

COVID-19: Briefing materials

Global health and crisis response

Updated: October 30, 2020

Current as of October 7, 2020

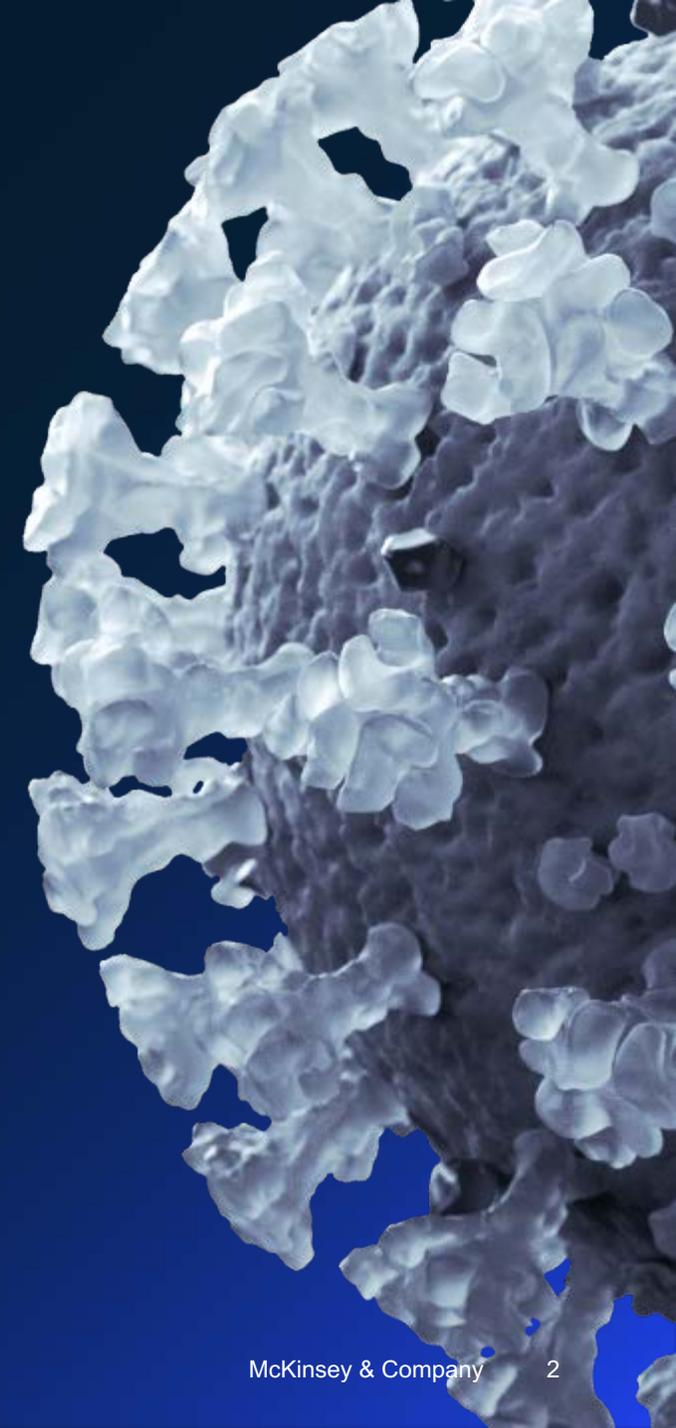
COVID-19 is, first and foremost, a global humanitarian challenge.

Thousands of health professionals are heroically battling the virus, putting their own lives at risk. Governments and industry are working together to understand and address the challenge, support victims and their families and communities, and search for treatments and a vaccine.

Companies around the world need to act promptly.

This document is meant to help senior leaders understand the COVID-19 situation and how it may unfold, and take steps to protect their employees, customers, supply chains, and financial results.

[Read more on McKinsey.com](#) →



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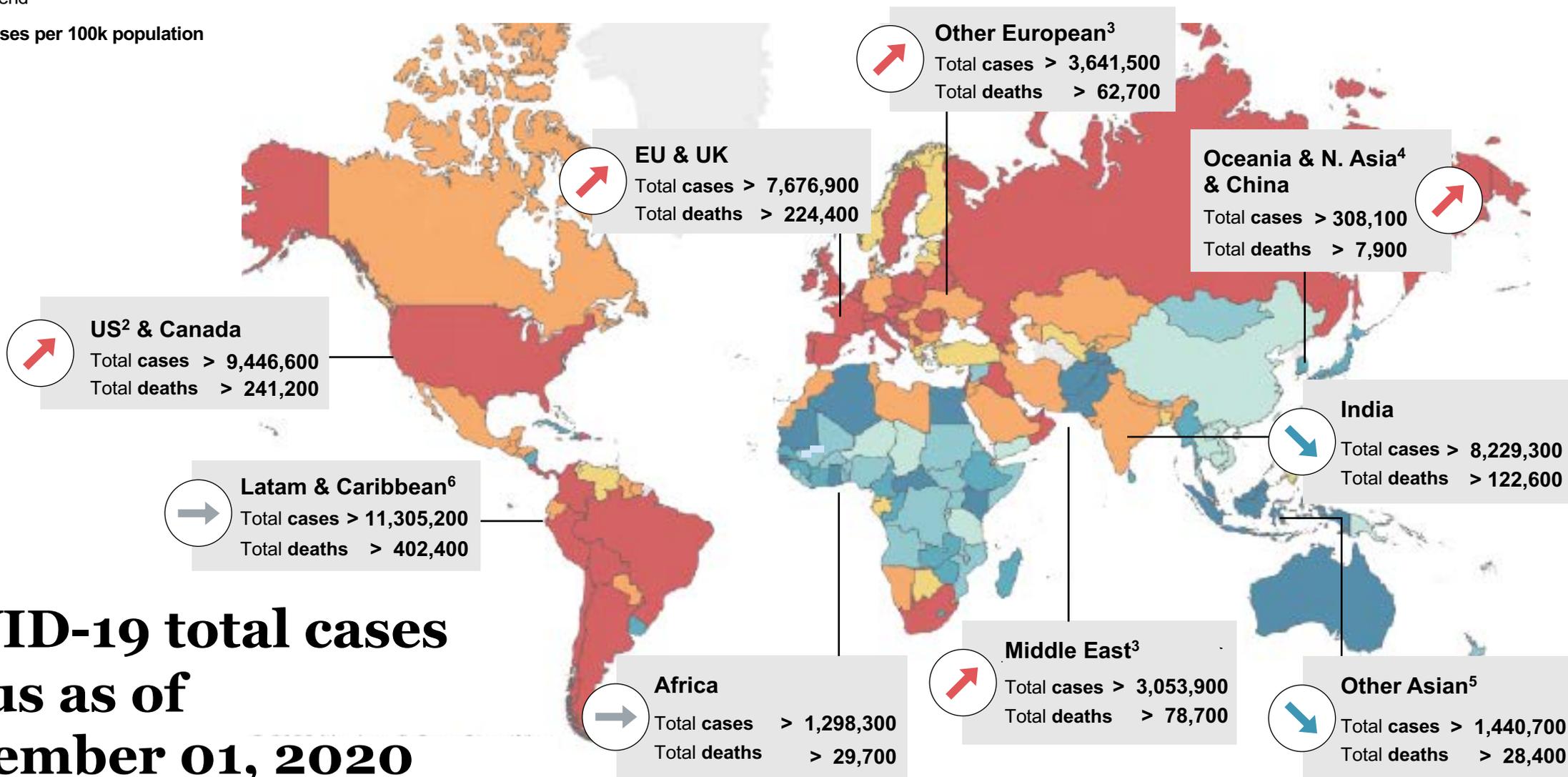
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Snapshot of the present: COVID-19 pandemic in numbers

Outlook: when the epidemic might functionally end

Propagation trend¹

Total reported cases per 100k population



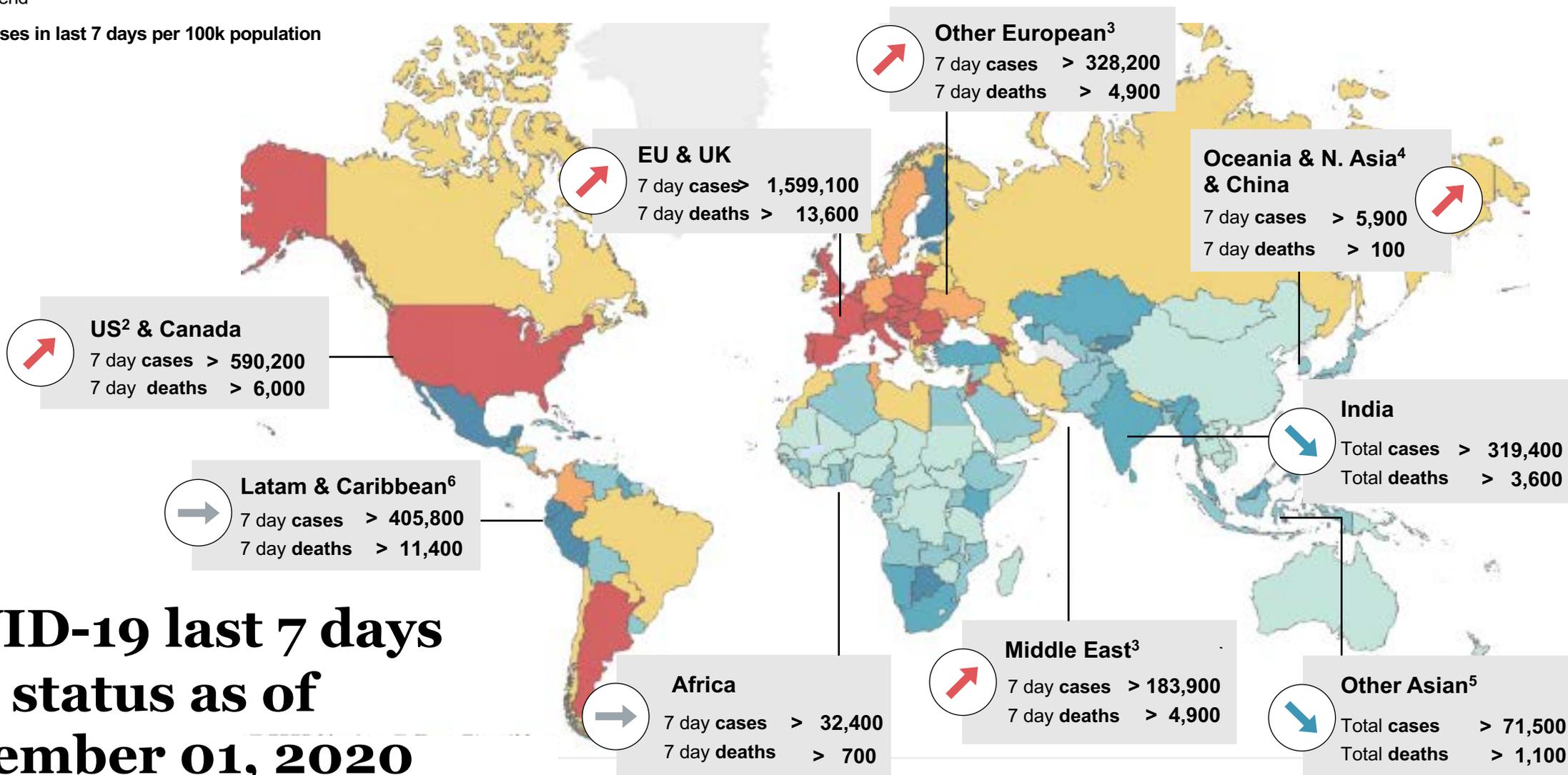
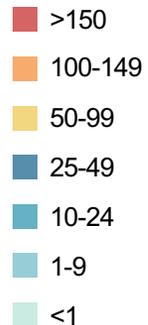
COVID-19 total cases status as of November 01, 2020

1. Increasing: > 10% increase in cumulative incremental cases over last 7 days, compared to incremental cases over last 8-14 days; stabilizing: -10% ~ 10%; decreasing: < -10%; if difference in incremental cumulative cases over last 7 days vs 8-14 days is less than 100, stabilizing; 2. Includes Puerto Rico and US Virgin Islands; 3. All remaining European countries, including Russia; 4. Includes Japan, Singapore, and South Korea; 5. All remaining Asian countries, not including Russia; 6. Includes European territories in the Caribbean

Source: Statistics collected from various national centers for public health and select academic institutions (e.g. Johns Hopkins). Specific sources available upon inquiry. The boundaries and names shown on maps do not imply official endorsement or acceptance by McKinsey & Company.

Propagation trend¹

Total reported cases in last 7 days per 100k population



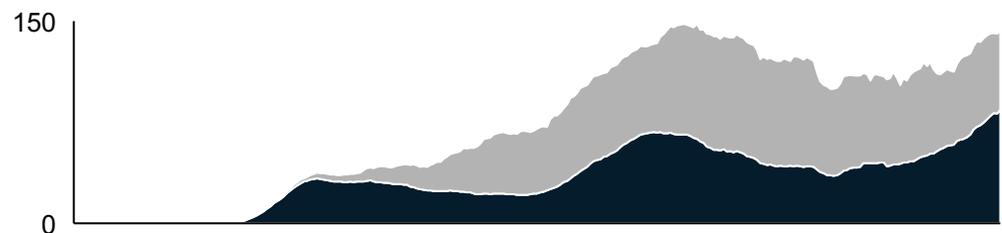
COVID-19 last 7 days case status as of November 01, 2020

