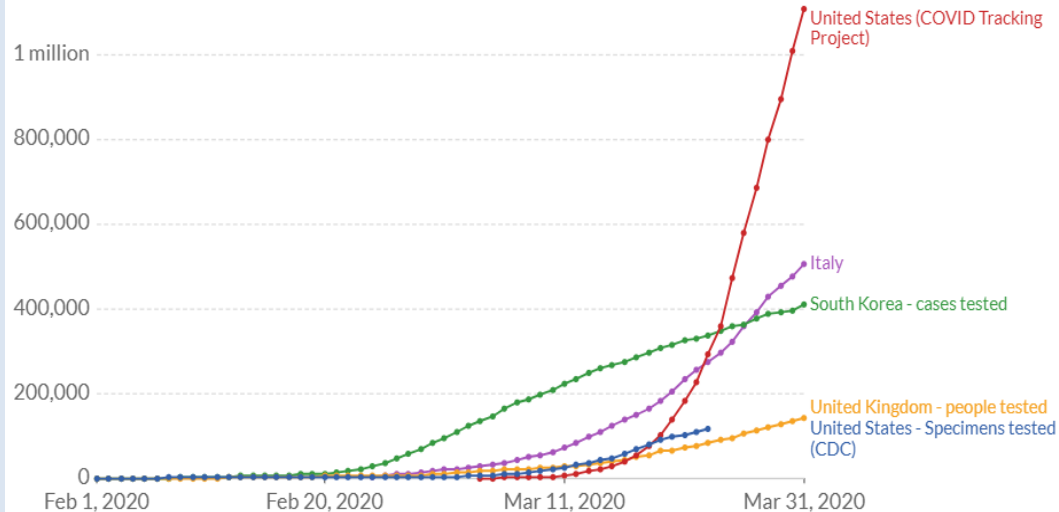
# NATIONAL TESTS, TOTAL AND TESTS PER MILLION

## Total Tests and Total Tests Per Million People for COVID-19, February 1 - March 31, 2020

### Total tests for COVID-19

Comparisons across the series are compromised for several reasons. See note below for more information about the series for the US and South Korea. For the UK and Italy only limited descriptions of the data are provided by the sources.

LINEAR



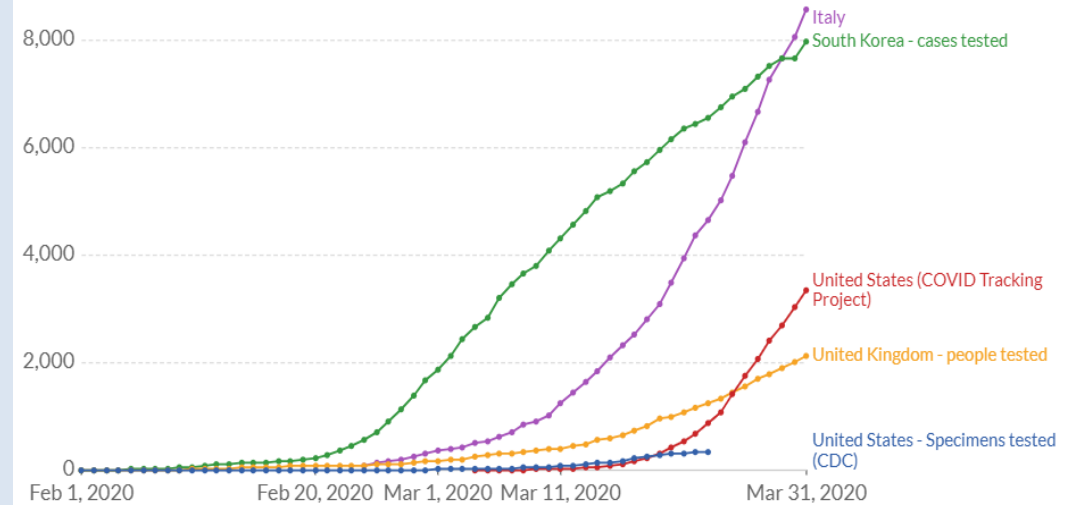
Source: US: CDC, COVID Tracking Project; South Korea: KCDC; UK: PHE/DHSC; Italy: Ministero della Salute  
Note: 'Cases tested' is equivalent to the number of people tested. The COVID Testing Project aggregates figures for the number of tests and the number of people tested as reported by US states. US CDC figures do not include private labs; COVID Testing Project figures do so partially.

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### Total tests for COVID-19 per million people

Comparisons across the series are compromised for several reasons. See note below for more information about the series for the US and South Korea. For the UK and Italy only limited descriptions of the data are provided by the sources.

LINEAR

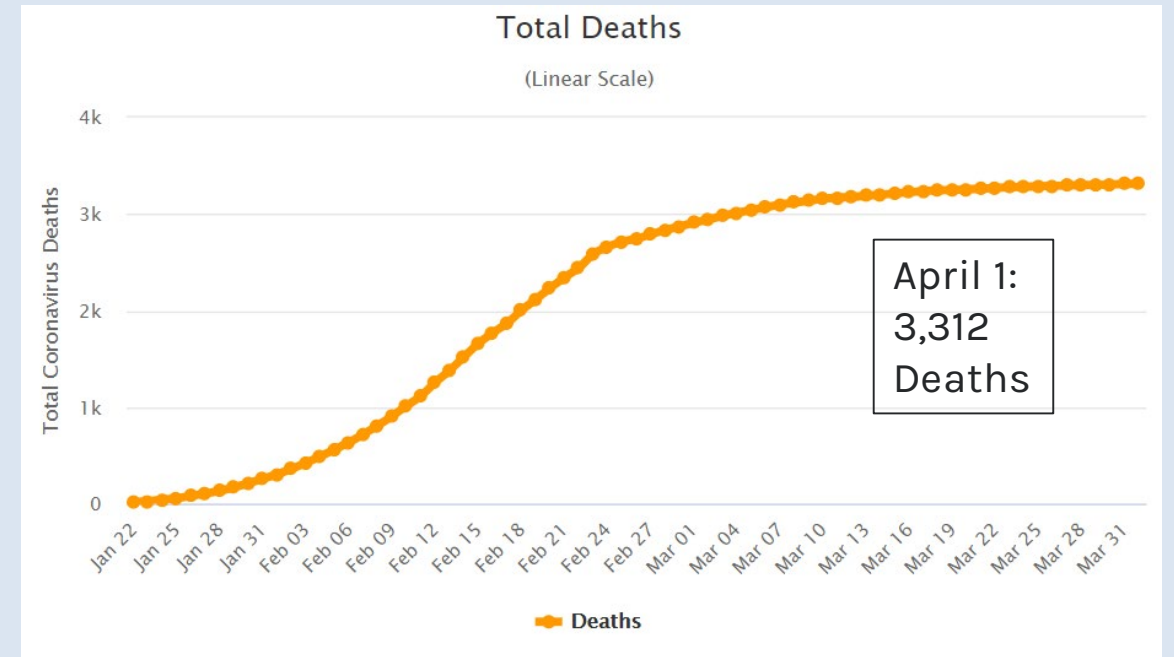
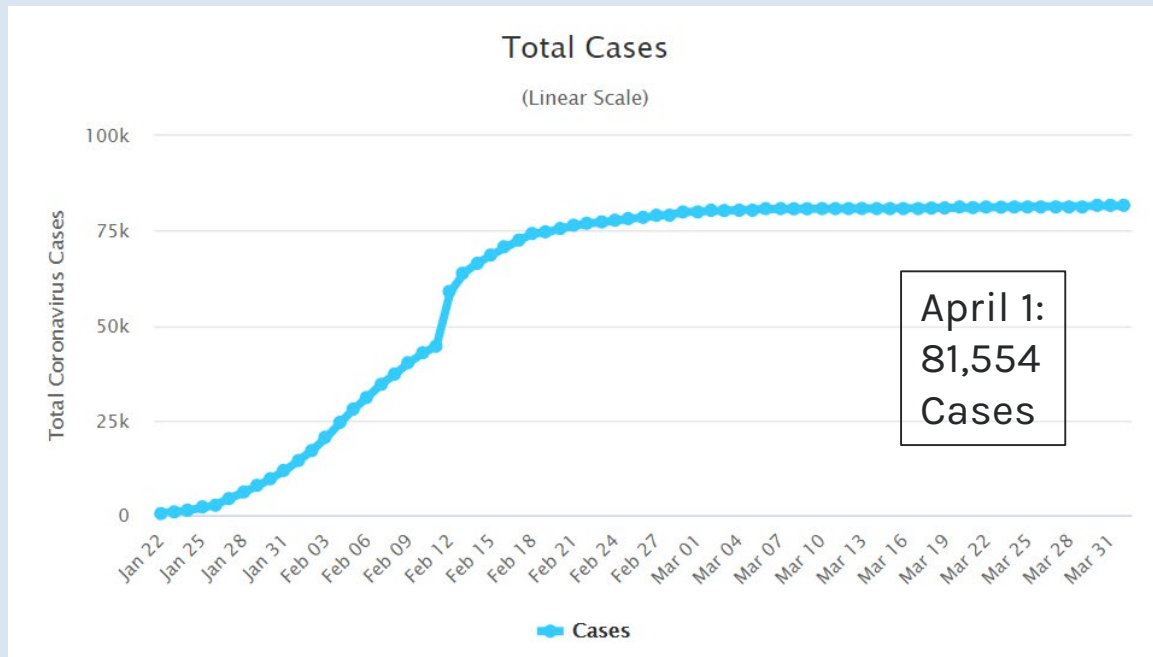


