

Covid-19 & Measles Epidemics: Externalities, Public Goods, and Free Riding

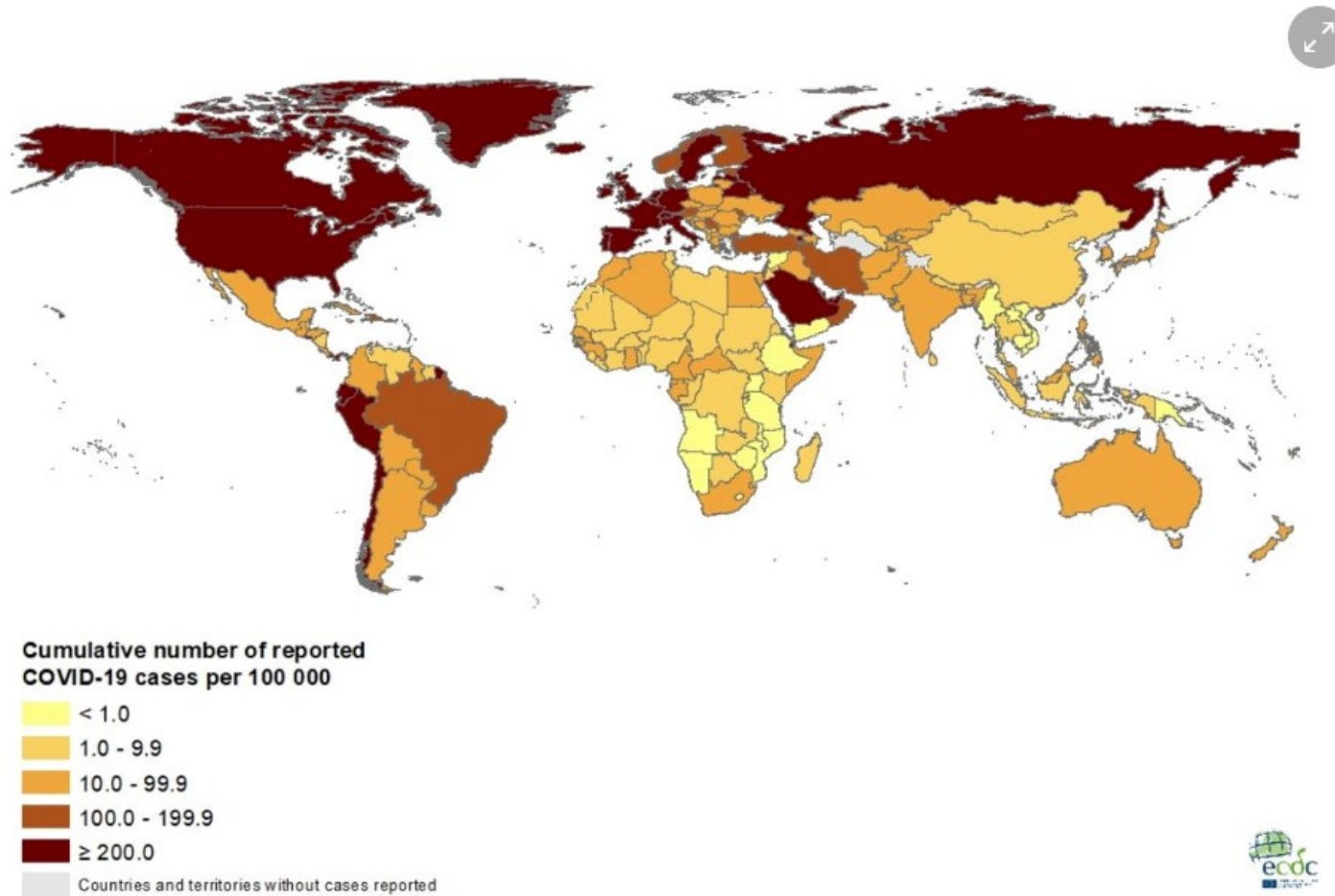
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June, 2020