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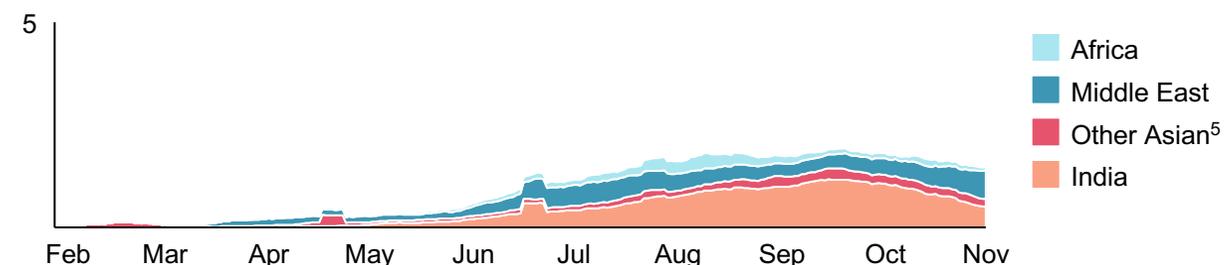
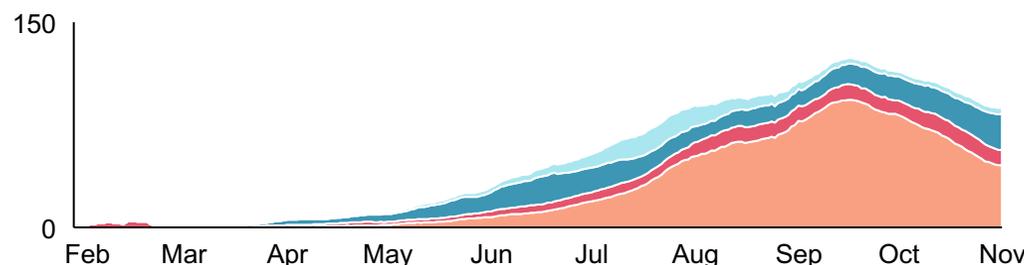
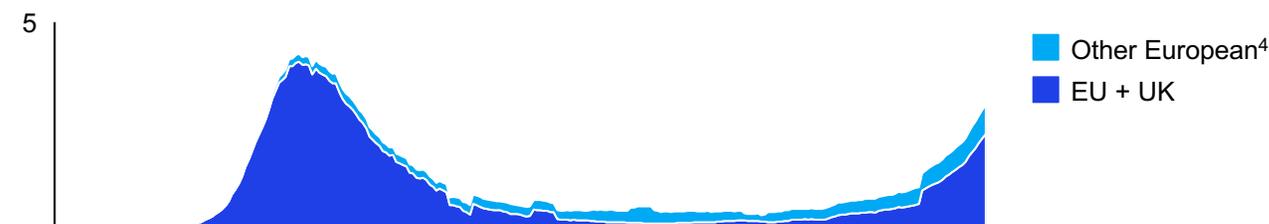
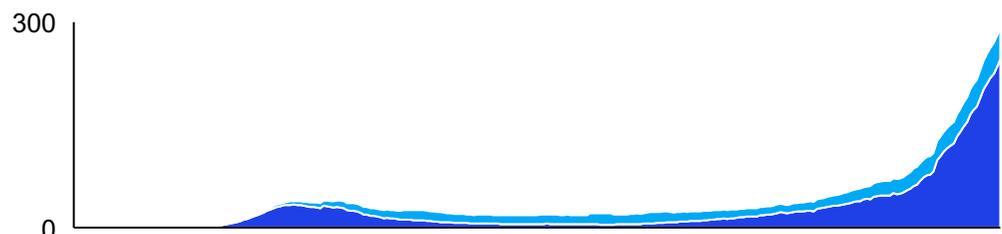
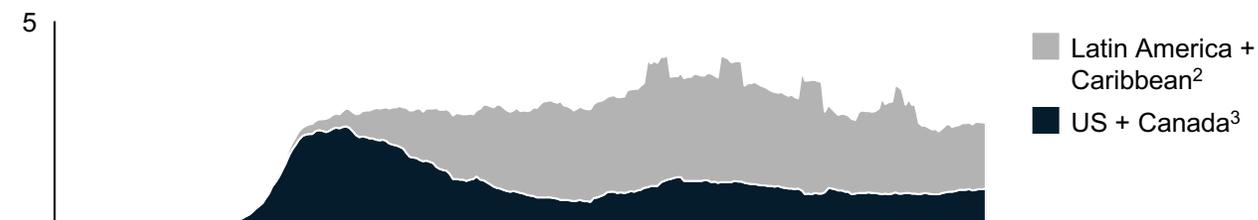
Source: Statistics collected from various national centers for public health and select academic institutions (e.g. Johns Hopkins). Specific sources available upon inquiry. The boundaries and names shown on maps do not imply official endorsement or acceptance by McKinsey & Company.

The global distribution of new COVID-19 cases and deaths has shifted over the last months

Daily new cases¹ in thousands in each country/region



Daily new deaths¹ in thousands in each country/region



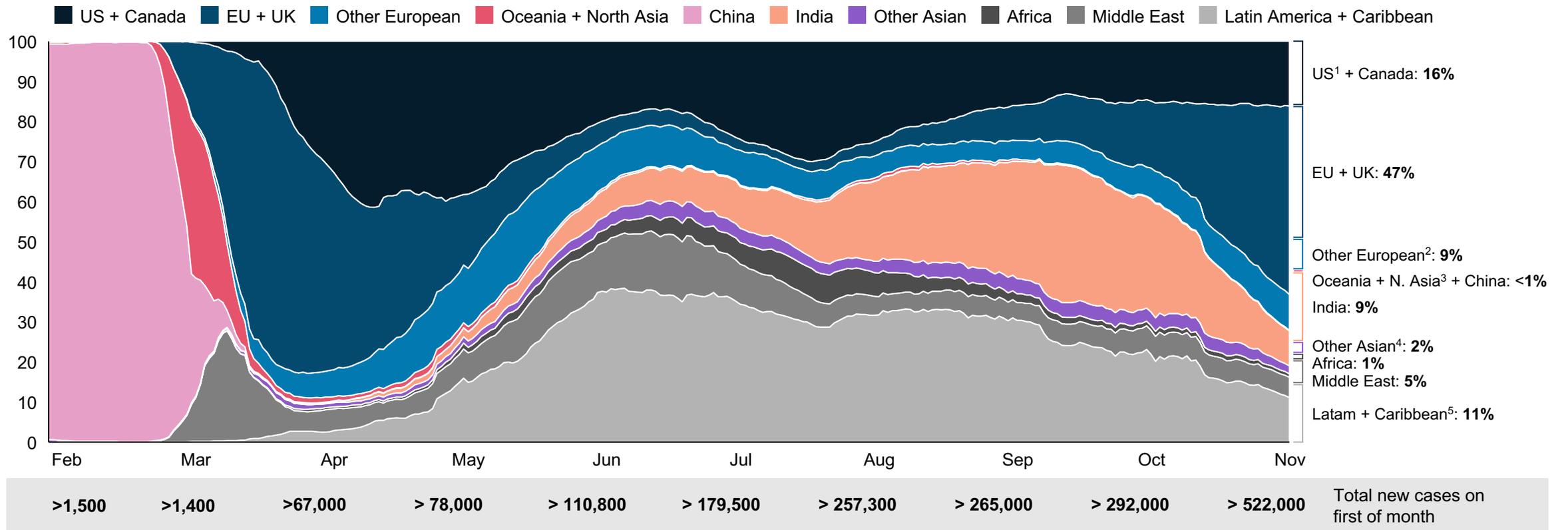
>1.5	>1.4	>67	>78	>110	>179	>257	>265	>292	>522	>0.03	>0.07	>4.0	>5.5	>4.0	>4.3	>5.6	>5.3	>5.6	>6.9	Total on 1 st of month
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1. Data points shown as 7 days moving average to account for reporting differences (e.g., reporting only once per week); 2. Includes European territories in the Caribbean; 3. Includes Puerto Rico and US Virgin Islands; 4. All remaining European countries, including Russia; 5. All remaining Asian countries, not including Russia

The global distribution of new COVID-19 cases has shifted over the last months

Proportion of new cases is shifting from Europe to predominantly Latin American and Asian countries (excluding China, Japan, Singapore and South Korea)

Daily new cases⁶ in each country/region as a % of global daily new cases

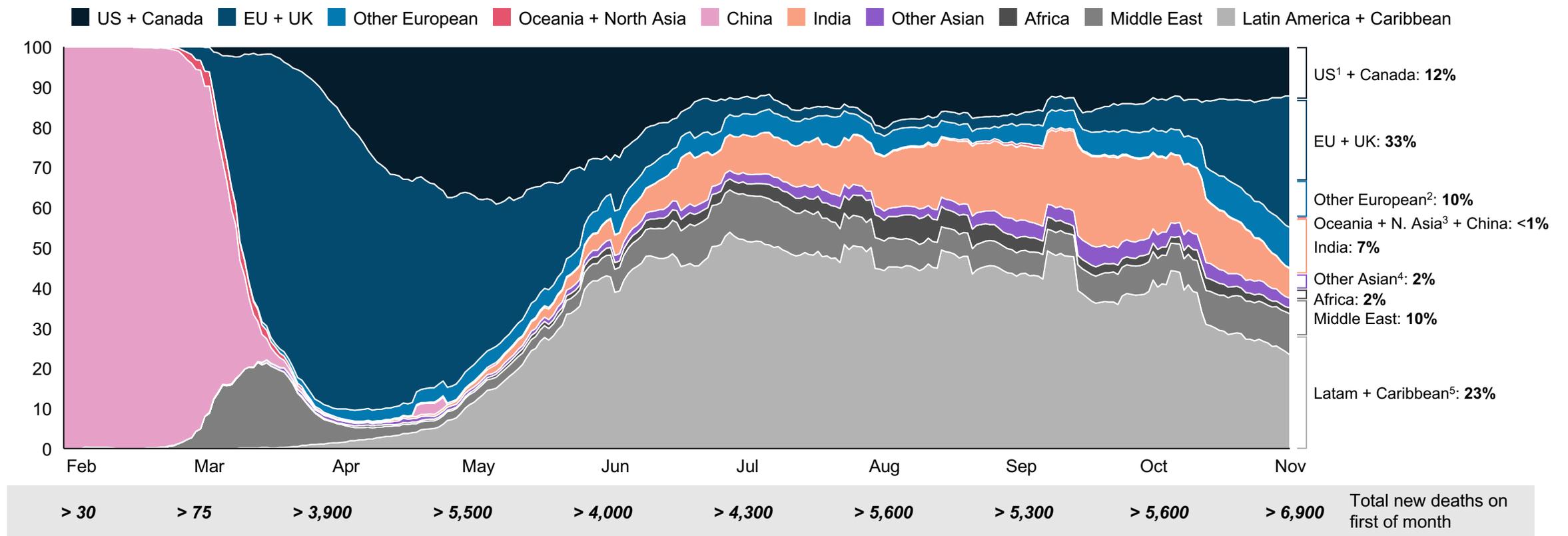


1. Includes Puerto Rico and US Virgin Islands; 2. All remaining European countries, including Russia; 3. Includes Japan, Singapore, and South Korea; 4. All remaining Asian countries, not including Russia; 5. Includes European territories in the Caribbean; 6. Data points shown as 7 days moving average to account for reporting differences (e.g., reporting only once per week), July 3 data not shown since UK adjusted case numbers.

COVID-19 global death distribution shows differential outcomes across regions

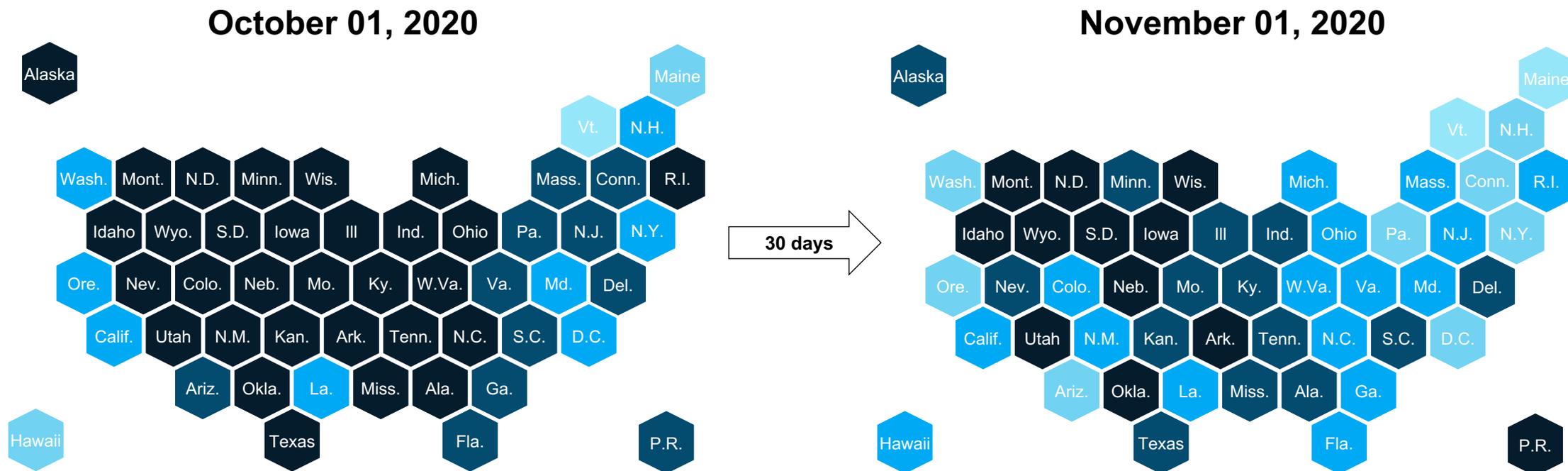
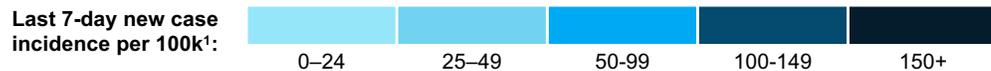
Latam/Caribbean, US/Canada, and Asian countries (excluding China, Japan, Singapore and South Korea) display an increased share of daily new deaths

Daily new cases⁶ in each country/region as a % of global daily new cases



1. Includes Puerto Rico and US Virgin Islands; 2. All remaining European countries, including Russia; 3. Includes Japan, Singapore, and South Korea; 4. All remaining Asian countries, not including Russia; 5. Includes European territories in the Caribbean; 6. Data points shown as 7 days moving average to account for reporting differences (e.g., reporting only once per week), April 22 and 28 were excluded since major number adjustments were carried out on those days.

COVID-19 cases in the US have varied over the last month

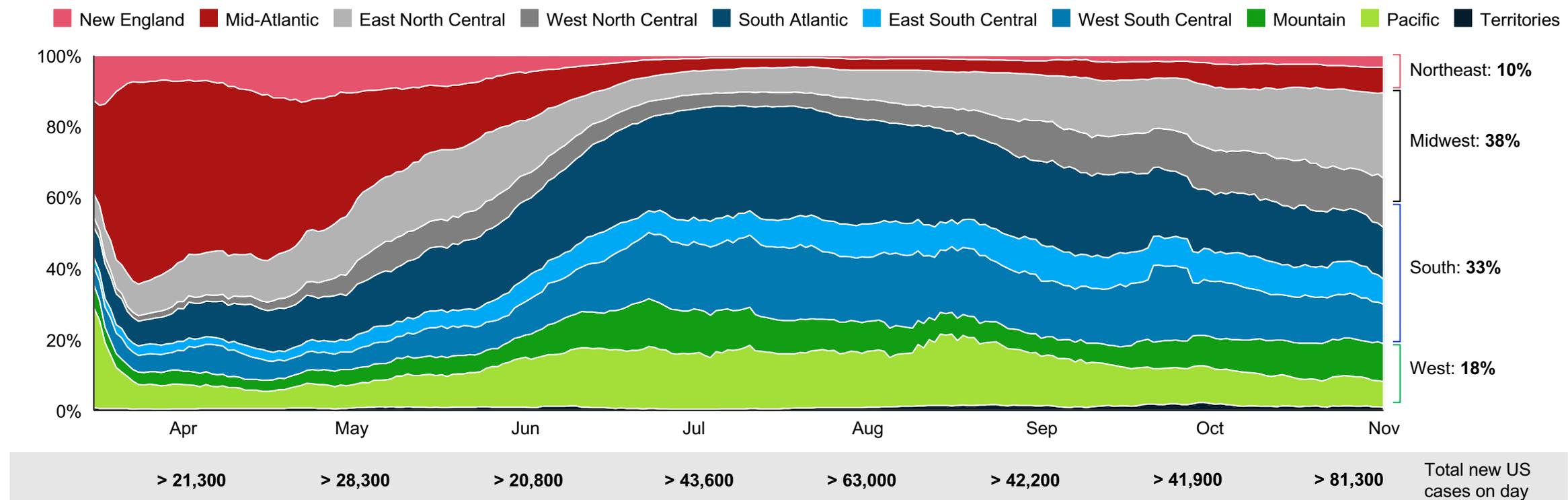


1. Defined as new cases over the 7 days prior to indicated date per 100k population

Source: Statistics collected from various national centers for public health and select academic institutions (e.g. Johns Hopkins). Specific sources available upon inquiry