Source: US: CDC, COVID Tracking Project; South Korea: KCDC; UK: PHE/DHSC; Italy: Ministero della Salute  
Note: 'Cases tested' is equivalent to the number of people tested. The COVID Testing Project aggregates figures for the number of tests and the number of people tested as reported by US states. US CDC figures do not include private labs; COVID Testing Project figures do so partially.

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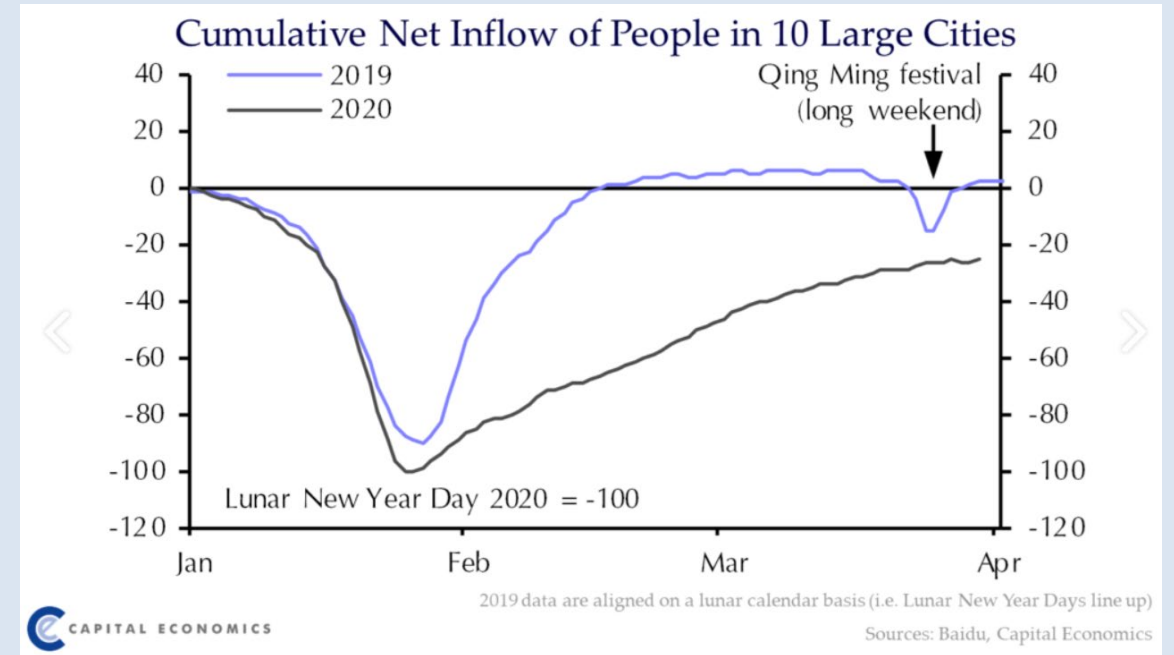
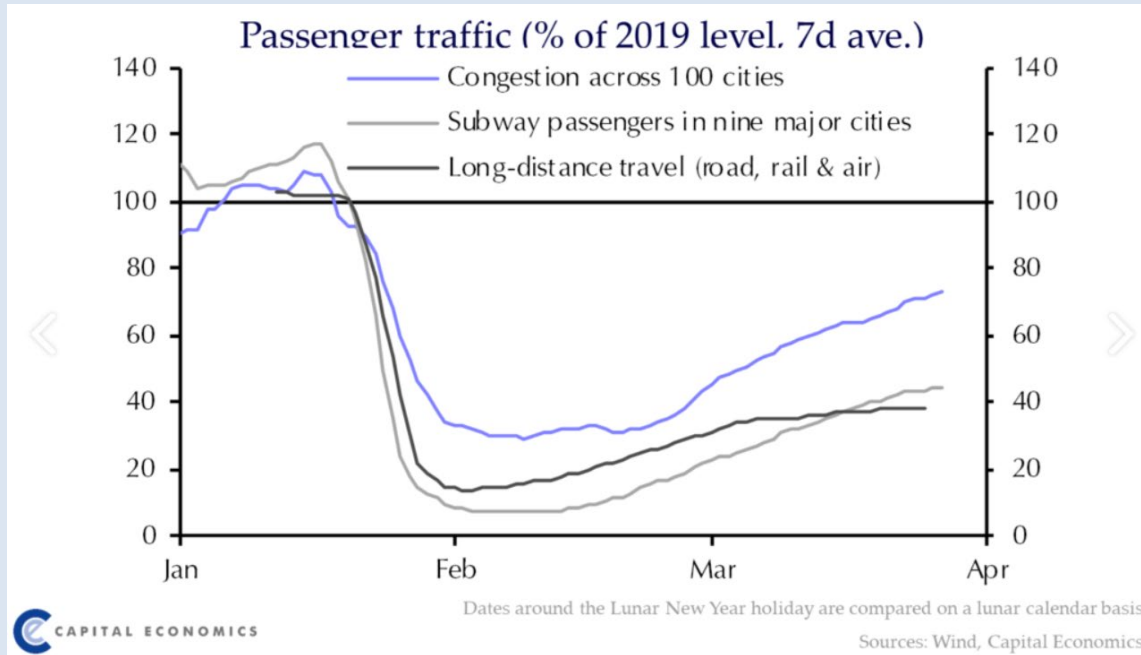
# THE SITUATION IN... CHINA