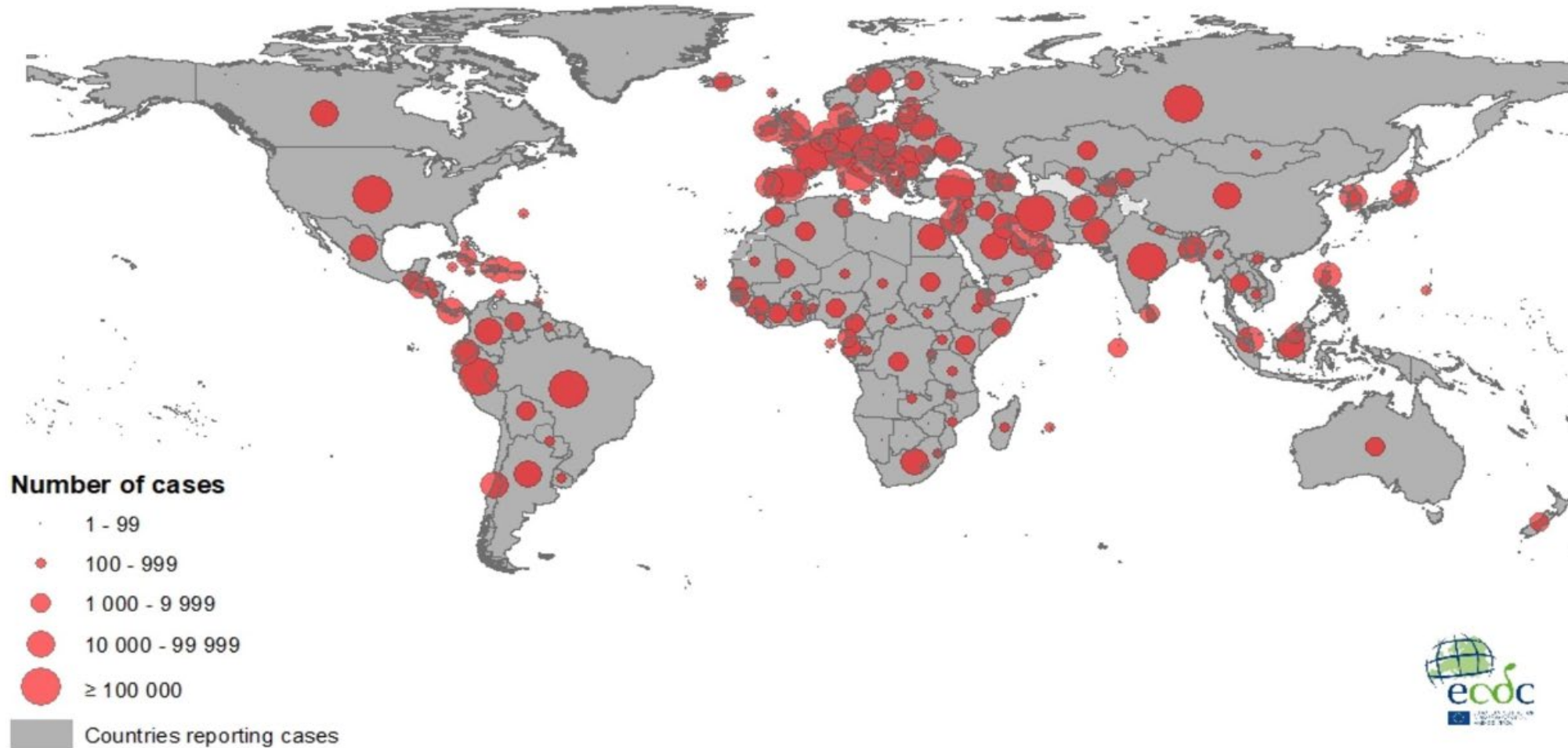
Outline

- Covid-19 & measles pandemics are sweeping the world
- How do economists think about responses? Quick review of
 - Externalities
 - Public goods
 - Free riding
- Vaccinations and anti-vaxxers
- Social distancing effects on other vaccination programs, pollution, production
- The tradeoff between social distancing and producing

Geographic distribution of cumulative number of reported COVID-19 cases per 100 000 population, worldwide, as of 26 May 2020