The distribution of new cases in the US has shifted from the Northeast to the Southern and Western states

Daily new cases as a % of total¹ US daily new cases, by US regional divisions



The Northeast includes New England (MA, CT, RI, VT, NH, ME) and the Mid-Atlantic states (NY, NJ, PA)

The Midwest includes the East North Central states (MI, OH, IN, IL, WI) and the West North Central states (MN, IA, MO, ND, SD, NE, KS)

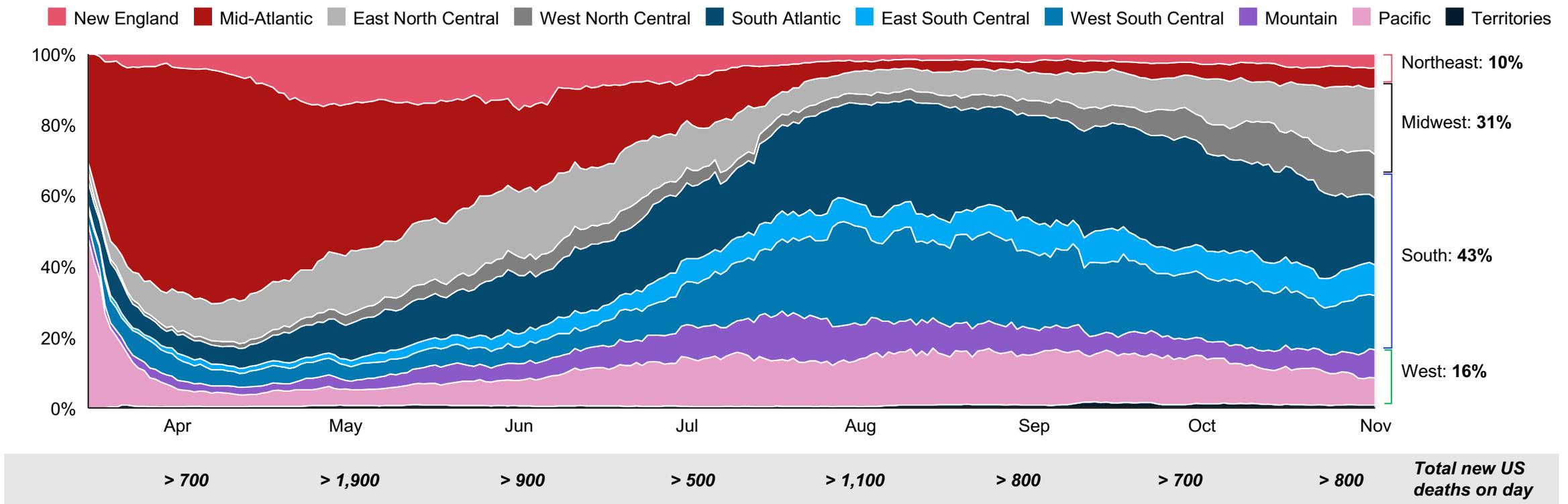
The South includes the South Atlantic states (WV, MD, DE, VA, NC, SC, GA, FL), the East South Central states (KY, TN, MS, AL) and the West South Central states (TX, OK, AR, LA)

The West includes the Mountain states (MT, ID, WY, NV, UT, CO, NM, AZ) and the Pacific states (CA, OR, WA)

1. Data points shown as 7 days moving average to account for reporting differences (e.g., reporting only once per week)

The distribution of new deaths in the US follows a similar trend as number of cases with a significant time lag

Daily new deaths as a % of total¹ US daily new cases, by US regional divisions



The Northeast includes New England (MA, CT, RI, VT, NH, ME) and the Mid-Atlantic states (NY, NJ, PA)

The Midwest includes the East North Central states (MI, OH, IN, IL, WI) and the West North Central states (MN, IA, MO, ND, SD, NE, KS)

The South includes the South Atlantic states (WV, MD, DE, VA, NC, SC, GA, FL), the East South Central states (KY, TN, MS, AL) and the West South Central states (TX, OK, AR, LA)

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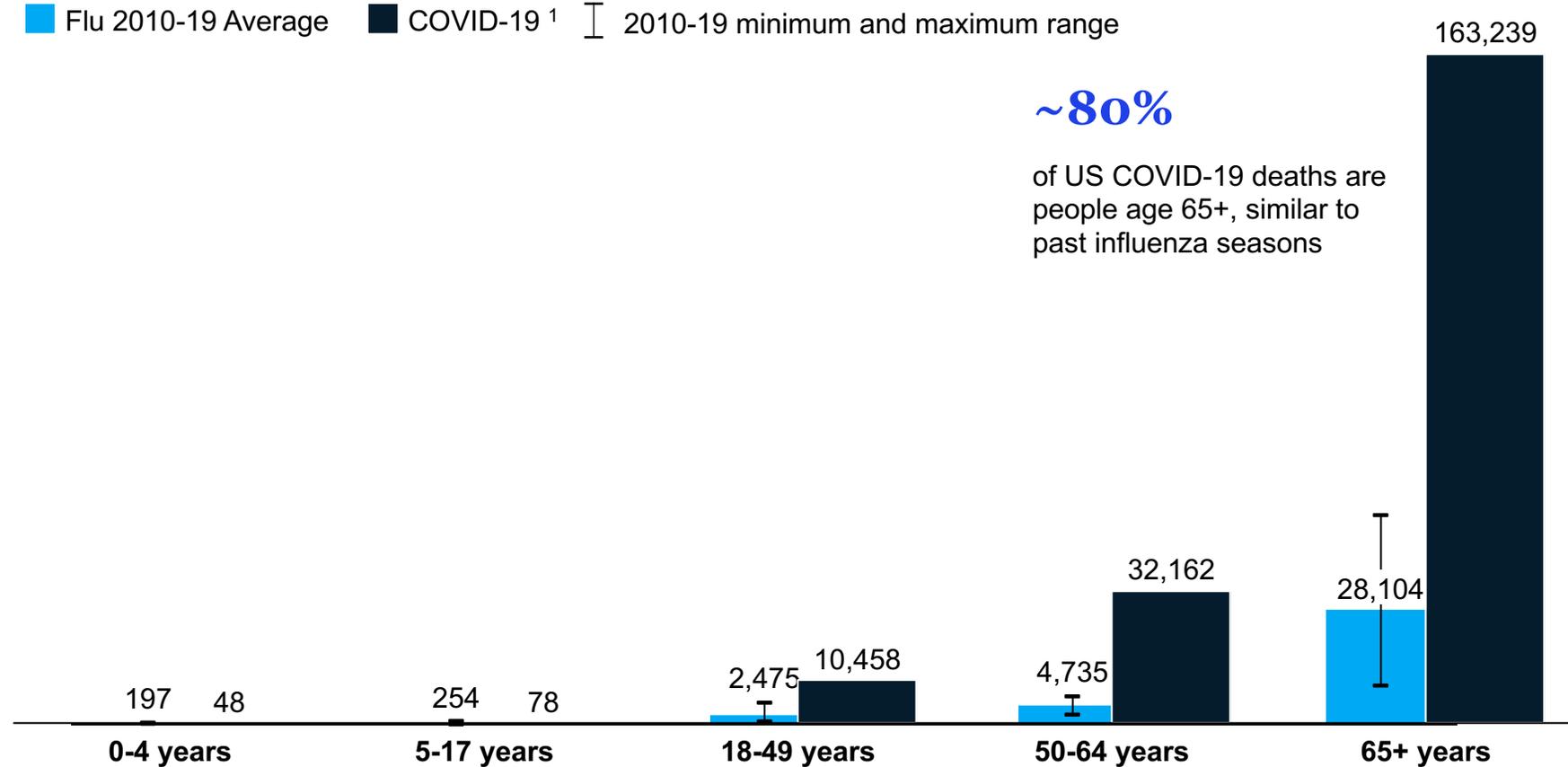
1. Data points shown as 7 days moving average to account for reporting differences (e.g., reporting only once per week).

COVID-19 has been responsible for more US deaths than the past five flu seasons combined

Mortality age distribution is similar to influenza, most severely impacting older adults

US deaths by age group

■ Flu 2010-19 Average
 ■ COVID-19 ¹
 2010-19 minimum and maximum range



Implications

COVID-19 is much deadlier than the flu

Older people face higher mortality from COVID-19 than younger people, which could be a result of increased comorbidities and generally weaker immune systems. The same is true of influenza

~25% of US COVID-19-related deaths have happened in nursing homes and long-term care facilities including residents and staff, possibly resulting from increased exposure and higher vulnerability

1. Data quality and reporting practices vary by geography - total number of COVID-19 deaths by age scaled proportionally to equal total number of COVID-19 reported deaths

The number of COVID-19 cases may be similar to a flu season, depending on detection rates, but mortality is more severe

Average flu season (2010-2019) vs. COVID-19 (Feb-Aug), US

Estimated cases



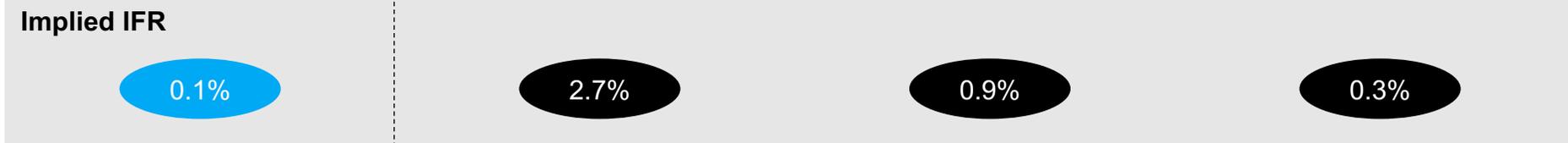
Hospitalizations



Deaths



Implied IFR



Flu est. annual average 2010-2019¹

COVID-19 Confirmed cases 1:1 CDR

COVID-19 3:1 CDR

COVID-19 10:1 CDR



Implications

Current COVID-19 case numbers may currently fall within the range of past flu seasons, depending on Case Detection Rate (actual cases divided by confirmed cases – displayed here as 1:1, 3:1, and 10:1);

COVID-19 is **much more severe**, particularly in terms of mortality rates, which range from 2-25x that of the flu in the scenarios presented here

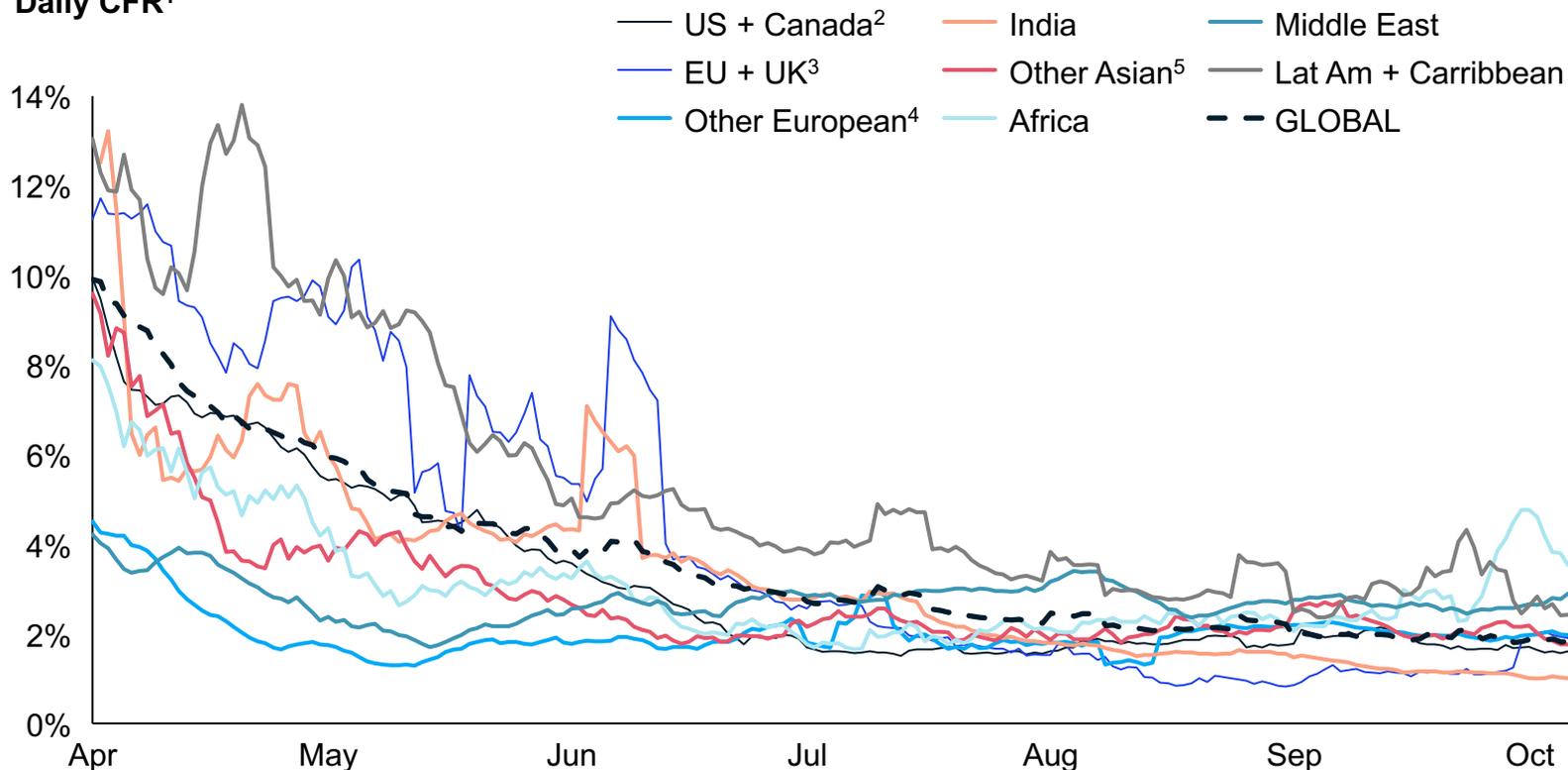
Hospitalization rates, however, may be similar or even lower than past flu seasons depending on CDR

1. Estimates for these seasons are preliminary and may change as data are finalized

The daily COVID-19 Case Fatality Rate (CFR) is approaching 2% globally and converging across regions