## COVID-19 Cases and Deaths in China Updated April 2, 2020



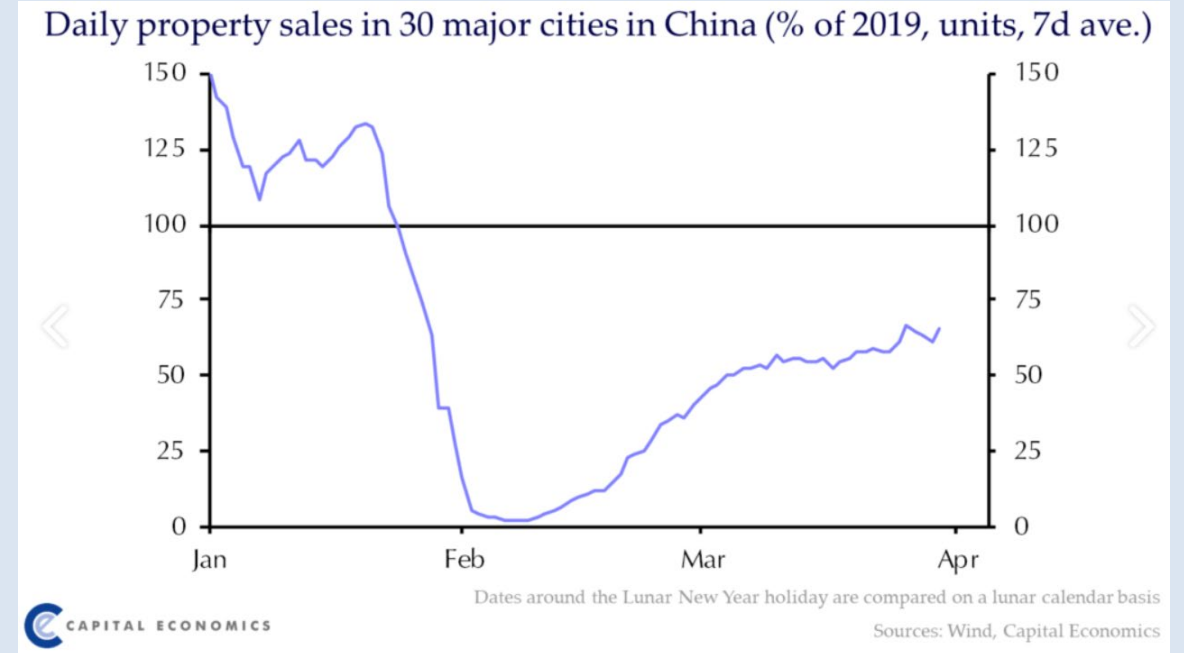
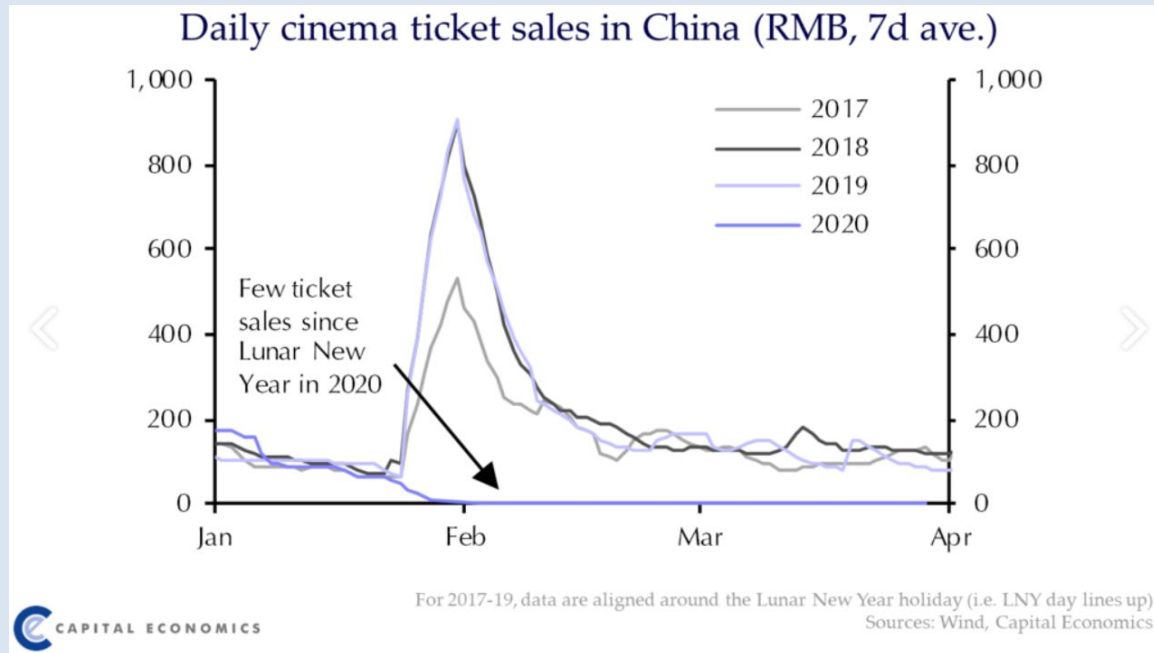
# CHINA... COMING OUT OF DEEP FREEZE?