ECDC: Measles Cases

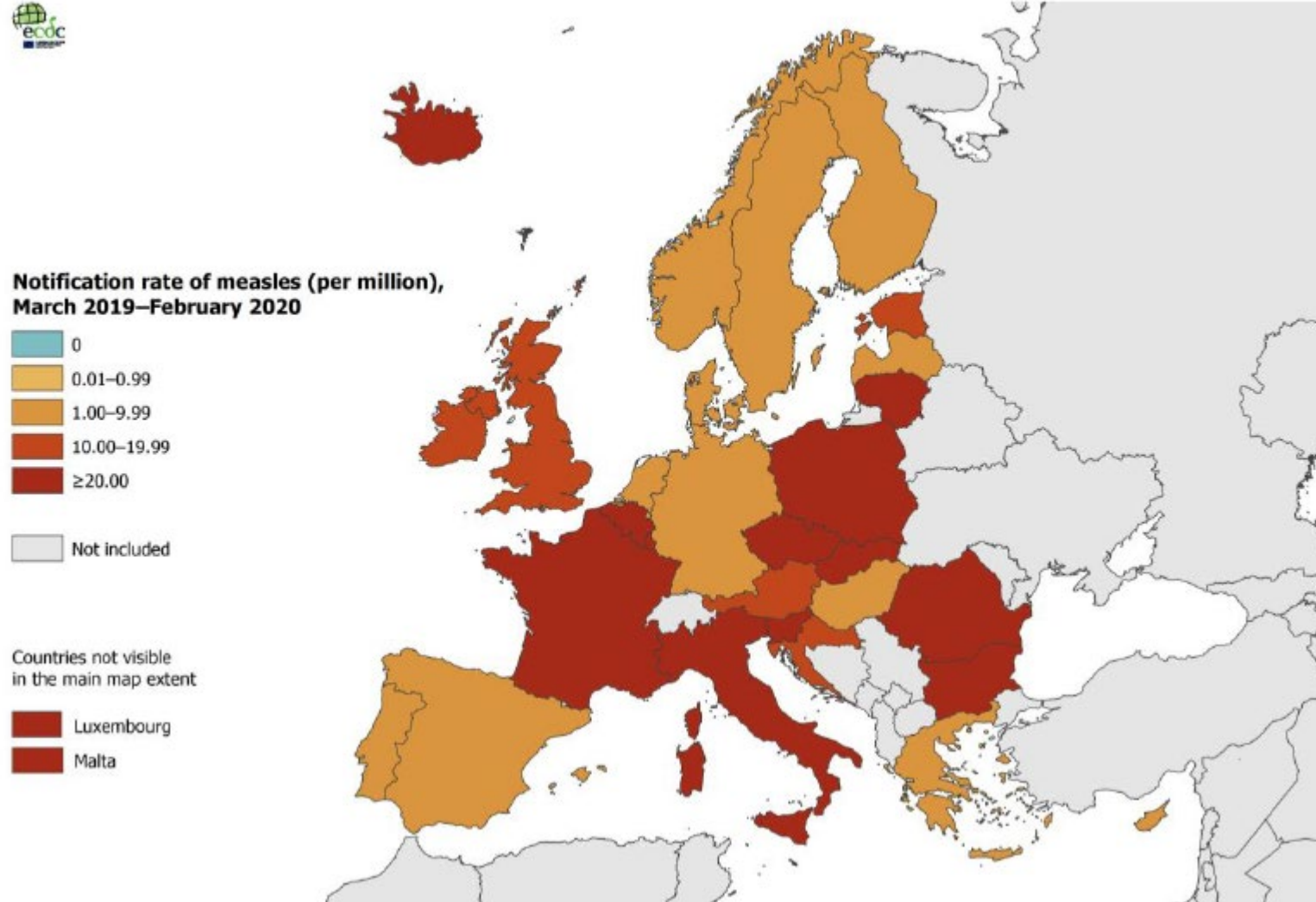


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The boundaries and names shown on this map do not imply official endorsement or acceptance by the European Union.

ECDC: Measles Notification Rate per Million

Figure 2. Measles notification rate per million population by country, EU/EEA and the UK, 1 March 2019–29 February 2020



Externality

- An **externality** is an uncompensated benefit or harm that results directly from an action of another person or firm (rather than indirectly through a change in price).
- Examples:
 - *Negative externality*: Driving a car produces pollution, which harms other people.
 - *Positive externality*: An attractive home benefits neighbors.



Positive Externalities

- To help prevent the spread of Covid-19 one can:
 - Wear face masks in public
 - Shelter in place—social distancing
 - Wash hands
 - Get a vaccine when available
- All these actions provide a positive externality: lowering the probability of infecting other people

Properties of goods

- A good is **rival** if only one person can consume it.
- A good is **exclusive** (or *excludable*) if its owner can prevent others from consuming it.
- Example: An apple
 - is rival: If Kari eats an apple, no one else can consume it.
 - is exclusive: Kari can keep others from taking her apple by, for example, locking it in her home or eating it.



Four types of goods

	Exclusive	Nonexclusive
Rival	Private good 	Common resources good 
Nonrival	Club good 	Public good 

Public goods

- A **public good** is nonrival and nonexclusive.
- Examples:
 - roads
 - national defense
 - parks
 - broadcast television and radio
(cable TV is a club good)



Herd Immunity

- **Herd immunity:** If a sufficiently large share of the population is immune to a contagious disease then the contagious disease cannot spread easily.
- An immune person provides a *positive externality* to others, lowering their probability of getting the disease.
- *Herd immunity is a public good.*



Herd Immunity Threshold Estimates

- According to most experts:
 - Measles: 92% to 95%
 - Covid-19: 60% to 90%
- Problems:
 - Over time, the virus mutates
 - Threshold rate is misleading if vulnerable people cluster
 - Covid-19: nursing homes, assisted living
 - Measles: children in schools