All regions have experienced a steady decline in their daily CFR since April

Daily CFR¹



CFR interpretation

$$CFR^1 = \frac{\text{Confirmed deaths}}{\text{Confirmed cases}}$$

CFR should not be confused by the Infection Fatality Rate (IFR) which predicts probability of someone dying from COVID-19

$$IFR = \frac{\text{Total deaths}}{\text{Total cases}}$$

IFR is currently estimated at ~0.5-1%, although it will remain imprecise

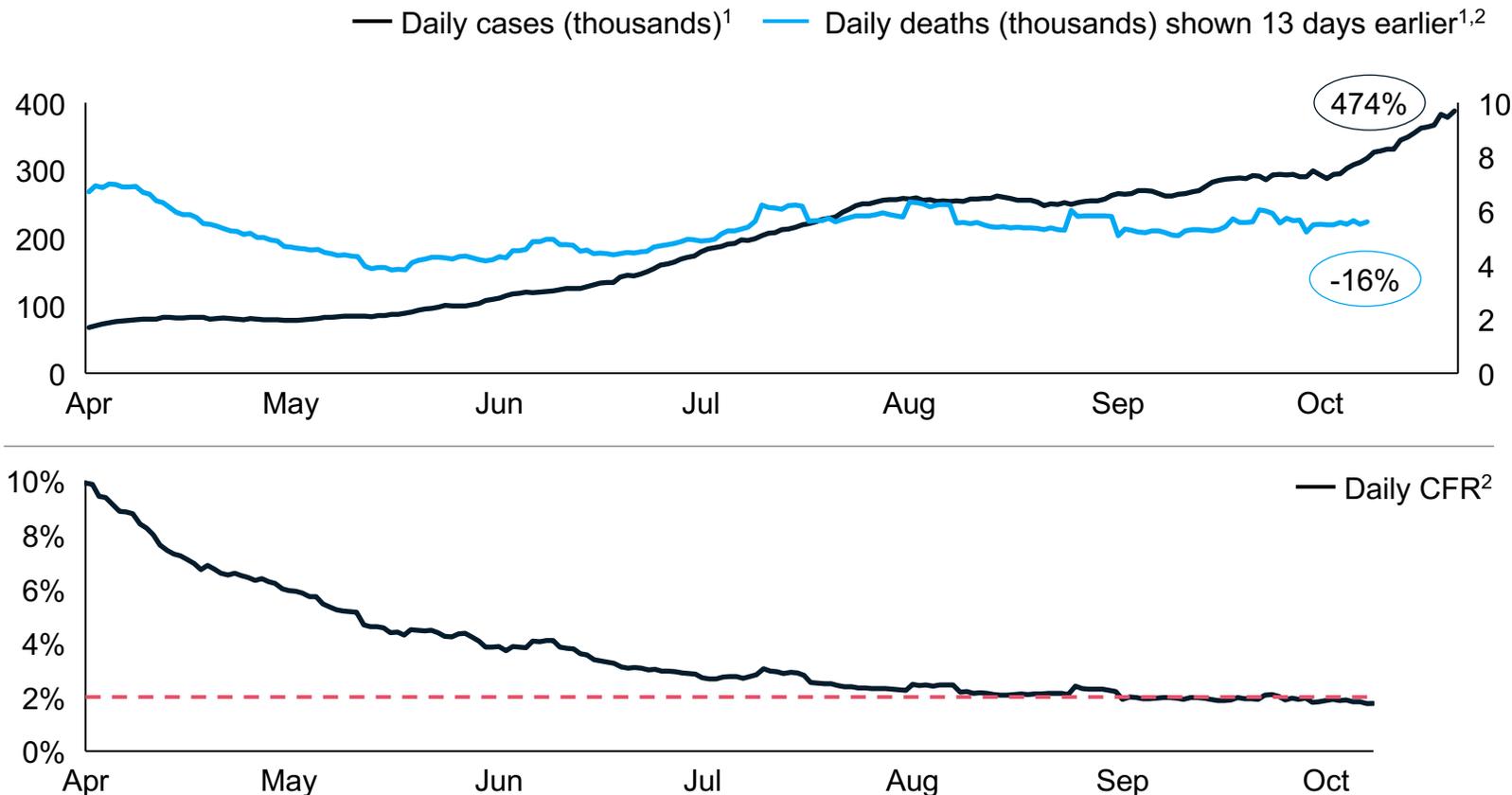
Multiple reasons can lead to **differential CFR rates across regions and over time**, including testing strategies, differences in effectiveness of health systems, evolution and improvement of standard of care, median age of population, discrepancies in attribution of a fatality to COVID-19

1. Daily CFR is calculated with a 13 day lag from cases to deaths (e.g. CFR for April 1 = deaths on April 14 / cases on April 1), uses 7 days moving average for cases and deaths to account for reporting differences;
 2. Includes Puerto Rico and US Virgin Islands; 3. Includes European territories in the Caribbean; 4. All remaining European countries, including Russia; 5. All remaining Asian countries, not including Russia

The Global COVID-19 Case Fatality Rate (CFR) has been declining since April approaching 2%

○ Growth from Apr 1 to current date

Trend in confirmed cases and deaths has led to a decrease in daily CFR



CFR interpretation

The steady decrease in daily CFR since April has come from an increase in daily cases of ~300% (from 60k+ to 250k+), while daily deaths has stayed fairly constant (from 6k+ to 5k+)

CFR is suspected to be decreasing primarily³ because of a combination of:

1. Increased testing leading to greater **case identification** (e.g. more asymptomatic and less severe cases),
2. Different **age mix** of new cases from different behaviors by age groups (i.e., younger people at less risk)
3. Better **treatment** of patients (this would also fundamentally alter IFR)

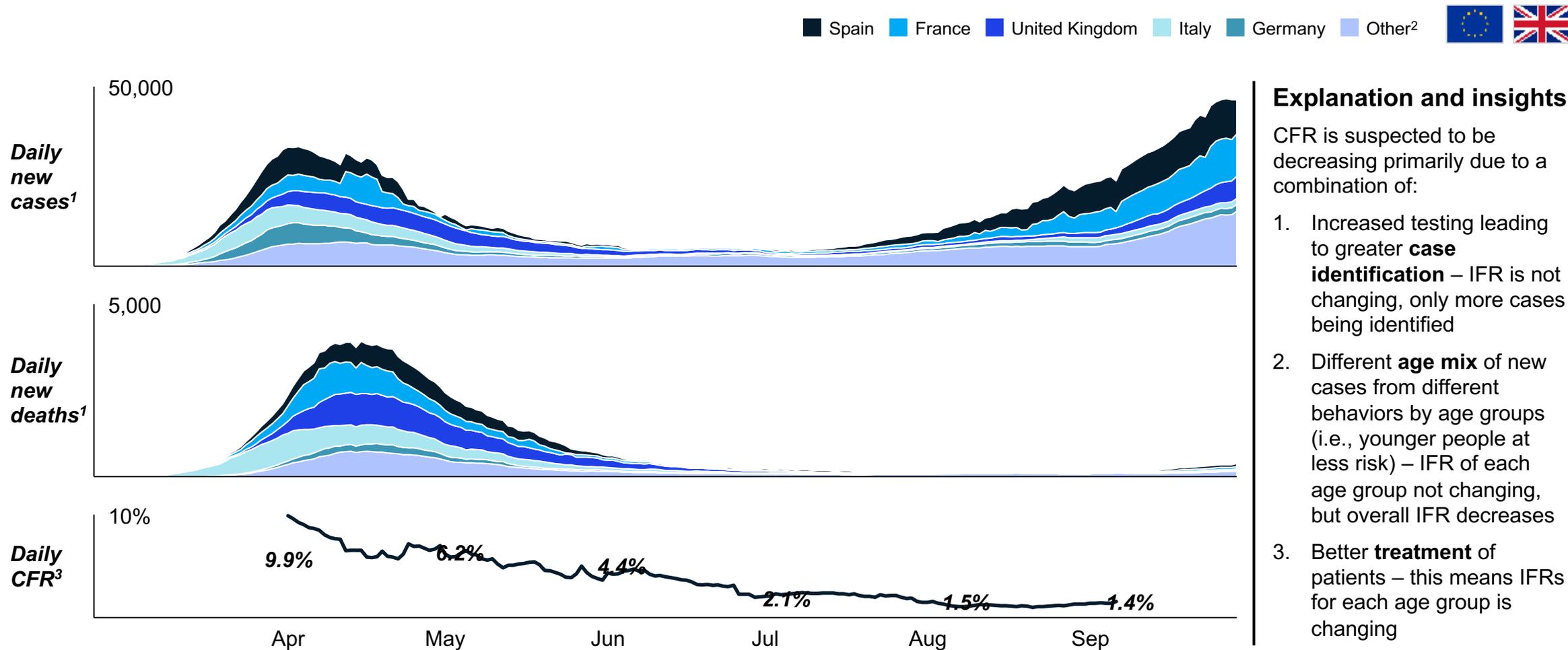
1. Data points shown as 7 days moving average to account for reporting differences (e.g., reporting only once per week)

2. Daily CFR is calculated with a 13 day lag from cases to deaths (e.g. CFR for April 1 = deaths on April 14 / cases on April 1)

3. Other factors have been hypothesized that might affect CFR and IFR, with little evidence, e.g., lower strength of infections because of mask usage, or stronger immune systems due to summer weather

The resurgence of cases in Europe has not translated to a significant increase in mortality

European Union and the UK



Explanation and insights

CFR is suspected to be decreasing primarily due to a combination of:

1. Increased testing leading to greater **case identification** – IFR is not changing, only more cases being identified
2. Different **age mix** of new cases from different behaviors by age groups (i.e., younger people at less risk) – IFR of each age group not changing, but overall IFR decreases
3. Better **treatment** of patients – this means IFRs for each age group is changing

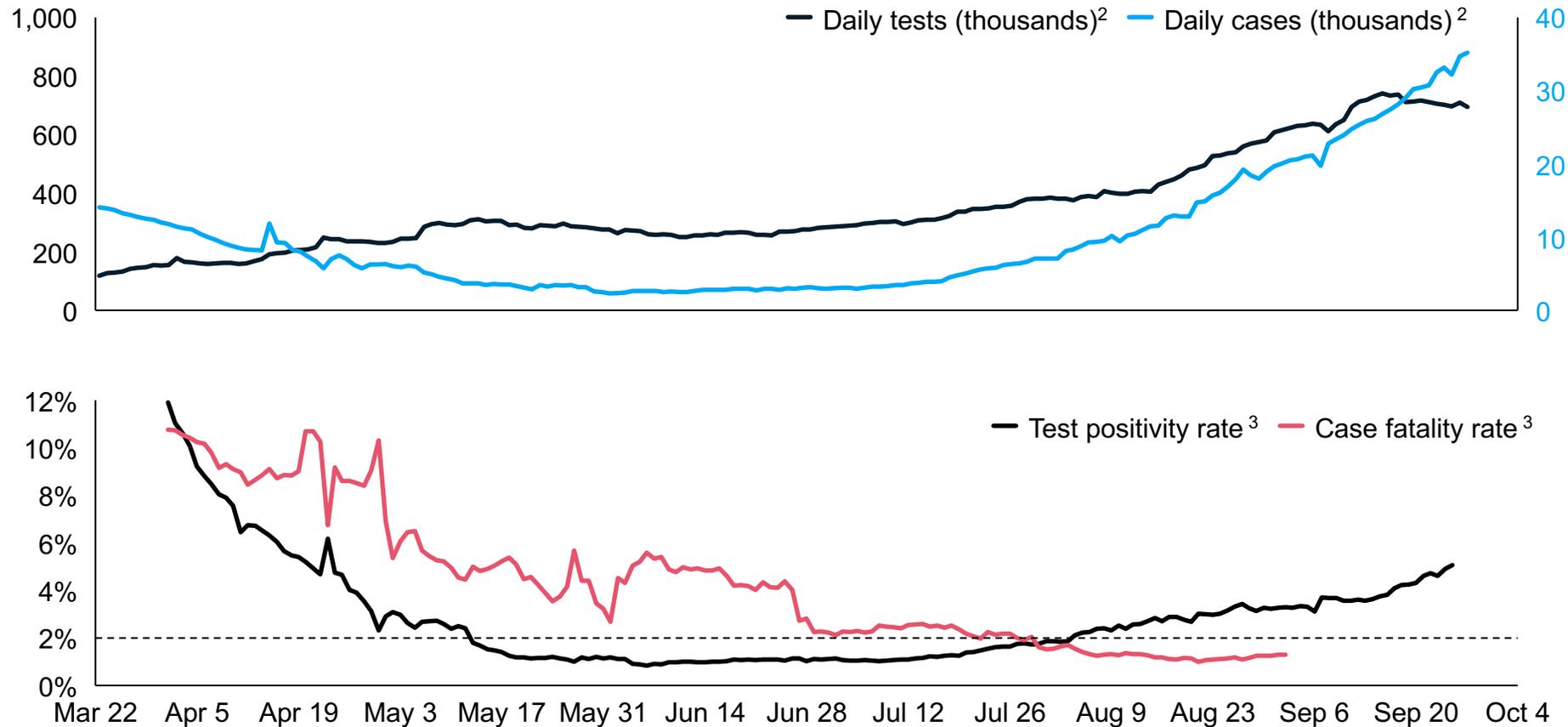
1. Data points shown as 7 days moving average to account for reporting differences (e.g., reporting only once per week), and for Spain's fatalities, data shown as 30 day moving average;

2. Other includes: Romania, Belgium, Netherlands, Sweden, Poland, Portugal, Czechia, Moldova, Austria, Ireland, Denmark, Bulgaria, Hungary, Greece, Croatia, Finland, Luxembourg, Slovakia, Slovenia, Lithuania, Estonia, Malta, Cyprus, Latvia

3. Case fatality rate calculated as deaths 23 days later divided by cases on day (e.g. CFR for Aug-1 equals deaths on Aug-24 divided by cases on Aug-1)

1: Greater case identification likely to have been a significant factor in lower CFR until May