## Passenger Traffic and Cumulative Net Inflow of People In 10 Chinese Cities Updated April 1, 2020



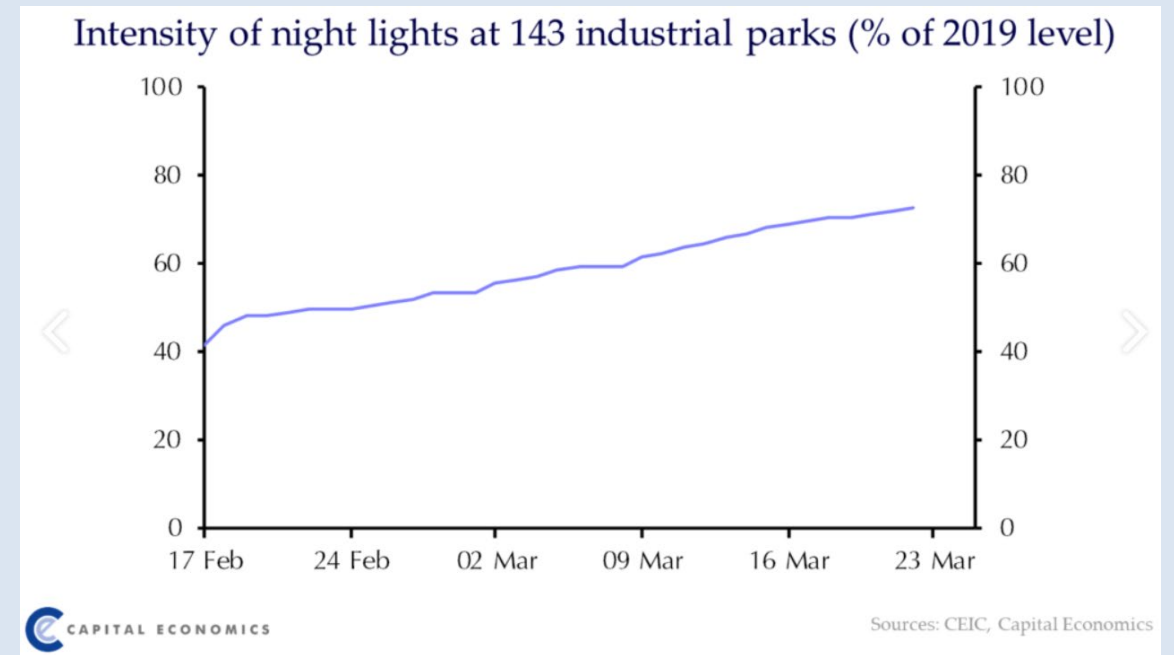
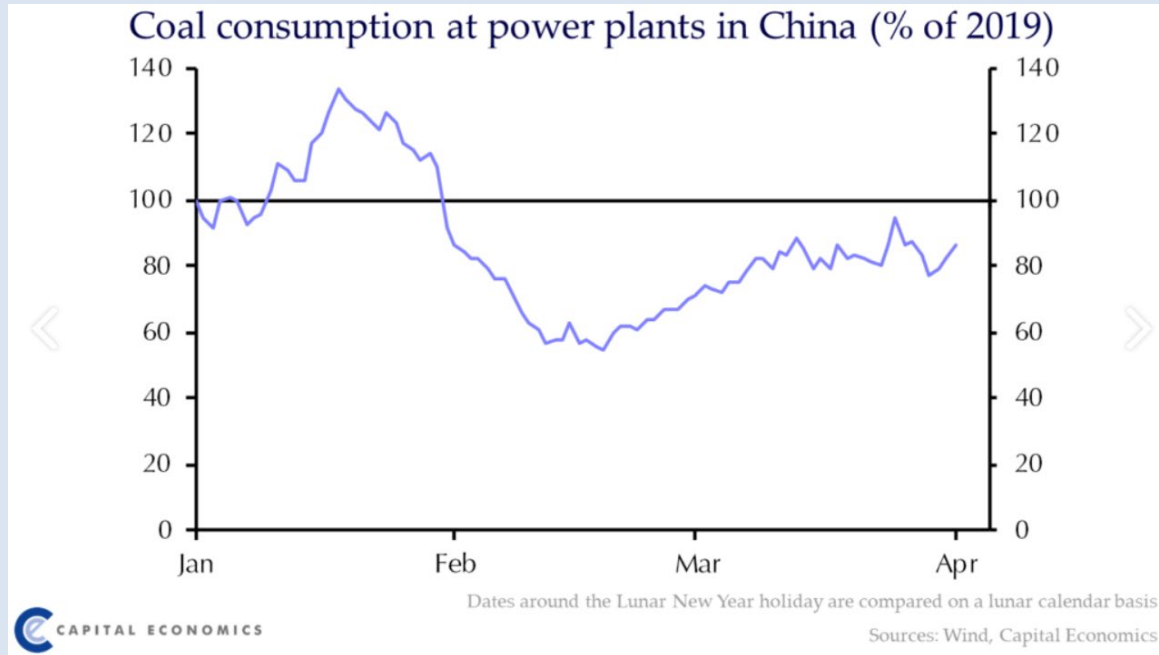
# CHINA... COMING OUT OF DEEP FREEZE?

## Daily Cinema Ticket sales and Daily Property Sales In 30 Chinese Cities Updated April 2, 2020



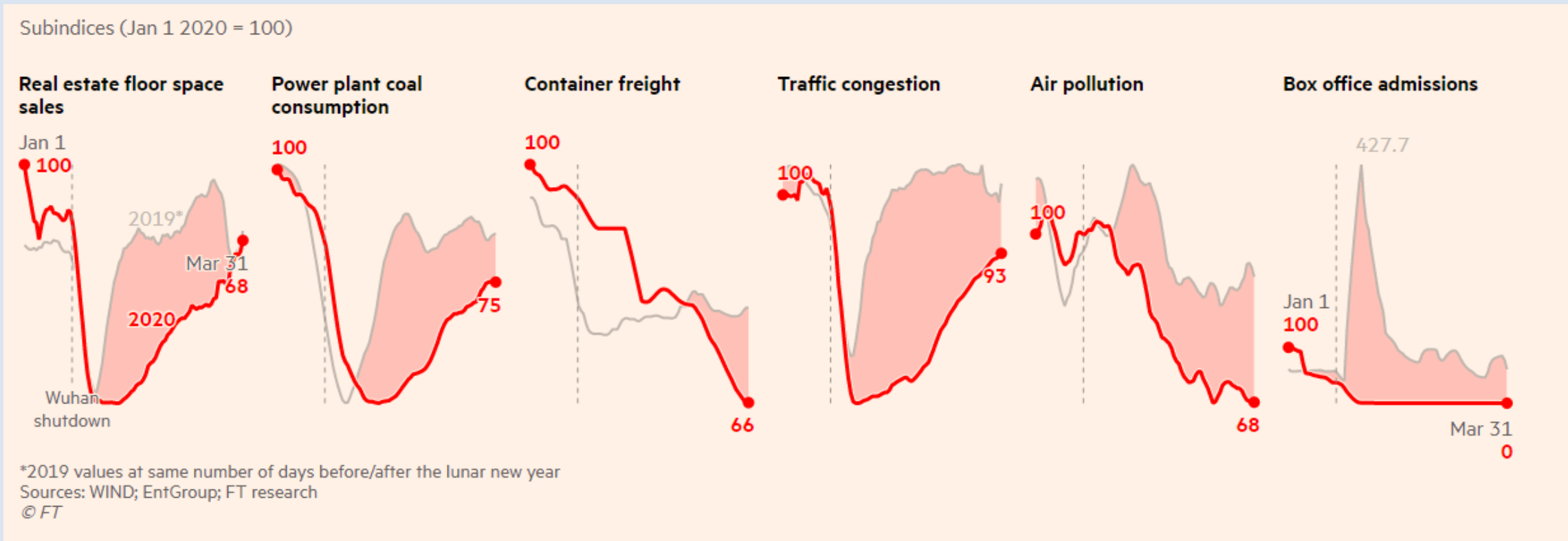
# CHINA... COMING OUT OF DEEP FREEZE?