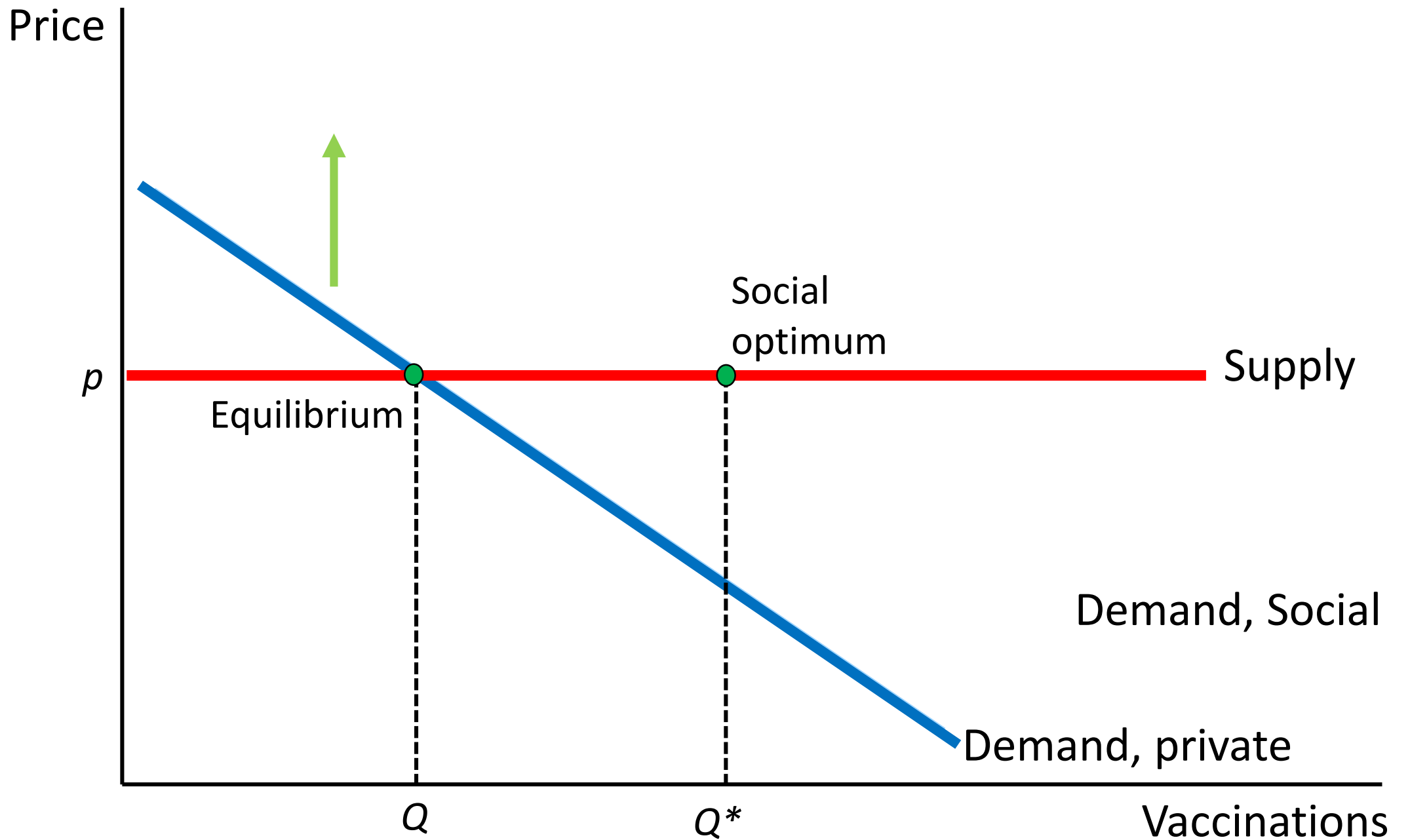
Covid-19 Herd Immunity: Antibodies

- New York City 19.9%
 - London 17.5%
 - Madrid 11.3%
 - Wuhan 10% (returning workers)
 - Boston 9.9%
 - Stockholm region 7.3%
 - Barcelona 7.1%
-
- *NY Times*, May 8, 2020: Studies represent best current estimates, but are inexact and may overestimate immunity where coronavirus infections are low. Sources: [New York State](#); [Public Health England](#); [Carlos III Health Institute](#); [Wu et al., Journal of Medical Virology](#); [City of Boston](#); [The Public Health Agency of Sweden](#).

Free Riding

- With public goods, people can **free ride**: benefit from the actions of others without paying.
- The people who do not pay for the public good benefit from a positive externality provided by people who pay.
- *A free rider*, who does not get vaccinated,
 - is protected by those who are vaccinated,
 - makes the herd more vulnerable.





Covid-19 Externality Estimates

- Bethune & Korinek, “Covid-19 Infection Externalities: Trading Off Lives vs. Livelihoods,” NBER, April 2020:
- With a vaccine:
 - private gain to vaccine €24,000.
 - social gain is €394,000.
- When using social distancing (when only 1% are infected initially):
 - private cost of an additional infection is €73,000.
 - social cost is €263,000 with testing to €528,000 without testing.