European Union¹



Explanation and insights

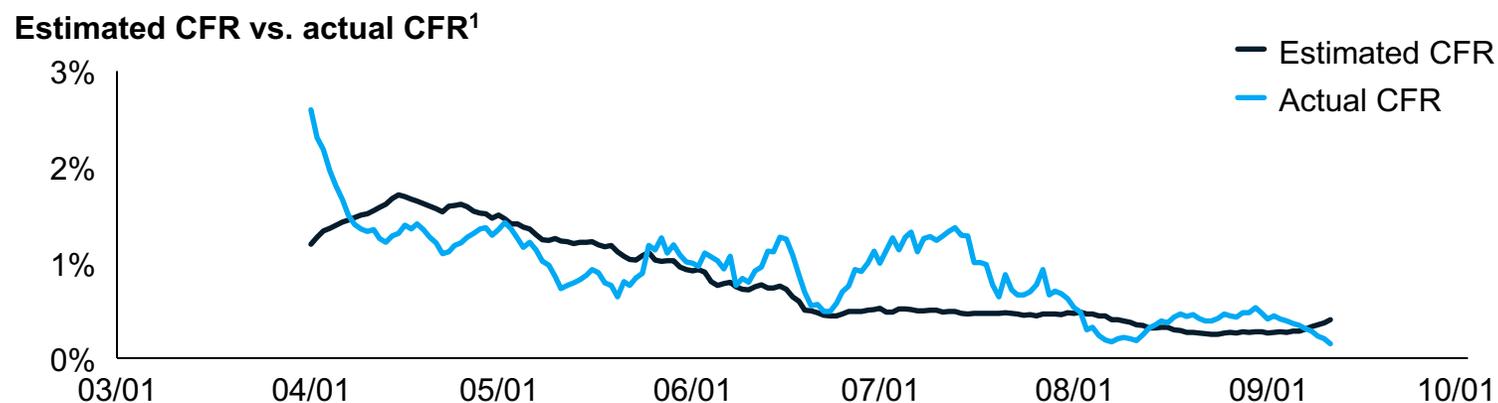
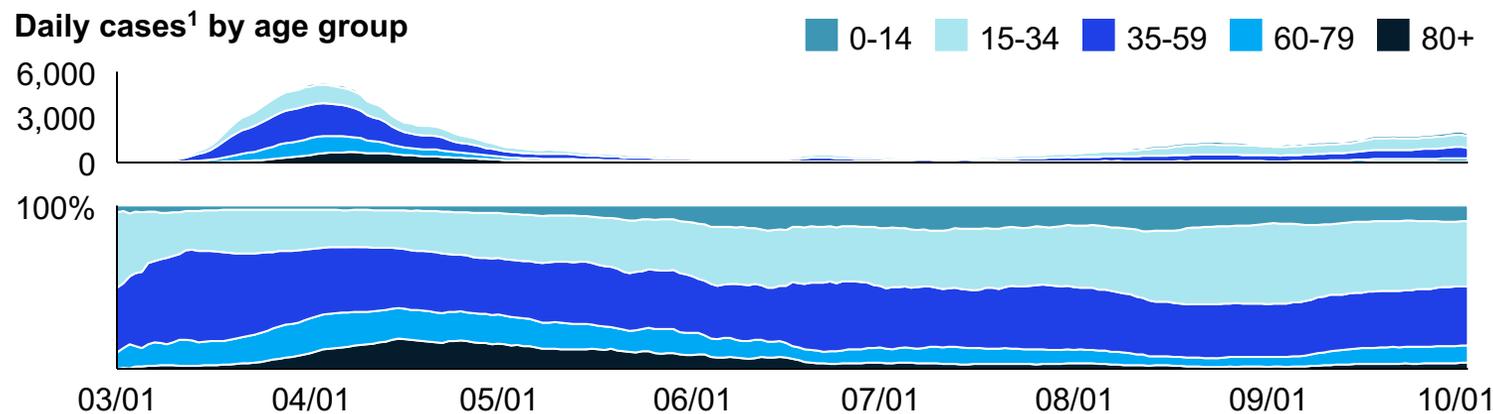
Given high Test Positivity Rate (TPR), low case detection was likely a large factor in CFR decrease from April to May (i.e. there were many more unidentified cases before May)

Testing has increased steadily, and TPR was below 2% for most of May until August. However, recently cases have been increasing at a faster rate than testing, and TPR has been steadily increasing to ~5%

1. Excludes Netherlands, Belgium, Sweden, Moldova, Croatia, Luxemburg, and Cyprus due to incomplete or missing data; excludes Spain until 4/23, France until 5/12, and Bulgaria until 5/12 due to incomplete or missing data
2. Data points shown as 7 days moving average to account for reporting differences (e.g., reporting only once per week)
3. Case fatality rate calculated as deaths 23 days later divided by cases on day (e.g. CFR for Aug-1 equals deaths on Aug-24 divided by cases on Aug-1), for Spain's fatalities use a 30 day moving average instead of 7

2: Different age mix of new cases can explain some of the decrease in CFR

Germany



Explanation and insights

Total estimated CFR is calculated by multiplying cases in each group by that age group's CFR, and then dividing by total cases

Age group's estimated CFR²

0-14	0.0%
15-34	0.0%
35-59	0.1%
60-79	2.2%
80+	6.7%

Estimated decrease in CFR driven by difference in age group mix correlates closely with actual CFR from April onwards for Germany

However, there have been relatively fewer cases since April peak, so correlation is driven by smaller number of cases

[Pending] Still researching data over time by age for other European countries

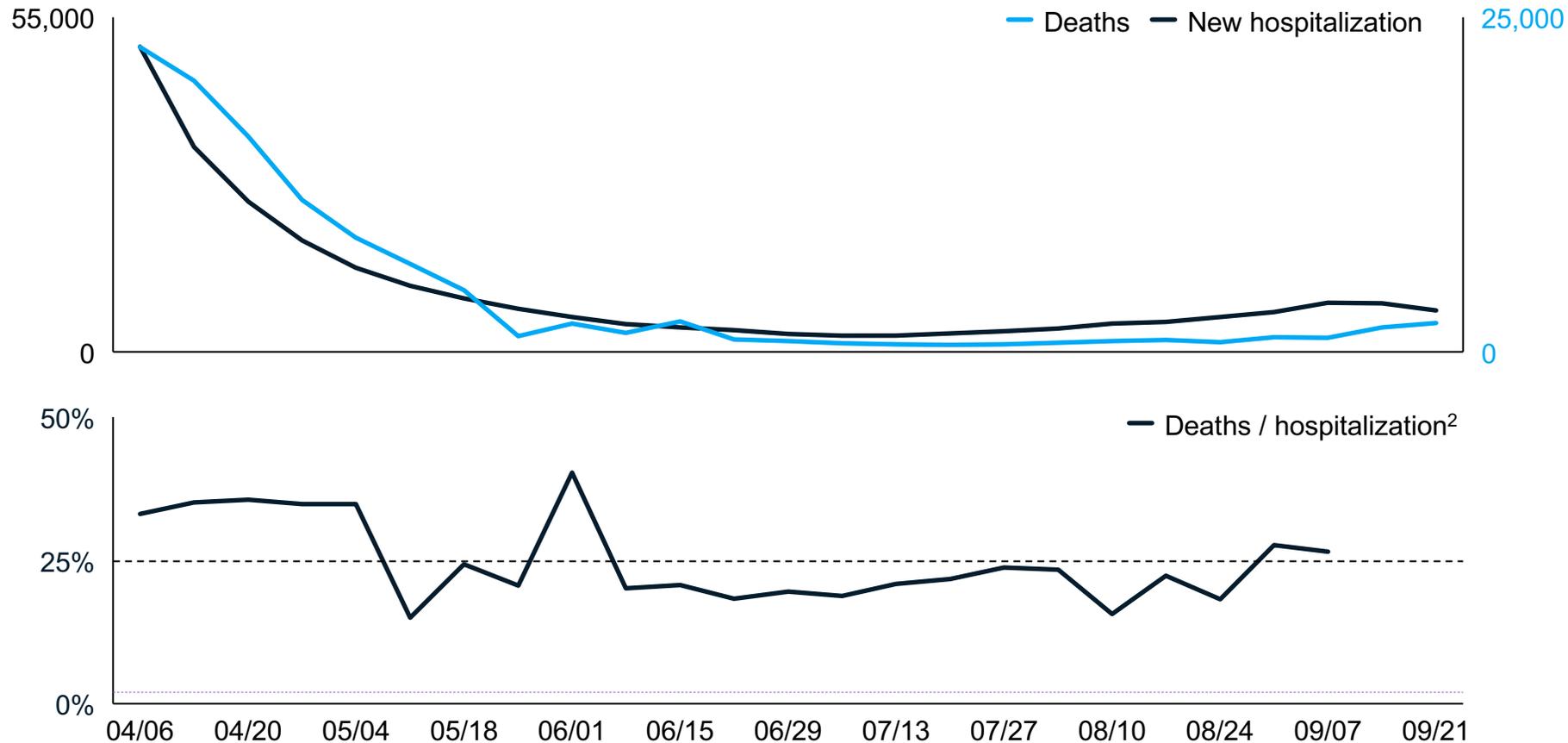
1. Data points shown as 7 days moving average to account for reporting differences (e.g., reporting only once per week)

2. Calculated as cases on day divided by deaths 23 days later

3. Using total actual CFR per age group from April 1st until September 11th

3: Deaths per new hospitalizations has oscillated at ~25%

Weekly data for European Union¹ countries



Explanation and insights

Deaths and hospitalizations have moved in sync for European countries. As such, **deaths per hospitalization has been relatively flat, oscillating at around 25%**

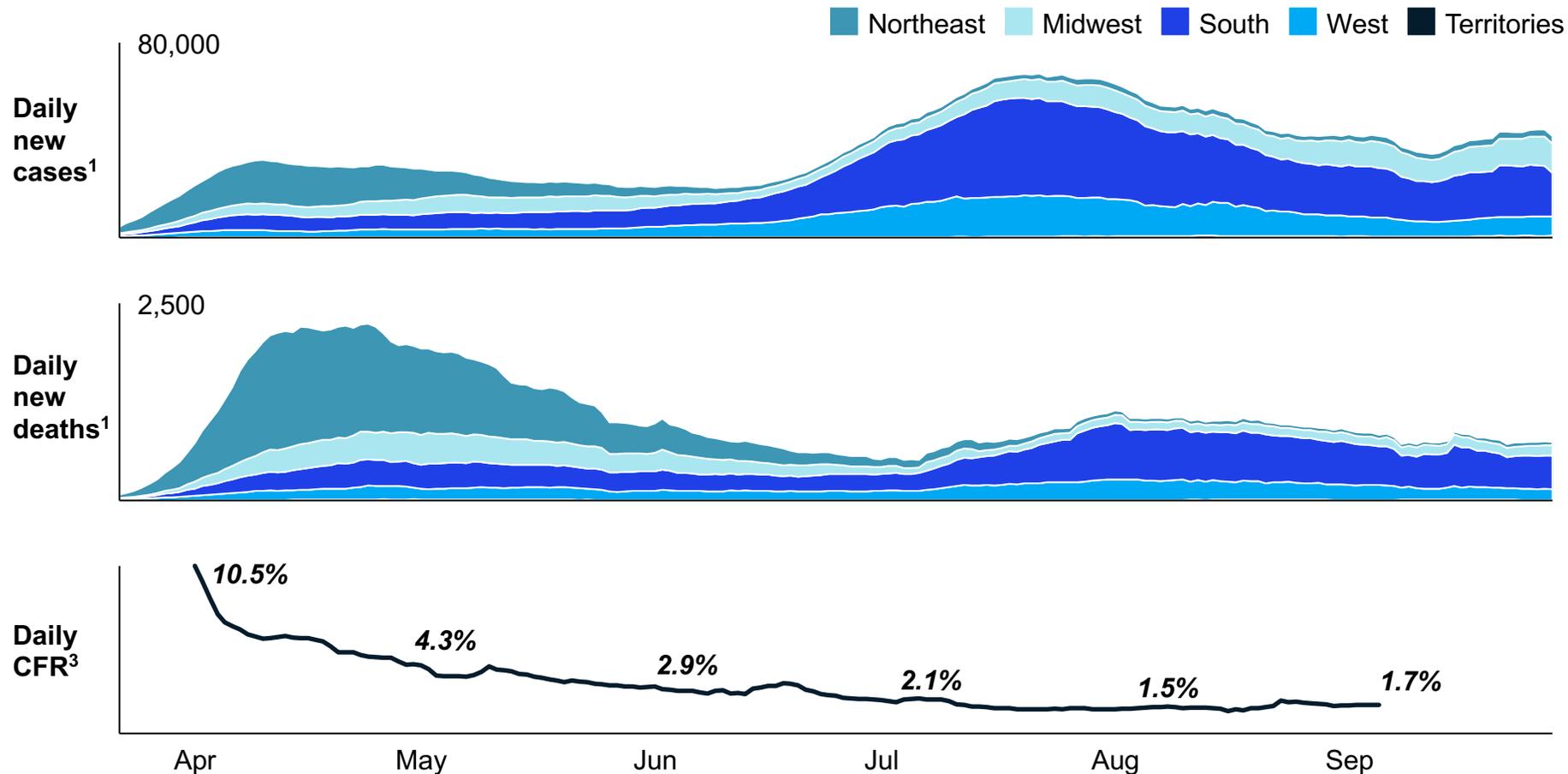
Despite the fact that research shows that hospital care has been improving, this is not shown in this data – however the data quality on COVID-19 hospitalizations is lower than data quality for cases and deaths

1. Includes Belgium, Croatia, Cyprus, Czechia, Denmark, Estonia, France, Germany, Ireland, Latvia, Malta, Netherlands, Portugal, Slovakia, Slovenia, Spain, United Kingdom

2. Calculated using a 13 day lag between hospitalization and death. Uses all COVID-19 deaths, even though ~1/3 of deaths are not in hospitals

The resurgence of cases in the US has not translated to a significant increase in mortality

US



Explanation and insights

CFR is suspected to be decreasing primarily due to a combination of:

1. Increased testing leading to greater **case identification** – IFR is not changing, only more cases being identified
2. Different **age mix** of new cases from different behaviors by age groups (i.e., younger people at less risk) – IFR of each age group not changing, but overall IFR decreases
3. Better **treatment** of patients – this means IFRs for each age group is changing

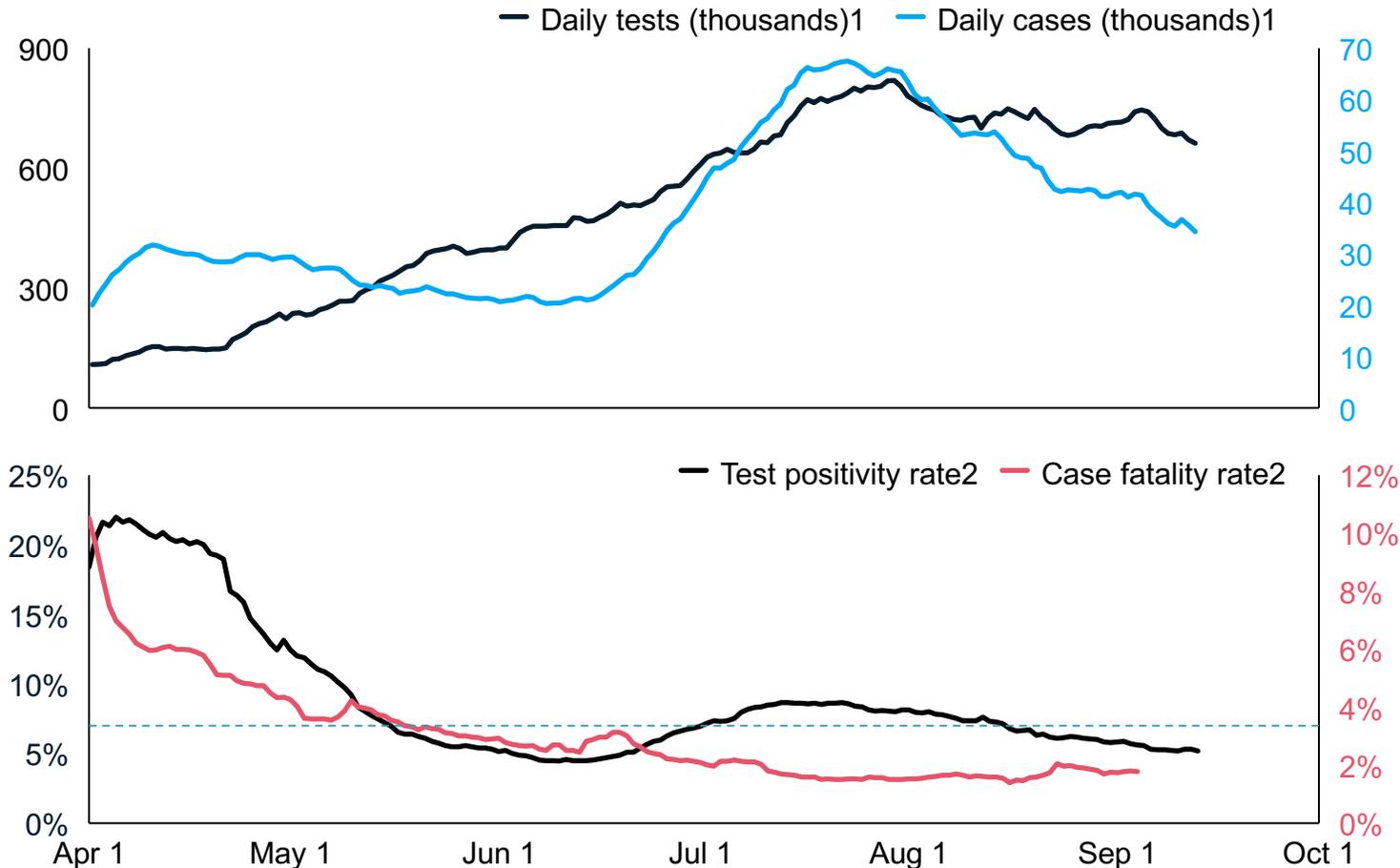
1. Data points shown as 7 days moving average to account for reporting differences (e.g., reporting only once per week), and for Spain's fatalities, data shown as 30 day moving average;