## Coal Consumption at Power Plants and Intensity of Night Lights At 143 Industrial Parks, Updated April 2, 2020



# CHINA... COMING OUT OF DEEP FREEZE?

## Store Floor Space, Coal Consumption, Container Freights, Traffic, Pollution, and Box Office Sales in China Updated April 1, 2020





# WILL THE REAL DEATH TOLL PLEASE STAND UP?

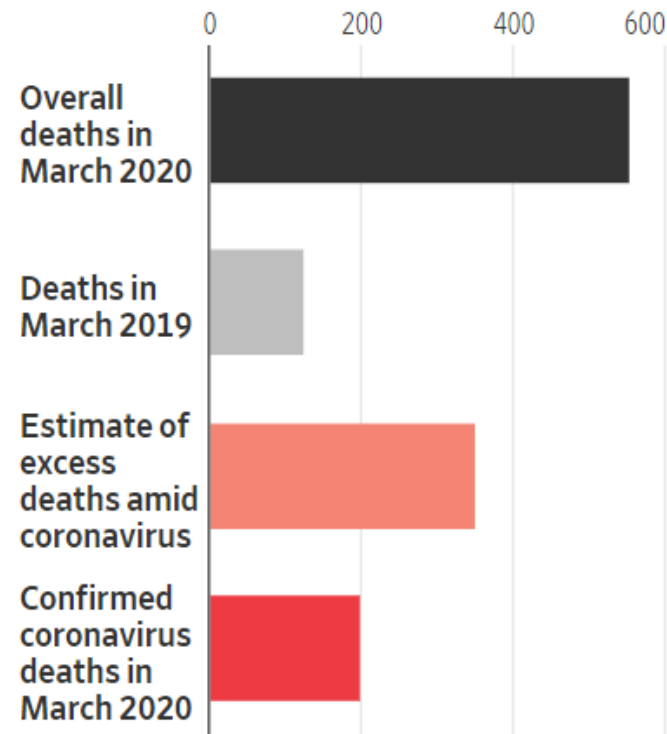
## AS EXPECTED, YoY CHANGE IN TOTAL DEATH GREATLY EXCEEDS C19-POSITIVE DEATHS

Most egregious in China, due to lack of test kits (in February) and deliberately restrictive counting of both tests and cases.

But undercounting continues in France and Italy—in part due to counting only deaths in hospitals.

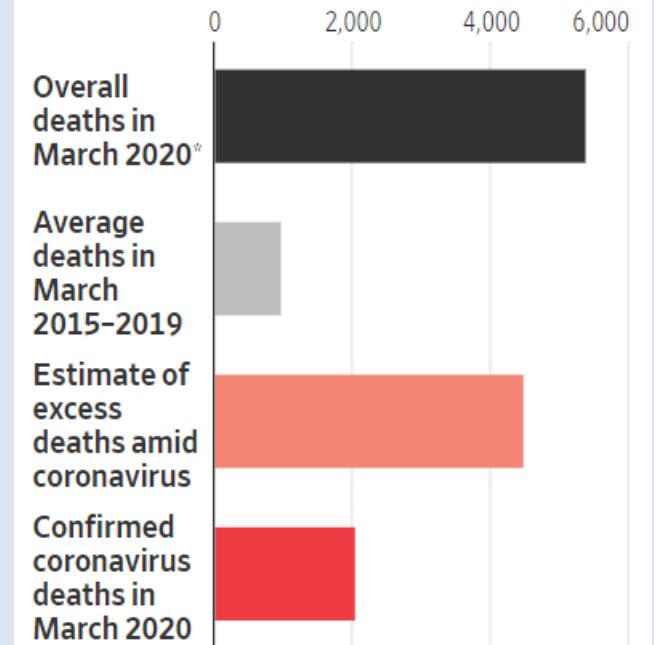
Excess in total YoY deaths is a count more comparable to the way CDC calculates flu death. And it roughly may double the death toll.

Bergamo, a city of around 120,000, has been hit particularly hard by the coronavirus.



Source: Bergamo city government (overall deaths, confirmed coronavirus deaths, average deaths over past 10 years); WSJ (estimate of excess deaths amid coronavirus)

The wider Bergamo province, which has about 1.1 million residents, has also been heavily affected.

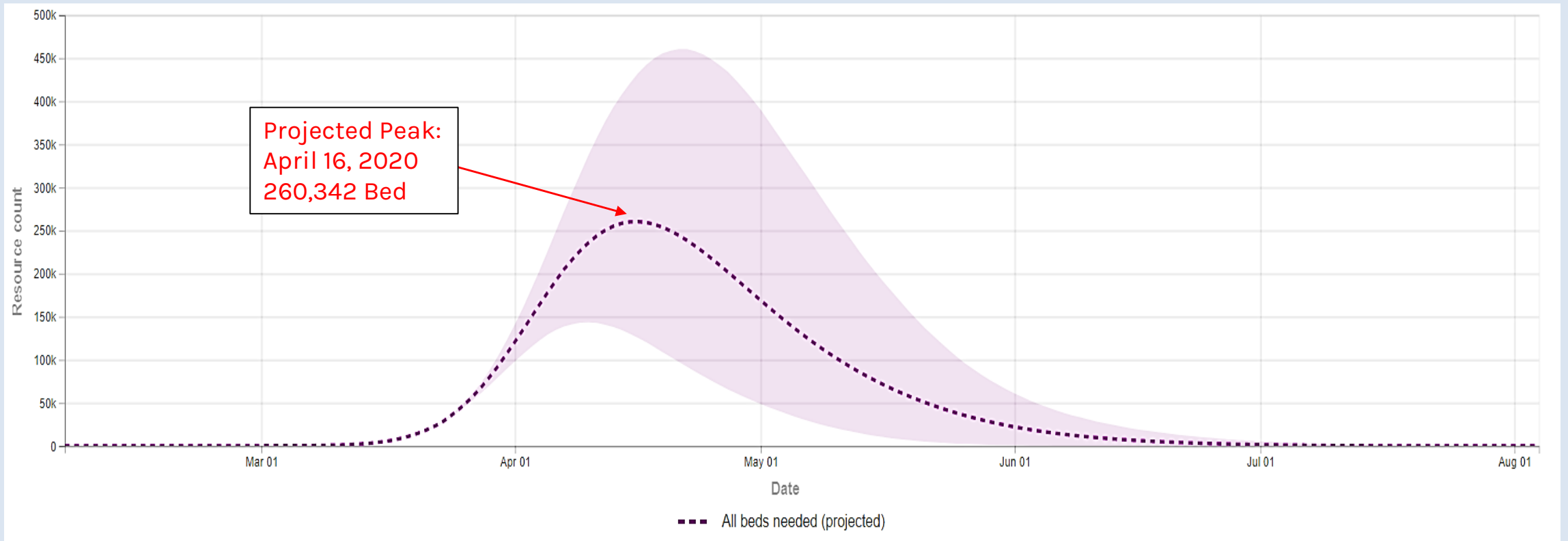


\*Estimate

Source: Bergamo provincial government (confirmed coronavirus deaths); Eco di Bergamo and InTwig (overall deaths, estimate of excess deaths amid coronavirus); Italian Statistics Agency (average deaths in March)