Measles



- Measles is very contagious: 90% who are exposed become infected.
- One sick person typically infects 12 to 18 others who lack immunity—hence the high herd immunity threshold.
- A sick person inflicts a *negative externality* on others.
- Before the measles vaccine (1963), measles infected 90% of children by the time they were 15.
 - Out of 1,000 children: 1 developed brain damage and 2 died.
 - 2.6 million people died every year

Measles Vaccine

- The vaccine eliminated measles in most of the world (we thought).
- But measles have reappeared
 - the vaccination rate dropped
 - 2009-2014, 93% of U.S. cases were due to citizens returning from travel abroad. Similarly in Europe.



Anti-Vaxxers

- Some people believe a discredited study that the measles vaccine causes autism.
 - The journal that published it retracted the paper.
 - The author was stripped of his medical license.
- Some people oppose all vaccines.
- Famous anti-vaxxers include Jessica Biel, Robert F. Kennedy Jr., Jenny McCarthy, Robert DeNiro, Donald Trump.

Anti-Vaxxers in Europe

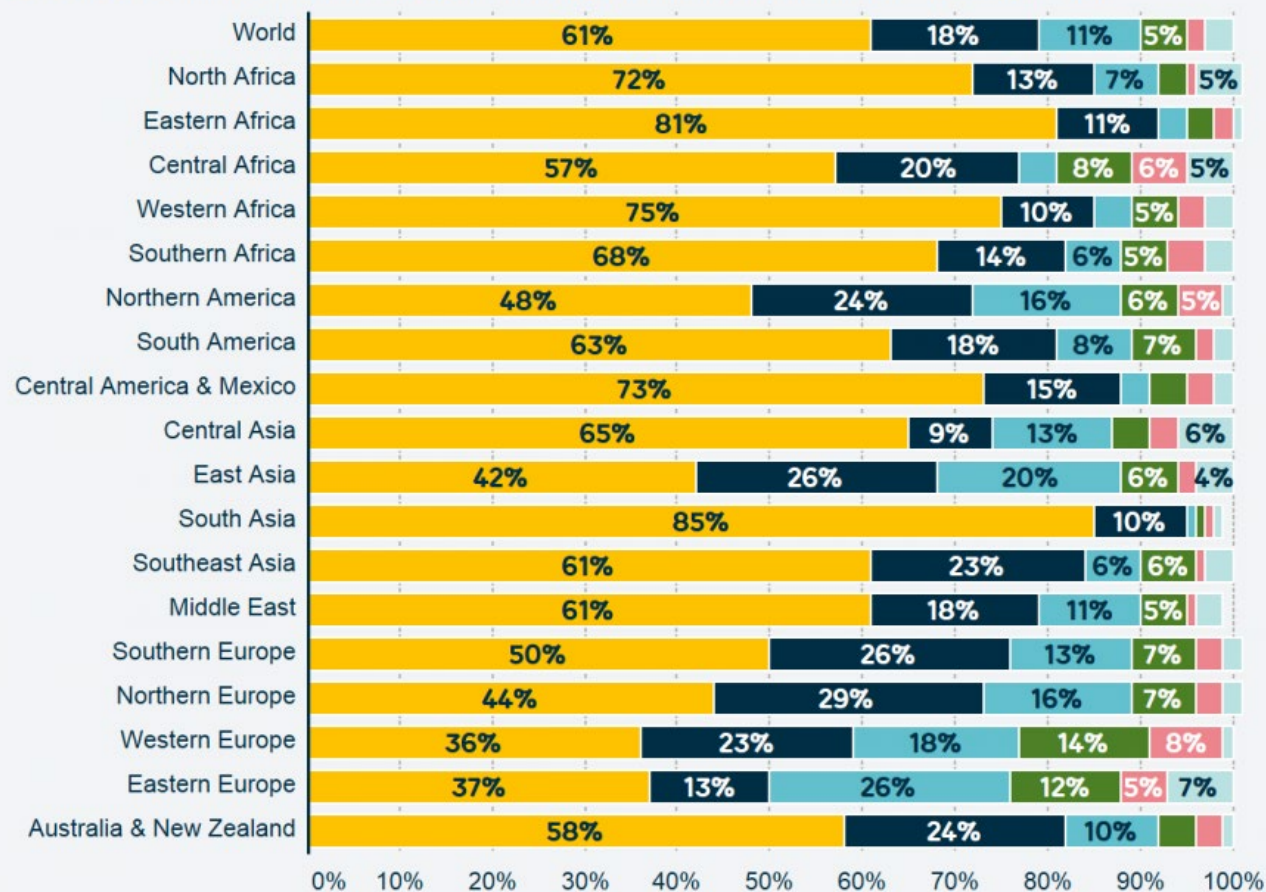


- Growing anti-vaxxer movement in Europe: social media, anti-establishment populists (Italy, France,...).
- Around a fifth of Europeans either disagree or are unsure that vaccines are safe.