2. Other includes: Romania, Belgium, Netherlands, Sweden, Poland, Portugal, Czechia, Moldova, Austria, Ireland, Denmark, Bulgaria, Hungary, Greece, Croatia, Finland, Luxembourg, Slovakia, Slovenia, Lithuania, Estonia, Malta, Cyprus, Latvia

3. Case fatality rate calculated as deaths 23 days later divided by cases on day (e.g. CFR for Aug-1 equals deaths on Aug-24 divided by cases on Aug-1)

1: Greater case identification likely to have been a significant factor in CFR decrease until May

US



Explanation and insights

Given high Test Positivity Rate (TPR), low case detection was likely a large factor in CFR decrease from April-May (i.e. there were more unidentified cases before May)

- Test positivity rate was at a high of 22% in April
- Since May, TPR has fluctuated around the 7%, increasing during the July / August spike
- Testing has decreased since case peak, but cases have decreased faster than testing

Story is different state to state, e.g.,

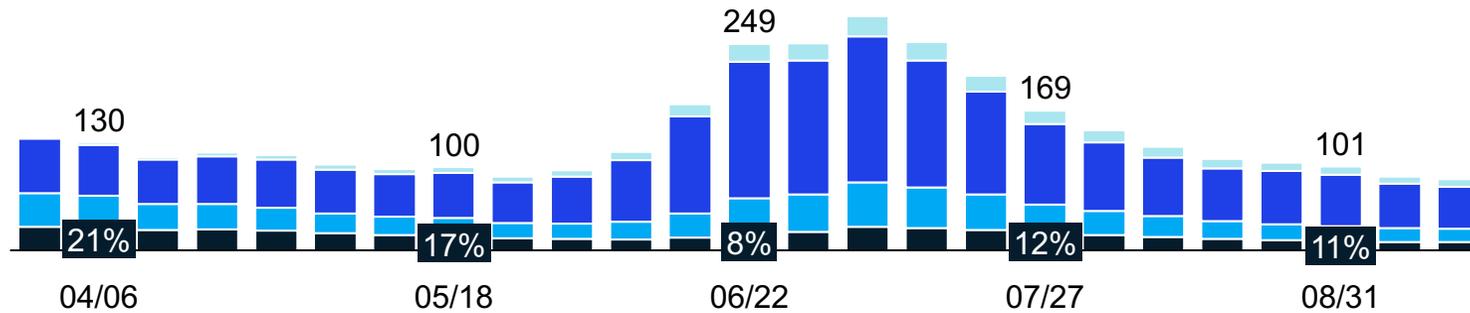
- NY, NJ: very high (~50%) TPR in April during case spike, with low (3-5%) TPR from June onwards with significantly increased testing
- TX, AZ FL: TPR fluctuated from ~5-25% (with averages of 11-14%), TPR decreased in May/June, increased during spike in Jul/Aug, decreasing again more recently
- CA: similar case profile to TX, AZ, FL, with spike in Jul/Aug, but similar TPR profile to

2: Different age mix of new cases can explain some of the decrease in CFR

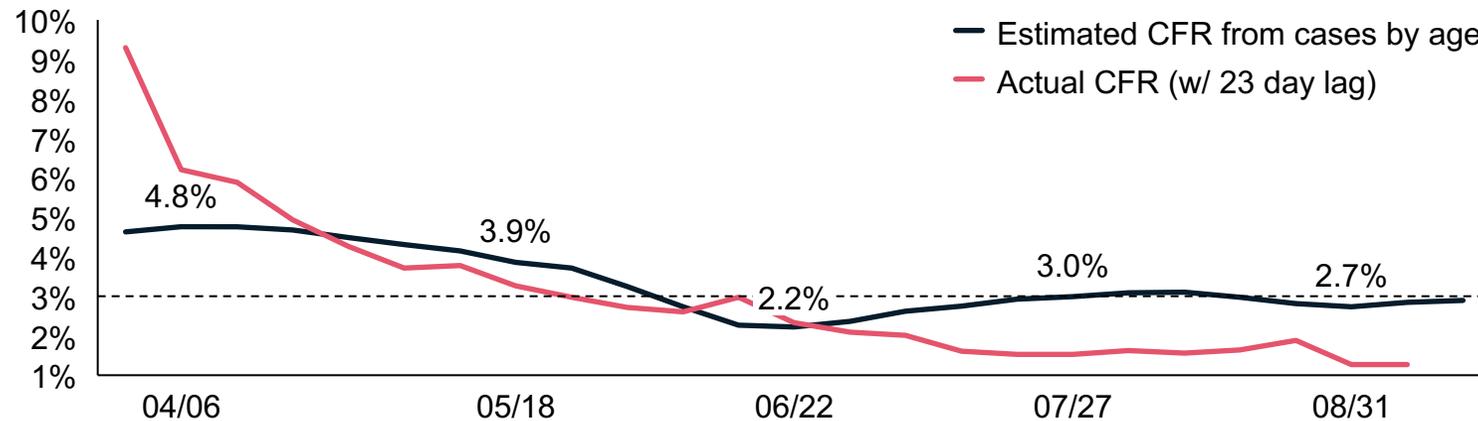
US data



Weekly cases by age, thousands



Estimated CFR vs. actual CFR¹



Explanation and insights

Total estimated CFR is calculated by multiplying cases in each group by that age group's CFR, and then dividing by total cases

Age group's estimated CFR²

0-17 years	0.1%
18-49 years	0.5%
50-64 years	3.5%
65+ years	16.4%

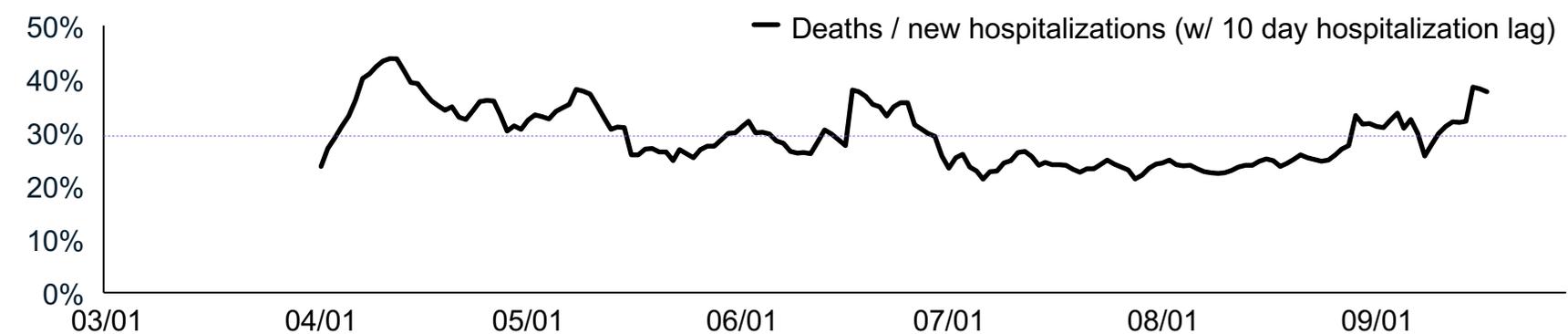
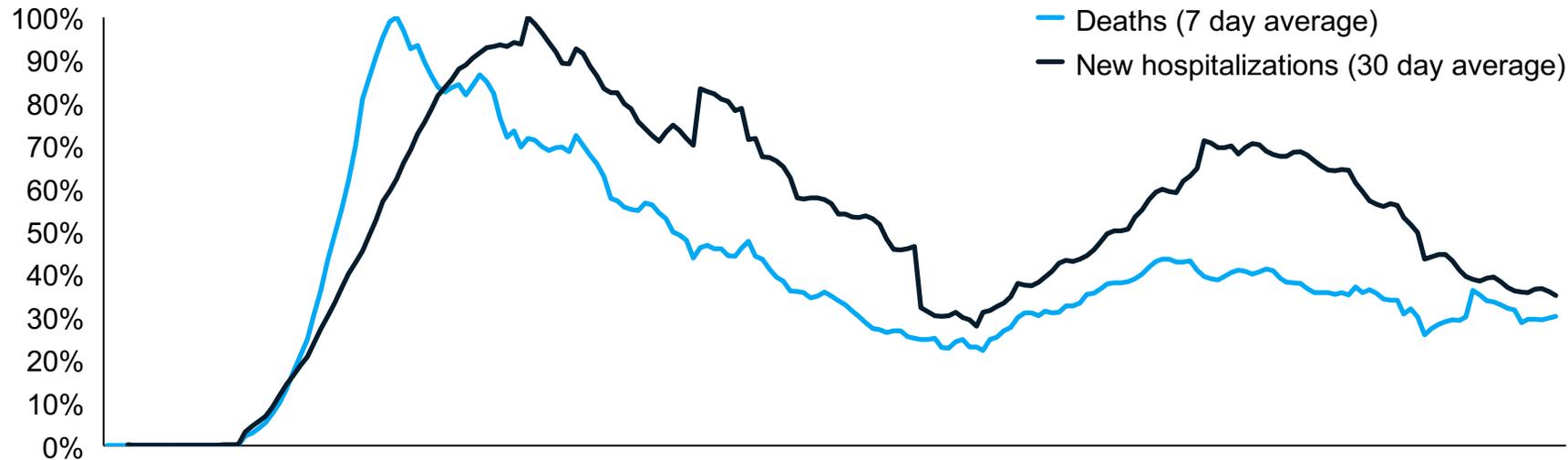
Estimated decrease in CFR driven by difference in age group mix correlates closely with actual CFR decrease from April to July

After July actual CFR has continued to decrease, but it does not seem to be explained by the ages of new cases

1. Calculated as cases on day divided by deaths 23 days later

2. Using WHO estimates

3: Deaths per new hospital admissions has been relatively constant at ~30% US

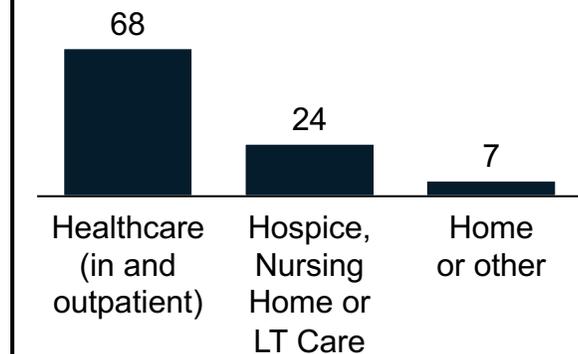


Explanation and insights

Total deaths¹ per new hospital admissions has been relatively constant at ~30%

Despite the fact that research shows that mortality in hospital care of critical COVID-19 patients has been improving, this is not shown in this data – however the data quality on COVID-19 hospitalizations is lower than data quality for cases and deaths

>2/3 of all COVID-19 deaths occur in healthcare settings (9/16):



1. Including deaths outside of hospitals

Our knowledge on COVID-19 has greatly increased in a few months...



The reported number of cases is only a fraction of the total, due to asymptomatic or otherwise undetected cases. Seroprevalence data are limited but show significant variability across geographies



Evidence shows pre- and symptomatic cases drive most infections, with asymptomatic also playing a role in transmission of COVID-19. Transmission windows for individuals can range from 6-19 days¹



Although the SARS-CoV-2 virus does not appear to be directly affected by seasonal variations in weather, seasonality may contribute to **changes in human behavior (e.g., more indoor contacts) and so indirectly affect transmission**



There are significant disparities in outcomes of COVID-19 cases² correlated with factors such as age, socioeconomic status, preexisting comorbidities, race/ethnicity and occupation



Signs of increased risk of secondary complications³ are emerging in patients affected by COVID-19, such as MIS-C, pulmonary fibrosis, or pulmonary embolism. Dexamethasone and Remdesivir have shown benefit as treatments for COVID-19



Evidence from Asia, Europe and elsewhere shows that economic restarts might be possible under the right conditions, but renewed growth in transmission is a significant and ongoing risk⁴



Public health measures such as lock-downs/shelter-in-place, test, trace and isolate, and face coverings have been shown to reduce transmission of COVID-19⁴. We continue to learn about how to best combine these measures in each context

1. JAMA; 2. NEJM (Louisiana study); 3. New York City Department of Health, Lancet, MedPage Today; 4. Hong Kong Government Data Repository, Singapore Ministry of Health, Taiwan Center for Disease Control; 5. MedRxiv, USC, NYTimes

...but there are still unknowns



We do not know if antibody presence equates to immunity, how long immunity to COVID-19 lasts, or what predicts strength of immunity for those infected



For some geographies the accuracy of hospitalization and death data remains largely unknown, especially when there is limited testing capacity or where lab-confirmed diagnoses are required to report cases



While the evidence-base is expanding, much remains to be learned about how best to combine public health measures for sustained control of COVID-19 in different contexts

Contents

Snapshot of the present: COVID-19 pandemic in numbers

Outlook: when the epidemic might functionally end

There are two definitions of “end,” each with a separate timeline

	An epidemiological end point Herd immunity is achieved	A transition to a form of normalcy Almost all aspects of social and economic life resume
Most likely timeline¹ in developed economies	Q3 or Q4 of 2021	Q1 or Q2 of 2021
Description	Public-health-emergency interventions deployed in 2020 no longer needed, threat of widespread transmission will be gone. A COVID-19 vaccine will likely be the most important factor to achieve herd immunity. Regular revaccinations may be needed, perhaps similar to annual flu shots	The next normal might come when we can live without fear of ongoing mortality ² or long-term health consequences related to COVID-19. This might be different from the old normal in surprising ways, and getting there will be gradual. However, the transition will enable many familiar scenes, such as air travel, bustling shops, humming factories, full restaurants, and gyms operating at capacity, to resume