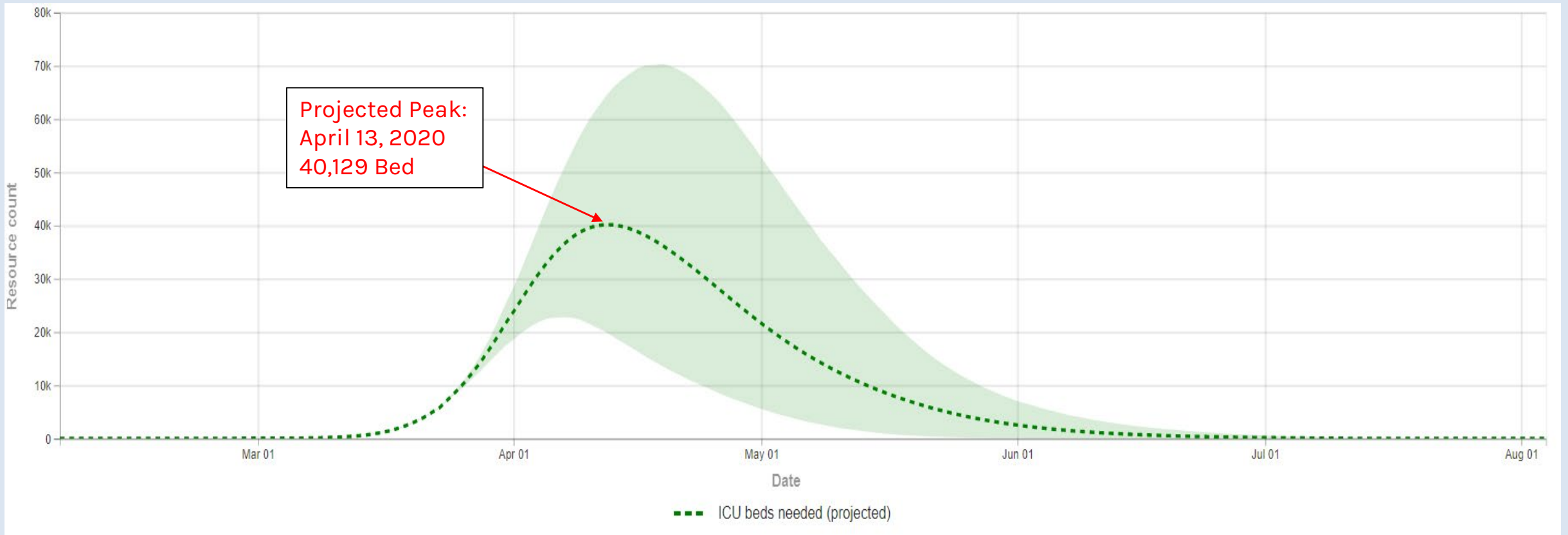
# THE PEAK IS COMING...

## Projection of All Hospital Beds Needed For COVID-19



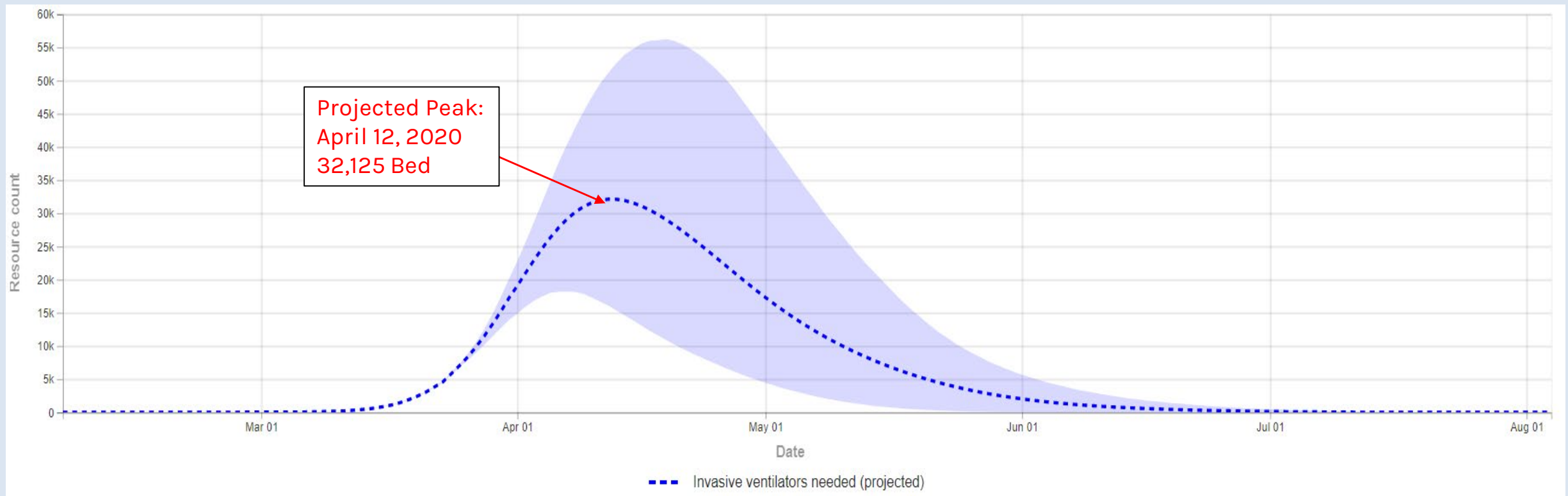
# THE PEAK IS COMING...

## Projection of ICU Beds Needed For COVID-19



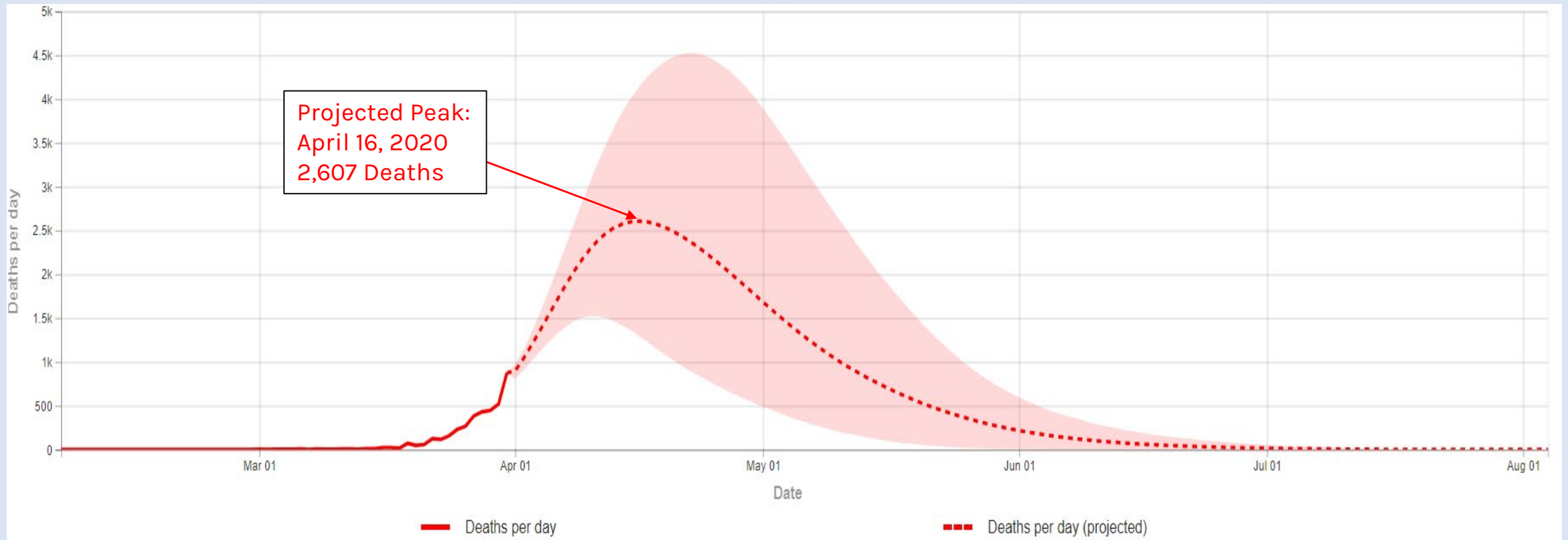
# THE PEAK IS COMING...