Chart 5.2: Perceived safety of vaccines by region

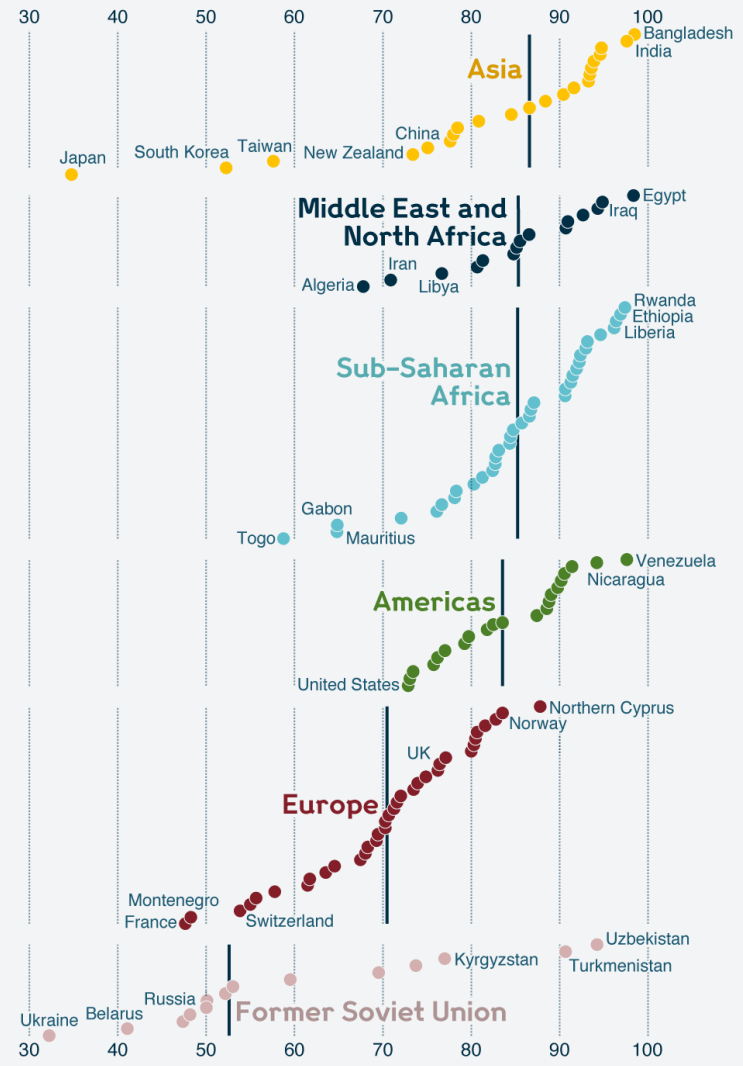
Percentage of people who answered 'strongly agree', 'somewhat agree', 'neither agree nor disagree', 'somewhat disagree', 'strongly disagree' or 'no opinion'

Do you agree, disagree, or neither agree nor disagree with the following statement? Vaccines are safe



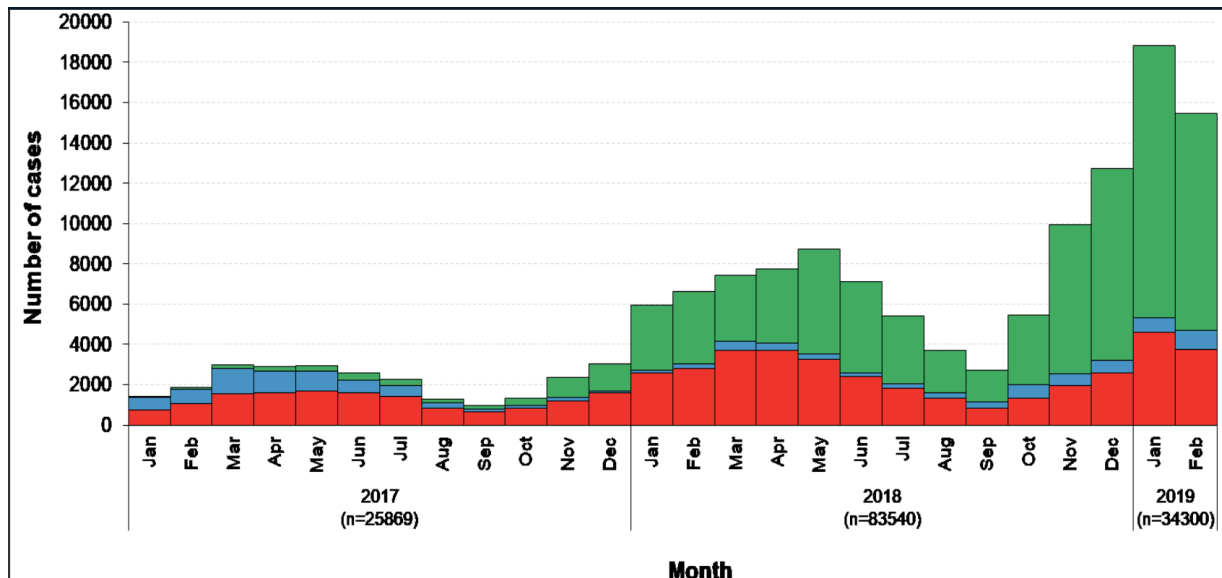
% of people who believe vaccines are safe, by country and global region

Dark vertical lines represent region medians



Anti-Vaxxers in Europe & Measles

- In 2018, 527,000 European children missed their first dose of the measles-containing vaccine.
- European measles cases spiked
 - 60,000 in 2018, more than double that in 2017.
 - 90,000 infected in the first half of 2019.
 - A large measles outbreak in Ukraine infected more than 25,000.