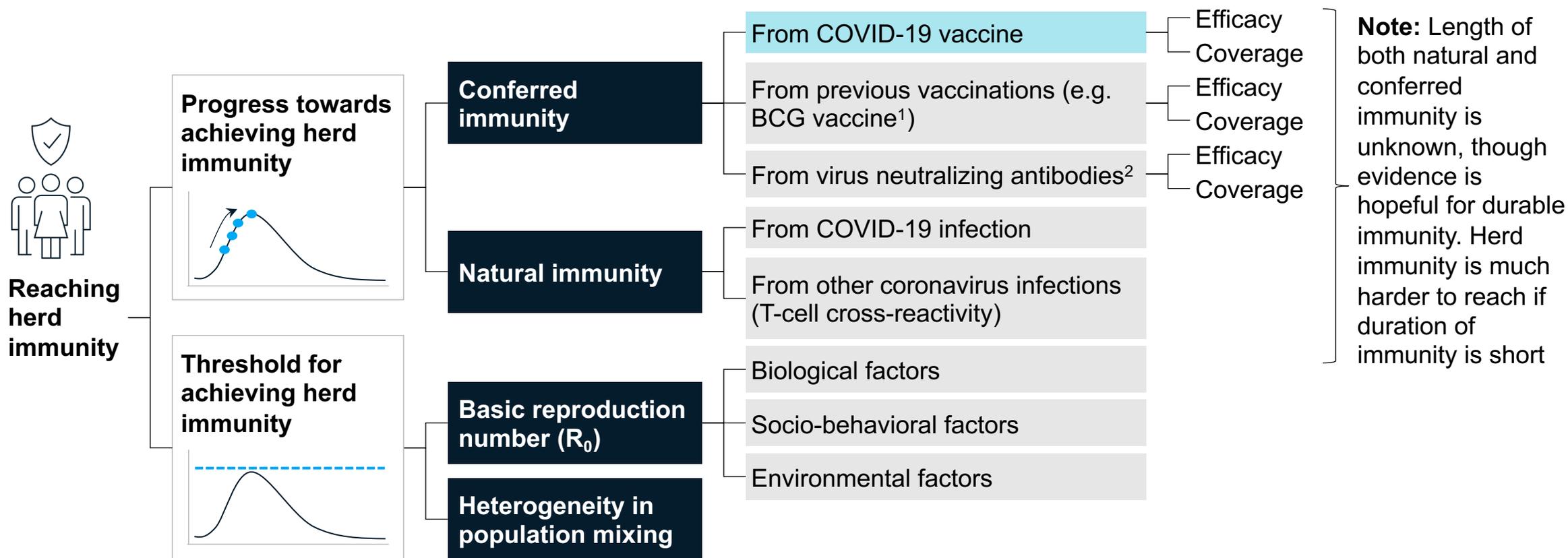
1. The timeline to achieve the ends will vary by location, and will not be single point in time events

2. When a mortality rate is no longer higher than a country's historical average

Factors influencing the timeline to a “to normal” through herd immunity

Herd immunity is the point at which enough people in a population have immune protection so that sustained transmission is no longer possible. Several factors influence the threshold for achieving herd immunity and our progress towards achieving it:

■ Factor most countries are expecting to be key to achieving herd immunity

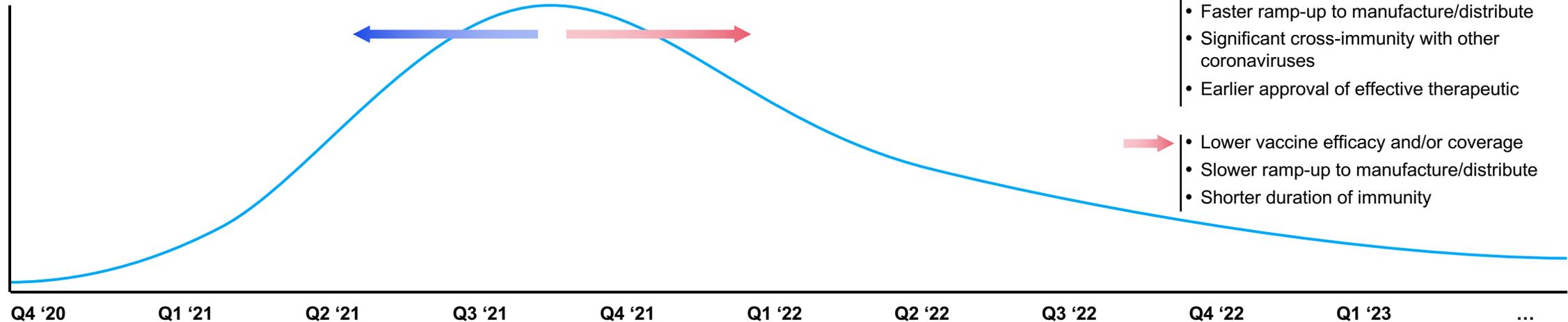


1. Countries with higher levels of BCG vaccination have correlate with slower infection and death rates, but causation has not been proven
 2. Through monoclonals or polyclonals / plasms products

Probability of when COVID-19 might “functionally end” in the US currently seems to be highest in Q3-4 2021

Not comprehensive Directional And Illustrative

Relative probability of a functional end to the epidemic in the US²



Q4 '20 Q1 '21 Q2 '21 Q3 '21 Q4 '21 Q1 '22 Q2 '22 Q3 '22 Q4 '22 Q1 '23 ...

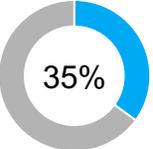
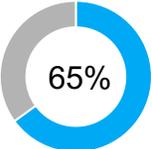
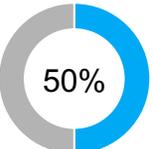
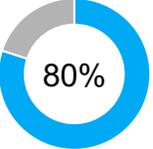
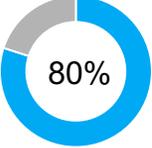
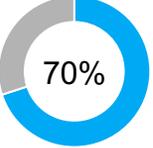
What you have to believe on epidemic trajectory	Low probability of reaching herd immunity	Some probability of functionally ending the pandemic, driven by either: <ul style="list-style-type: none"> • Significant cross immunity from other coronaviruses • Arrival of a highly effective therapeutic (e.g. PEP or PrEP) enabling a return to normal without significant immunity 	Peak probability of functional end if an effective vaccine is approved in Q1 or Q2 2021 and ramp-up to widespread coverage takes approximately 6 months Ongoing possibility of high-impact therapeutic	Vaccine arrives, however, lower levels of efficacy or coverage require a longer ramp-up time to reach herd immunity Ongoing possibility of high-impact therapeutic	Long tail possibility that society is still battling hyper-endemic levels of COVID-19 from end of 2022 onwards, likely due to a combination of factors, which may include: <ul style="list-style-type: none"> • Low efficacy vaccine and therapeutics • Short duration of immunity • Significant mutation of SARS-CoV2 in a way that impacts vaccine efficacy
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1. A functional end to the epidemic is defined as reaching a point where significant, ongoing public health measures are not needed to prohibit future spikes in disease and mortality (this might be achieved while there are still a number of people in particular communities who still have the disease, as is the case with measles); 2. Timeline to functional end is likely to vary somewhat based on geography

Vaccine-focused epi scenarios characterize potential epidemic trajectories based on a range of vaccine efficacy and coverage

Directional & Illustrative scenarios

Illustrates scenarios of how and when geographies might “return to normal” (i.e., $R_{effective} < 1$ and $RNPI = 2.4$)

	Vaccine efficacy	Vaccine coverage	Description
A Pessimistic scenario	 50%	 35%	Efficacy is at the minimum threshold stated for FDA EUA ¹ Public hesitance to adopt the vaccine is at rates similar to the healthy adults adoption of flu vaccine with relatively low coverage ceilings, as children are unlikely to be vaccinated in the initial post-launch period
B Midpoint scenario	 65%	 50%	Efficacy at the midpoint of optimistic and pessimistic scenarios Coverage rates similar to flu (adults: 51-64%; children: 41-45%) ² and mapping to recent polling that suggests 51% ³ are willing to get a vaccine within 3 months of commercialization
C High coverage⁴	 50%	 80%	Efficacy is at the minimum threshold stated for FDA EUA ¹ Coverage levels approaching most common childhood immunizations
D Optimistic scenario	 80%	 70%	Efficacy is moderately high, approaching vaccine efficacy of some of the most commonly administered vaccines (e.g., childhood immunizations ⁴ , flu ⁵) Coverage is closer to other recent polling that suggests 70%+ ³ are willing to get a vaccine when available

All scenarios additionally assume:

6-month ramp up from regulatory approval to max coverage

2-year vaccine induced immunity duration (additional 1 year immunity scenario to follow in future versions)

Homogenous vaccine distribution across age groups

1. [FDA](#); 2. [CDC](#); 3. McKinsey COVID-19 Survey (07/17/2020); 4. [CDC](#); 5. [CDC](#)

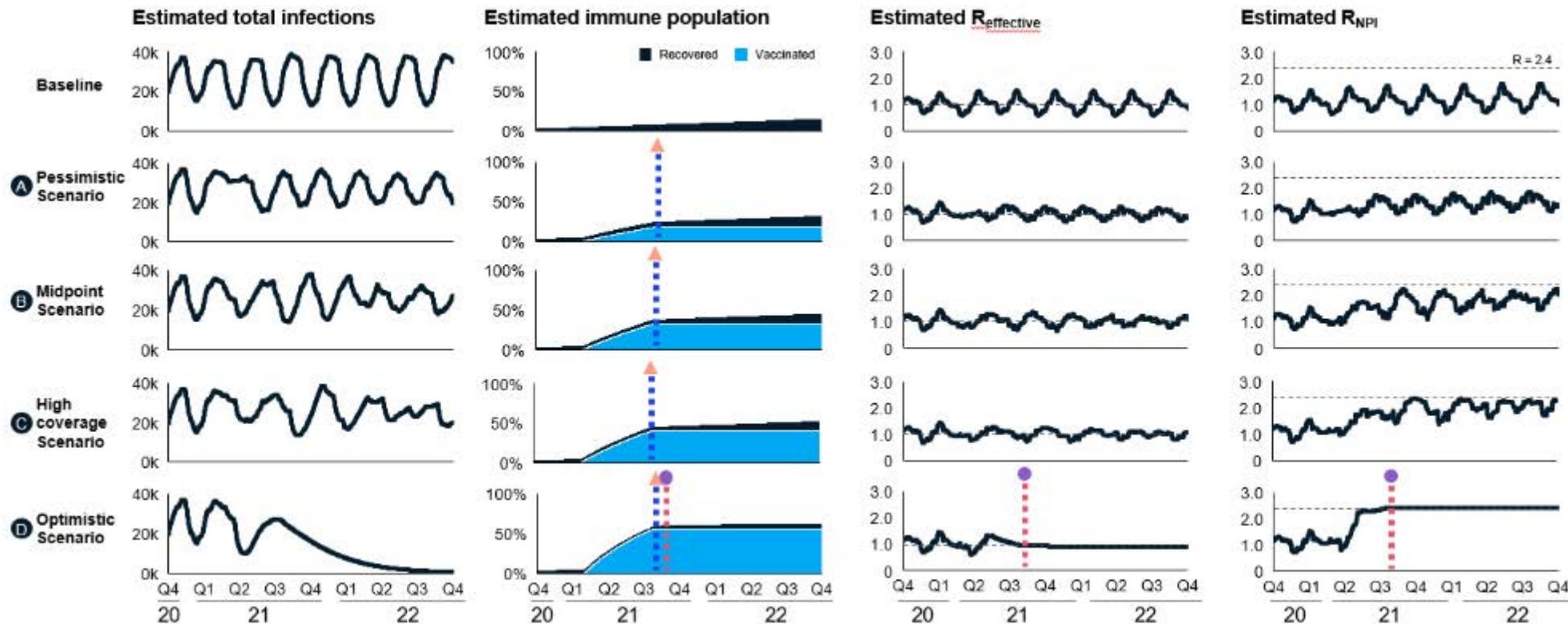
Simulation: Herd immunity and functional eradication only occur in two most optimistic scenarios due to modest existing immunity

Balancing act, cycle scenarios, target R_{NPI} of 2.4 in geography of 37M, starting seroprevalence of 3%

Directional & Illustrative scenarios

↑ Time when target vaccine coverage achieved ↓ Time when herd immunity/functional eradication achieved

Vaccine administration begins in Q1 2021 for all scenarios



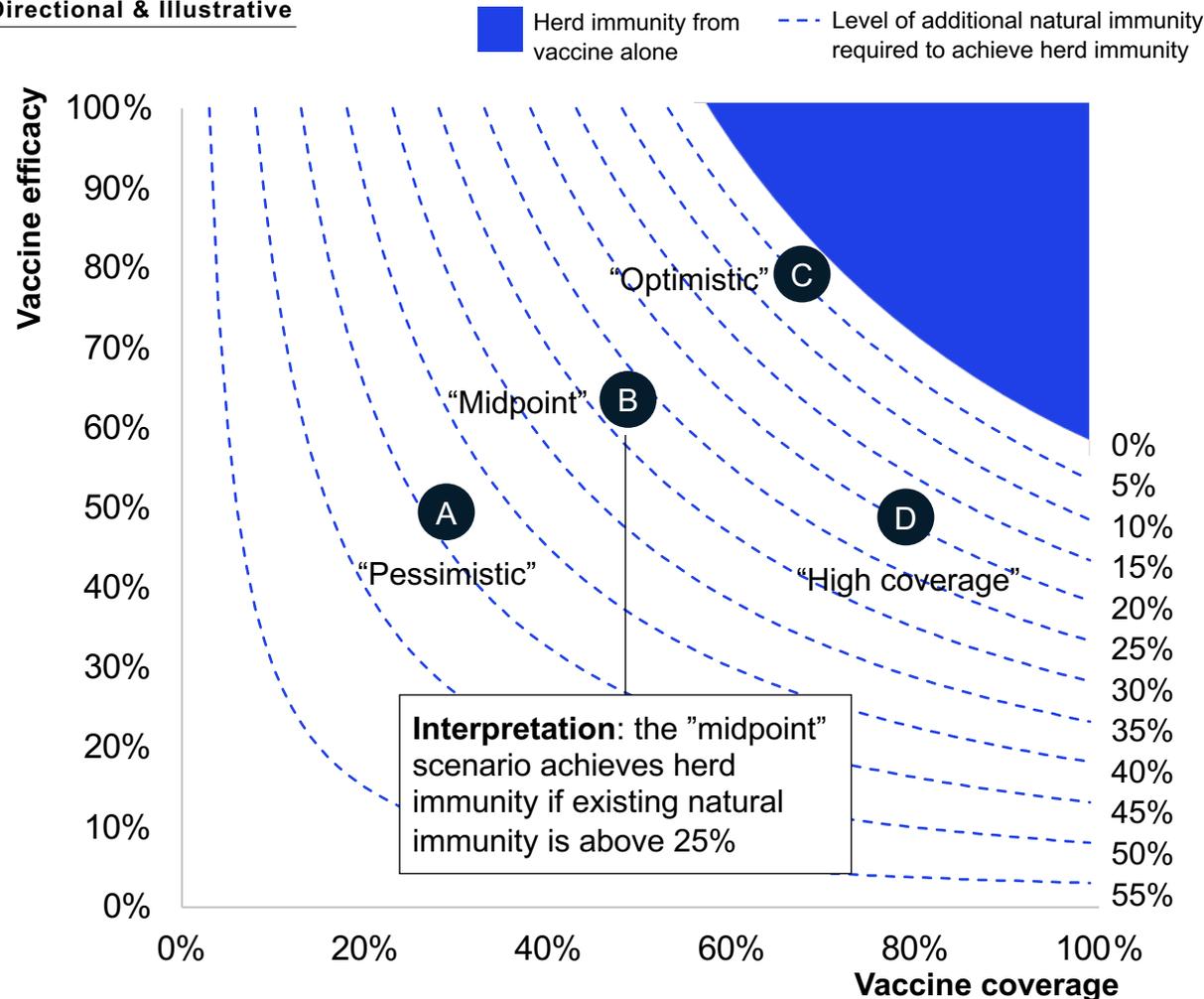
Under these assumptions herd immunity and functional eradication are achieved in the optimistic scenario but not in the high coverage, midpoint, pessimistic or baseline scenarios

1. Baseline is a Balancing act, cycles scenario with target R_{NPI} of 2.4: initial transmission is based on latest R_{NPI} derived from geographic-specific IFR assumption and is modulated to decrease R_{NPI} every 2 weeks by 5-50% so as not to exceed 85% ICU capacity within the next 30 days. And, provided that is not the case, to increase R_{NPI} by 5-50% every 2 weeks
2. Herd immunity occurs when $(\text{Immune population} / \text{Alive population}) > (1 - 1/R_0)$. For illustrative purposes, if R_0 were 2.4, this occurs when ~58% of the population is immune
3. Functional eradication is defined as $R_{\text{effective}}$ being sustained at less than 1 and R_{NPI} returning to 2.4

Vaccine scenarios achieve herd immunity under differing existing natural immunity thresholds

Vaccine scenarios, by coverage and efficacy, and levels of natural immunity required for herd immunity

Directional & Illustrative



Insights

In this chart, herd immunity is reached once total immune population reaches 58% (based on R_0 of 2.4)¹

No vaccine scenario – including the "optimistic scenario" – would reach herd immunity without additional contribution from natural immunity

Current national-level seroprevalence estimates range up to the mid-teens, which suggest only the "optimistic" and "high coverage" vaccine scenarios would achieve large-scale herd immunity if a vaccine were launched today.