## Projection of Invasive Ventilators Needed For COVID-19



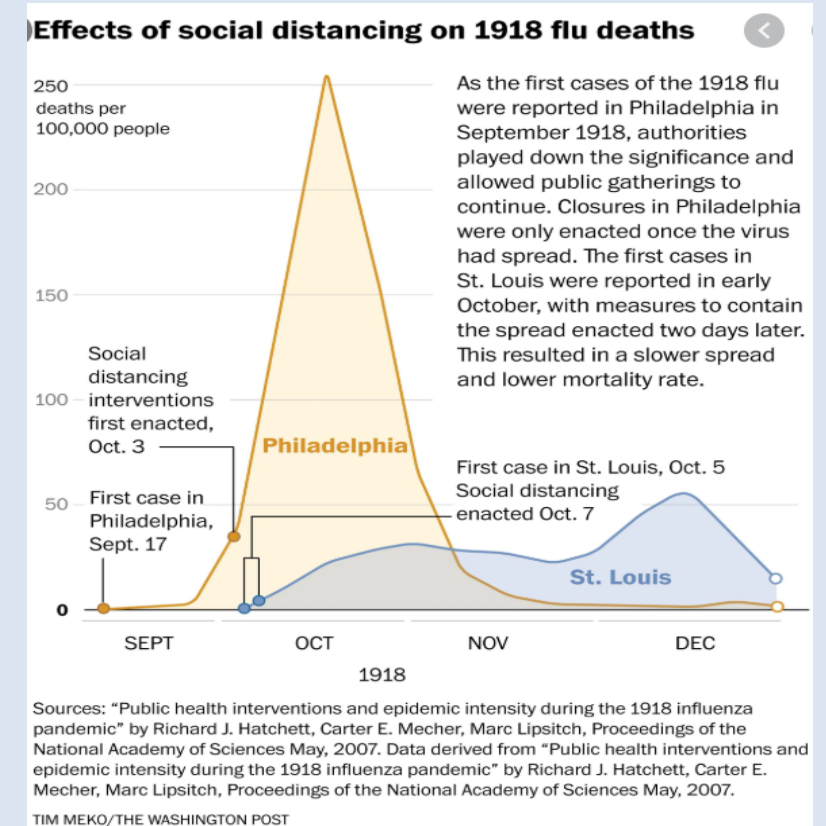
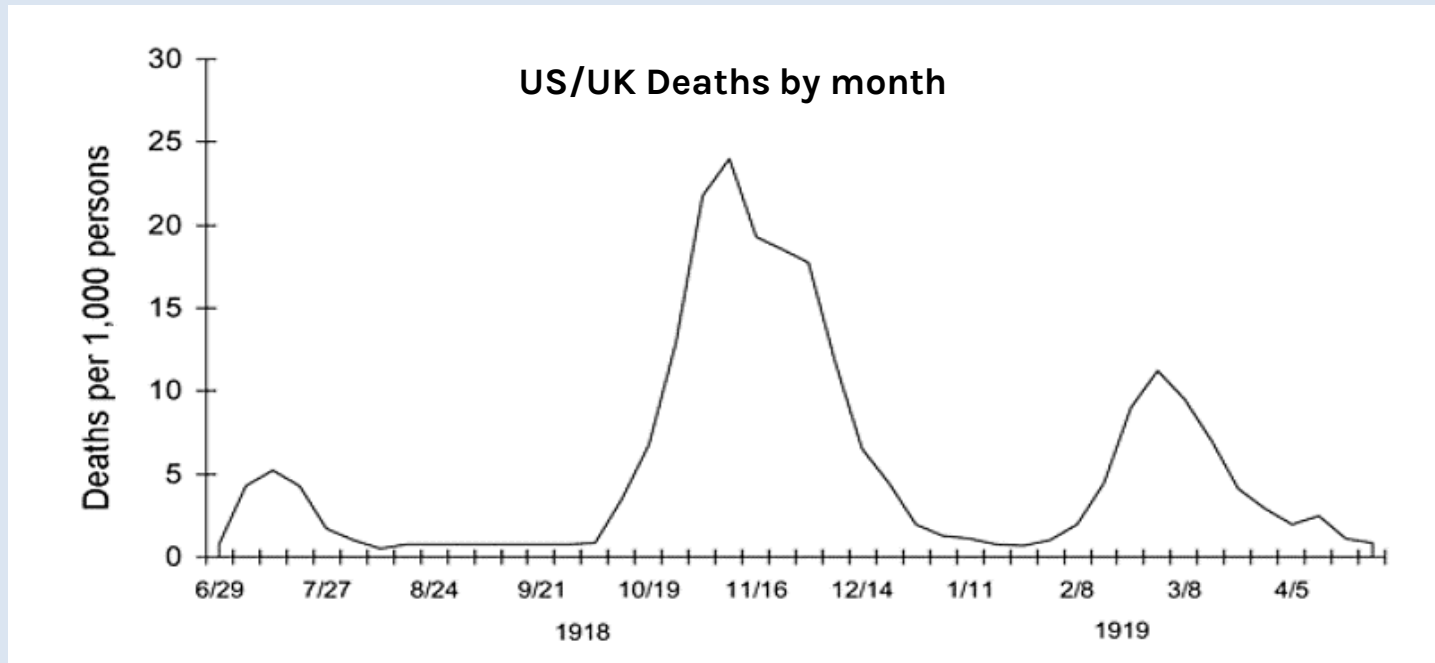
# THE PEAK IS COMING...