Monthly distribution and classification of measles cases, January 2017– February 2019, WHO European Region

Would you get a vaccine against Covid-19 if it became available?

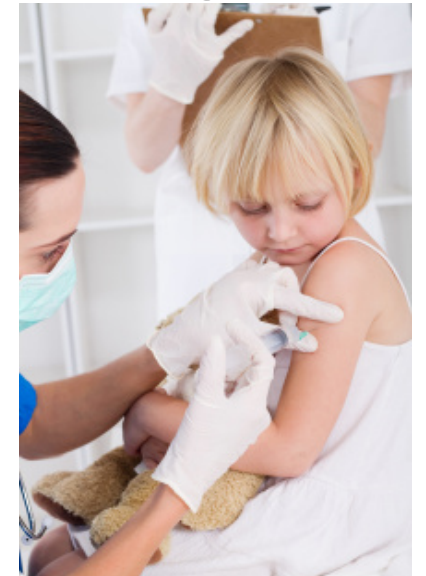
- Novak Djokovic says he may not play tennis again if he's required to take a Covid-19 vaccine to travel.
- The share that would not get vaccinated (The Vaccine Confidence Project and ORB International, Washington Post-ABC news poll):
 - 20% Switzerland
 - 18% France
 - 16% Austria
 - 9% Germany
 - 7% UK
 - 27% U.S.

Covid-19 Social Distancing Spillover Effects

- Other vaccination programs
- Pollution
- Production

Pandemic and Vaccination Programs

- More than half (53%) of 129 countries reported moderate-to-severe disruptions or total suspension of routine vaccination services, March-April 2020.
- The immunization rate for all recommended childhood vaccines fell 40% in the U.S. (late February through mid-April).
- Border closures and travel disruptions have led to vaccine shortages in at least 21 low and middle-income countries.



Social Distancing and Pollution: Positive Externality from Lockdowns

- **United States** (Cicala-Holland-Mansure-Muller-Yates, “Expected Health Effects of Reduced Air Pollution from COVID-19 Social Distancing,” NBER May 2020.):
 - Social distancing caused U.S. vehicle travel to fall 40% and electricity use by 6% by mid-April.
 - Estimate: Expected premature deaths due to air pollution declined by about 360 deaths (25%).
- **Europe** (Lauri Myllyvirta, lead analyst at the Helsinki-based Centre for Research on Energy and Clean Air): Improved air quality resulted in health benefits equivalent to avoiding 11,300 premature deaths.

Social Distancing and GDP

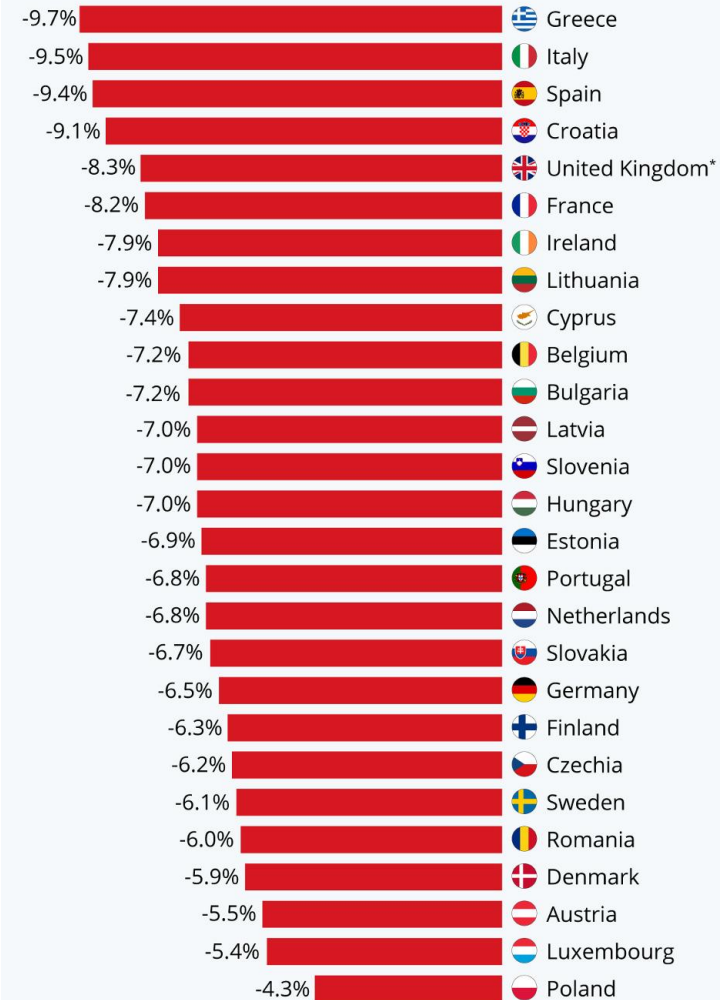
- Gross domestic product (GDP) measures the value of output sold in markets.
- All countries report major drops in GDP due to sheltering-in-place.
- European Commission forecast for EU:
 - Current quarter: Real GDP this quarter will be 16% lower than the last quarter of 2019.
 - 2020: Real GDP down 7.4% (previously forecast to be up 1.2%)
 - 2021: Real GDP up 6.1%.