## Projection of Daily COVID-19 Deaths



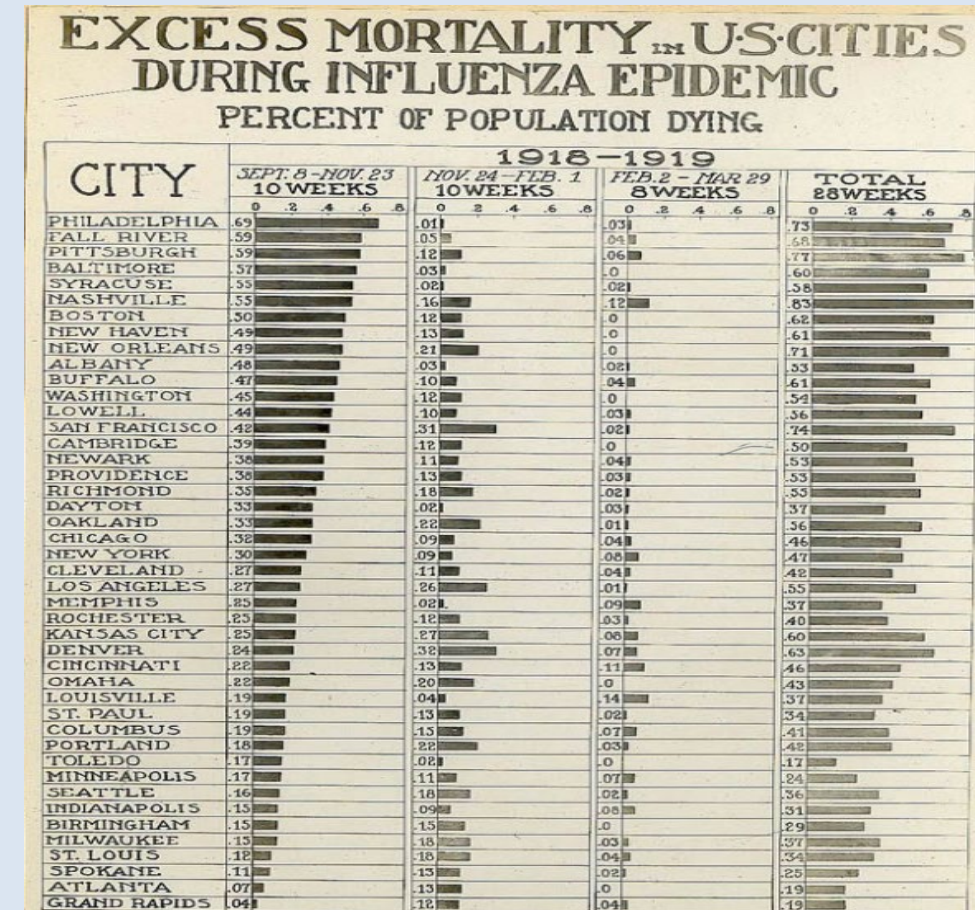
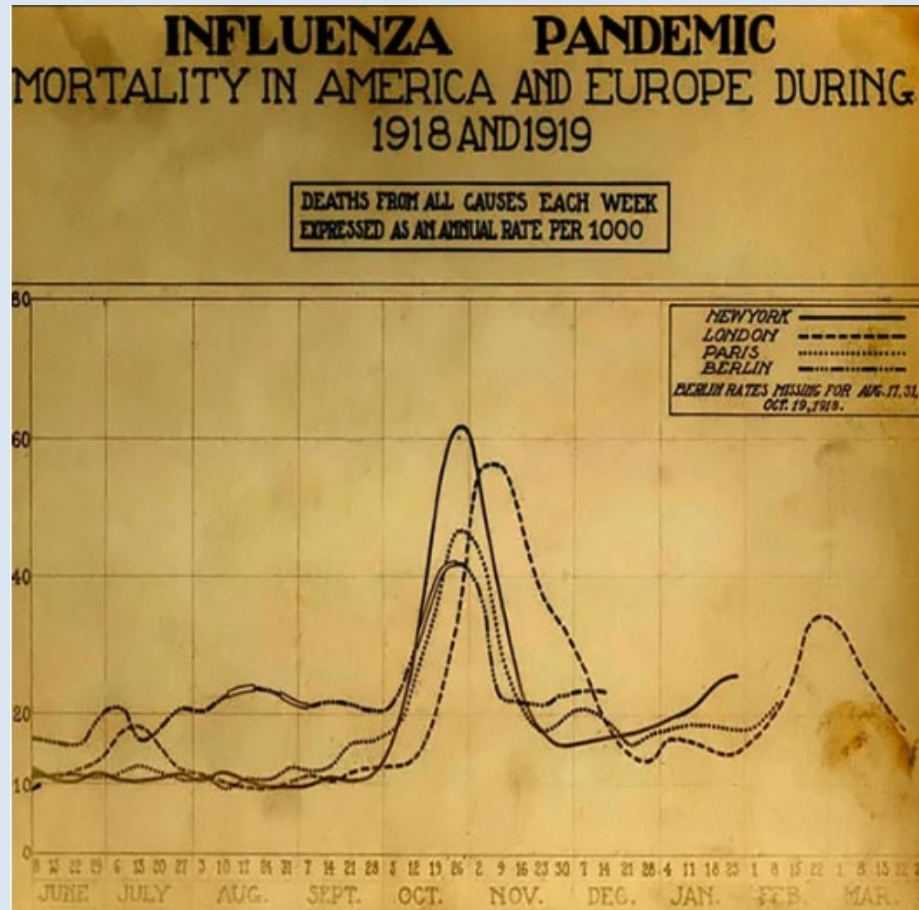
# THE UNFOLDING OF THE SPANISH FLU PANDEMIC

## US, UK, Philadelphia, and St. Louis Deaths From The Spanish Flu Per 1,000 Persons, 1918-1919



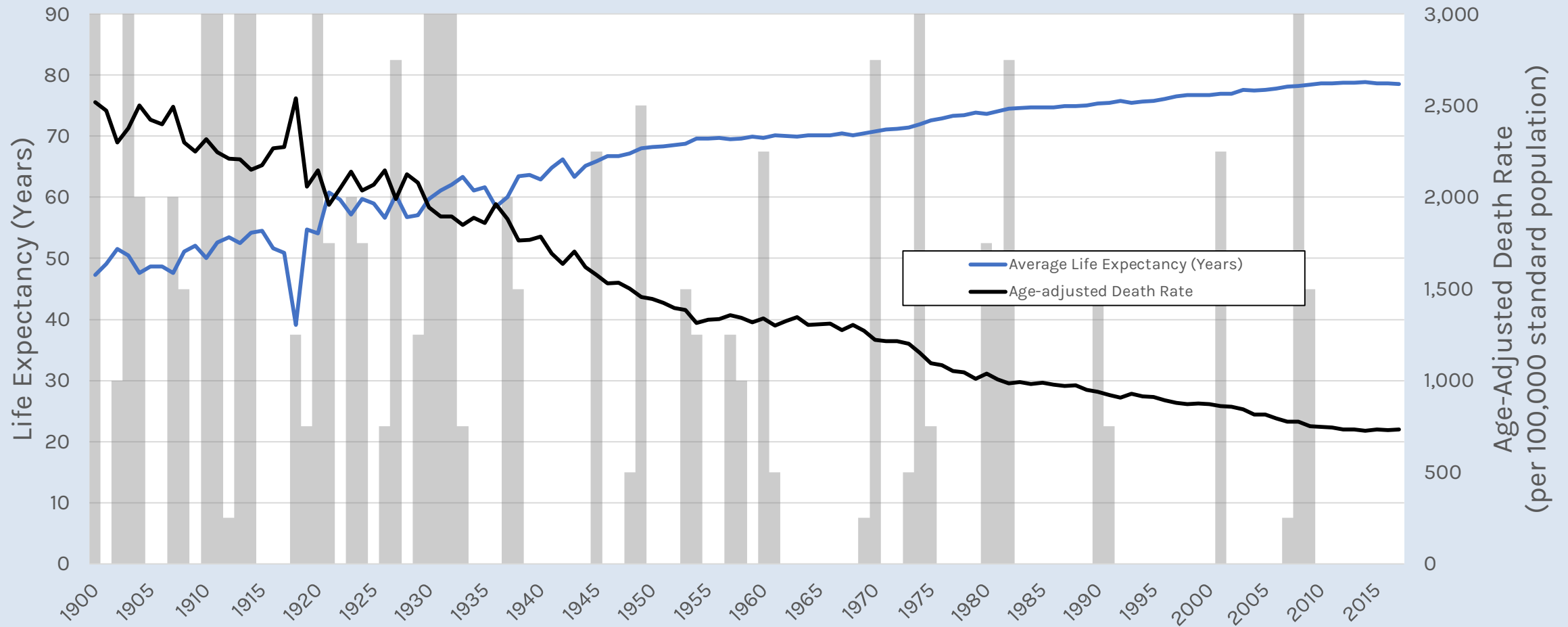
# THE UNFOLDING OF THE SPANISH FLU PANDEMIC

## Spanish Flu Mortality US, Europe, and US Cities, 1918-1919



# ARE RECESSIONS GOOD OR BAD FOR MORTALITY?

## Average Life Expectancy and Age-Adjusted Death Rate, 1900-2018 With Recession Bars





# RECESSIONS DRIVE DOWN VEHICLE DEATHS

## Motor-Vehicle Deaths and Death Rates, 1950-2018