<https://specials-images.forbesimg.com/imageserve/5eb3d038e249d2000639d413/960x0.jpg>

Norway -5.5%

COVID-19 Wreaks Economic Havoc Across Europe

Spring 2020 GDP growth forecast for the EU
(as of May 06, 2020)



* The United Kingdom formally left the EU on Jan 31, 2020.

Source: European Commission



Keep Living vs. Keep on Earning a Living

- Lacking a vaccine, should we use social distancing that harms economic and social activity or end it and risk the loss of millions of lives?
- Would we reopen Pandora's Box?



Tradeoff: Social Distancing vs. Reopen the Economy

- One group argues we should reopen the economy quickly. That results in more people dying soon (in a second wave), but more employment and production now.
- Another group argues for going slowly. That saves lives now, but prolongs the duration of the pandemic.



Winners & Losers: Targeting

- Reopening winners and losers:
 - Older people have more to lose by ending social distancing.
 - Young people lose more from shutting down the economy.
- Targeted Lockdown (Acemoglu, et al. “A Multi-Risk SIR Model with Optimally Targeted Lockdown,” NBER, 2020).
 - Broad-based vs. targeted lockdown of just elderly.
 - Keeping adult mortality $< 0.2\%$ would reduce GDP by 37.3% (Broad) or 24.8% (Targeted).
 - Keeping economic damage $< 10\%$ would raise mortality to 1% (Broad) or 0.48% (Targeted).

Some Estimates

- If Denmark and Norway had implemented Sweden's more lenient social distancing measures, the peak number of hospitalizations would have been 133% higher in Denmark and 231% higher in Norway (Juranek & Zoutman, "The Effect of Social Distancing Measures on the Demand for Intensive Care: Evidence on COVID-19 in Scandinavia," CESifo, April 2020).
- **Comparing South Korea to UK** (Aum, Lee, Shin, "Inequality of Fear and Self-Quarantine," NBER, May 2020):
 - A premature lifting of lockdown causes infections to rise and people choose to work at home—so output may not increase.
 - A longer lock-down eventually mitigates GDP losses as well as flattening the curve.
 - If UK had used South Korea's policies (earlier lockdown, aggressive testing & tracking, rather than a later blanket lockdown), GDP losses and infections would have been smaller in the short run and the long run.

Government Relaxation of Social Distancing Rules May Have Limited Effect

- Across many countries, people social distanced on their own before the governments imposed restrictions.
 - Norway: The effects of social distancing measures quickly spread to industries that were not directly affected by policy. (Alstadsæter, et al., “The First Weeks of the Coronavirus Crisis, Evidence from Norway,” NBER, May 2020.)
 - Sweden: Most of the drop in movie spending occurred before government intervention. (Maloney & Taskin, “Determinants of Social Distancing and Economic Activity during Covid-19,” World Bank, May 2020.)
- Polls indicate that after government relax social distancing rules, many people would continue to shelter in place.
- Euronews poll:
 - 29% in France, 42% in Germany, and 28% in Italy think lockdown is being “eased too quickly.”
 - 51% in France, 17% in Germany, and 40% in Italy do not think it is safe to leave home.

How Much Has GDP Fallen?

- Gross domestic product (GDP) measures the value of output sold in markets.
- All countries are reporting major reductions in GDP due to the sheltering-in-place.
- But, GDP does not include the value of lives saved (“opportunity cost”).



Estimated Savings from Sheltering in Place

- Greenstone & Nigam, “Does Social Distancing Matter?” NBER 2020, March 2020.
- The mortality savings per U.S. household would be €54,700 from 3-4 months of moderate distancing.

Wolfers' Thought Experiment

- A new pill can protect you from the virus.
- It has side-effects: you cannot safely drive or take other forms of transportation or leave your home.
- Suppose everyone is willing to pay €25 per day for the pill.
- Its worth more than that to society because protecting you helps protect others (positive externality).
- EU payments to a European drug company add €6.8 trillion to GDP.

Thank You

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kiitos
blagodarya
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Merci
dekui
gracias
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Danke
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