- Some communities have higher sero-prevalence and could achieve herd immunity more easily

Herd immunity could be reached more easily based on:

- Pre-existing immunity: population immune after recovering from COVID-19, or who have other pre-existing immune response from exposure to other coronaviruses or previous vaccinations (e.g. BCG)
- Heterogeneity of population mixing
- Lower R_0 , thus lower threshold for achieving herd immunity
- Super-spreaders moving to recovered/immune earlier in the epidemic

1. Herd immunity threshold is calculated as $1 - (1/R_0)$; higher R_0 values would drive higher thresholds to reach herd immunity

Some research has hypothesized that partial immunity may be conferred by previous vaccination for other diseases

Correlation has been suggested however a causal link has not been confirmed

Correlations have been found between BCG vaccination and lower COVID-19 burden, but causation not proven

Analyses suggest links between countries with mandatory BCG vaccination for TB and lower COVID-19 cases and deaths. Historically, BCG vaccination has been shown to confer protective effects that are not specific to just TB

A variety of potential confounding factors could be impacting the links between BCG vaccination and COVID-19 between countries (e.g. pandemic arrival timing, population demographics, etc.). Studies in Israel and Sweden compared cohorts of similarly aged adults, of BCG-vaccinated individuals and of unvaccinated individuals, and found no difference in COVID-19 positivity rates

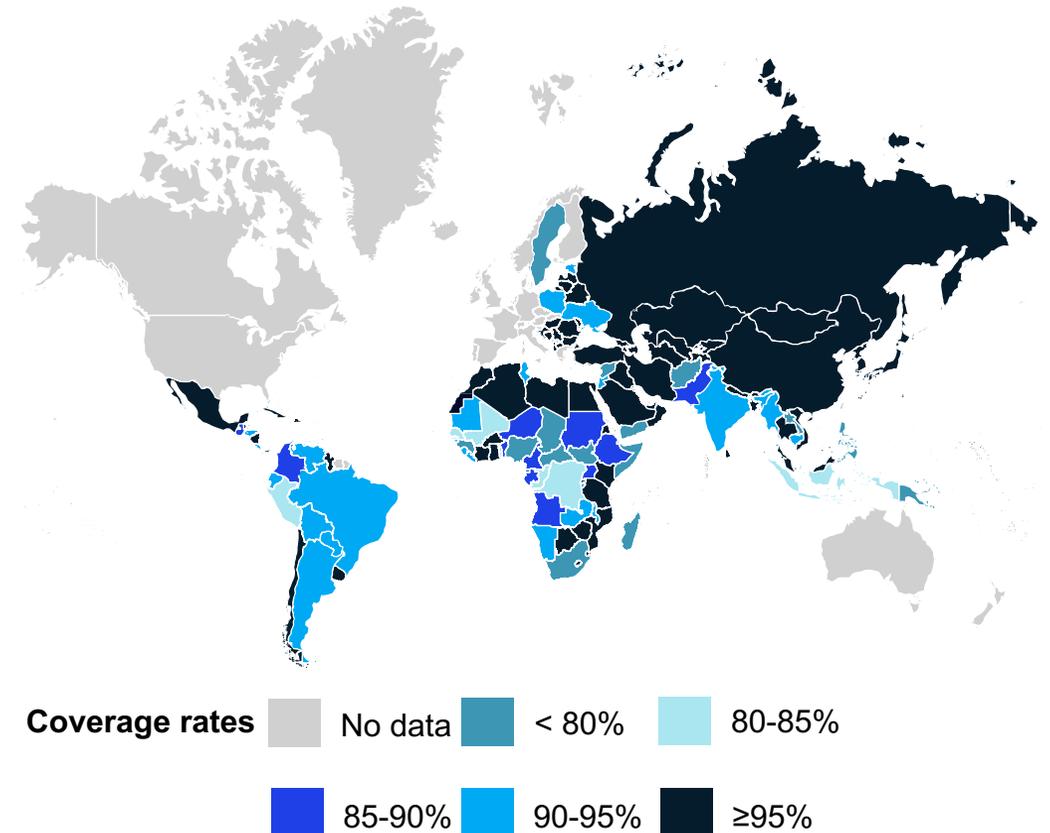
Implications

If BCG vaccination is proven to be an effective way of limiting COVID-19, it would suggest greater progress towards herd immunity

WHO has warned not to use BCG vaccine as a protective measure against COVID-19 until causality is proven. This requires clinical trials; multiple are underway

It has also been hypothesized that other live vaccines (e.g. oral polio vaccine) could confer some form of immunity against COVID-19, however evidence is quite limited

BCG immunization coverage among 1-year olds, 2018



The boundaries and names shown on maps do not imply official endorsement or acceptance by McKinsey & Company.

Virus neutralizing antibodies could be used as treatment or have similar effect to vaccines

There are at least 67 virus neutralizing antibody therapies in development for COVID-19

Pipeline snapshot

	Description	Candidates profiled ¹
Monoclonal antibodies (mAbs)	Homogeneous population of antibodies that are produced as clones of specific immune cells	45
Polyclonal antibodies / plasma	A mixture of immunoglobulin molecules that are secreted by specific immune cells	22

Timeline for antibody therapies is similar to vaccines

Originally published timelines indicated antibodies could be available as early as late mid Q3 2020; however, trial enrollment has been slower than expected²

1.Excludes several compounds with lack of public data; often in early stage research settings

Source: Milken Institute, BioCentury, FiercePharma, FierceBiotech; 2. [WSJ](#), [NYTimes](#)

Factors influencing progress towards herd immunity are similar to vaccines, with a few key differences

In theory: Like vaccines, efficacy and coverage are the two main variables influencing how impactful virus neutralizing antibodies might be in advancing society towards herd immunity

In practice: Virus neutralizing antibodies are more expensive and offer shorter immunity, which means they will have more targeted use cases and are unlikely to be deployed at the same mass population level that vaccines are

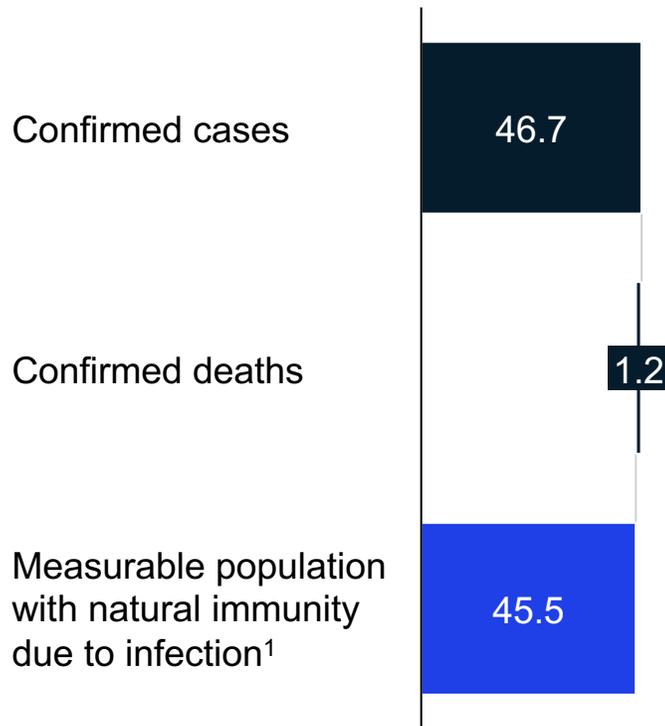
Note: Virus neutralizing antibodies could also be used as treatment in addition to prevention

As people contract COVID-19, most are likely to acquire some degree of immunity

There are ~46M people whom we can measure who may have some natural immunity from COVID-19 infection



The actual number of cases, and number of people with natural immunity from COVID-19 infection, may be much higher



3:1

Case Detection Rate would imply roughly **137M** people with natural immunity from COVID-19 infection

10:1

Case Detection Rate would imply roughly **455M** people with natural immunity from COVID-19 infection

Implications

As more people become immune, the rate of transmission falls. New infections will **naturally be slower** when society is halfway to herd immunity than at the beginning of the pandemic

Geographic differences in the density of cases mean that some places are closer to herd immunity and less susceptible to faster case growth rates

The **length of immunity** from contracting COVID-19 is currently unknown – implications and emerging evidence are presented in the pages to follow

1. Natural immunity is not complete in all cases. There have been a few reported, and one documented, case of re-infection. However, they seem to be a rare event which leads many experts to be optimistic, seeing encouraging signs of lasting immunity

Two key unknown variables impacting progress towards herd immunity are length of immunity and mutagenicity of the virus

Length of natural and conferred immunity is still unknown

- Some data suggest that natural immunity to COVID-19 might **not be complete or life-long, but much is still unknown**, however there is hopeful evidence for durable immunity¹
- Some studies suggest immunity from a COVID-19 infection may not last long, with antibody response fading in two months for some
- Hong Kong saw the first documented² case of re-infection on 8/24. The re-infected man was asymptomatic the second time, suggesting that though he no longer had immunity, his immune system reacted more effectively
- However, this may have been a rare event. Many experts are optimistic, seeing encouraging signs of lasting immunity

The duration of vaccine **conferred protection is also uncertain**

- Many vaccines often require boosters because our bodies' "memories" of the immunizing antigen fade over time
- Duration of immunity is likely to vary by vaccine candidate

Mutagenicity is likely a more minor factor

Like all viruses, SARS-CoV-2 has the potential to mutate

However, the mutations seen to date are unlikely to affect the efficacy or durability of a vaccine

Influenza is a poor analogue – SARS-CoV-2 does not have the same potential for changing season-to-season as the flu

Less durable immune response and/or higher mutagenicity, would make it more likely that COVID-19 becomes a circulating endemic disease

1. Various studies have shown immune responses several months after infection, e.g., a large serosurvey in Iceland found antibodies to SARS-CoV-2 infection lasted for at least 4 months after initial infection

2. Doctors have reported cases of presumed reinfection before, but none of those cases have been confirmed with rigorous testing. Recovered people are known to carry viral fragments for weeks, which can lead to positive test results in the absence of live virus

Recent studies open possibility that some individuals may have natural immunity from previous exposure to other coronaviruses

Early signs of T-cell cross-reactivity could be a bellwether of accelerated progress towards herd immunity

Summary of recent findings

SARS-CoV-2 is one of seven coronaviruses known to infect humans. Four of them are causes of the common cold (OC43, HKU1, 229E and NL63), while SARS-CoV and Middle East respiratory syndrome (MERS) cause severe pneumonia.

All of these coronaviruses trigger antibody and T-cell responses in infected patients: However, antibody levels appear to wane faster than T-cells

20-50%

of sampled populations have evidence of T-cell cross-reactivity

Some studies suggest between 20-50% of sampled populations who have not contracted COVID-19 have “cross-reactivity” in specific T-cells, mostly likely from contracting other coronaviruses. While more data are needed, this might be a signal that these individuals’ immune systems are primed to protect them against COVID-19

The degree to which T-cell cross-reactivity immunizes individuals to SARS-CoV-2 has not been proven

Implications

If T-cell cross-reactivity is present in a significant amount of the population, and if these T-cells offer a significant degree of protection (i.e. akin to immunity from SARS-CoV-2 infection), this finding **would imply we may be closer to herd immunity than originally thought**

T-cell cross-reactivity may also help explain the **differences in symptoms** and severity of COVID-19 among infected people across geographies

More evidence is needed before public policy or individual behavior should be informed based on cross-reactivity

Progress towards herd immunity is not geographically uniform

Geographic variations will lead to different timelines to herd immunity

Several factors might drive geographic variance in reaching herd immunity – for example: i) levels of total exposure and ii) levels of adoption of eventual vaccines

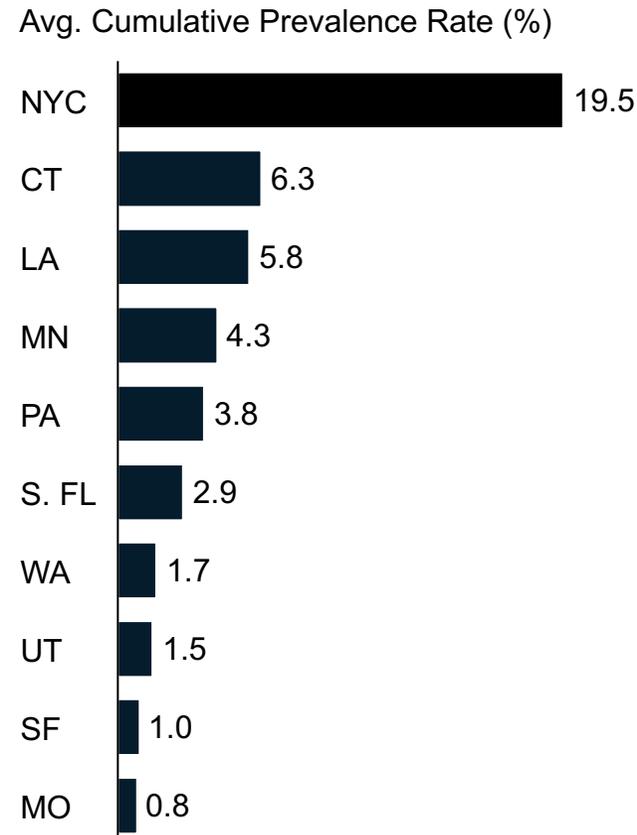
Given wide ranges in the level of total exposure, **some specific geographies may even be close to reaching herd immunity**, e.g.:

 **Mumbai:** One study found some poor, dense neighborhoods with 51-58% antibody prevalence, compared to 11-17% elsewhere in the city²

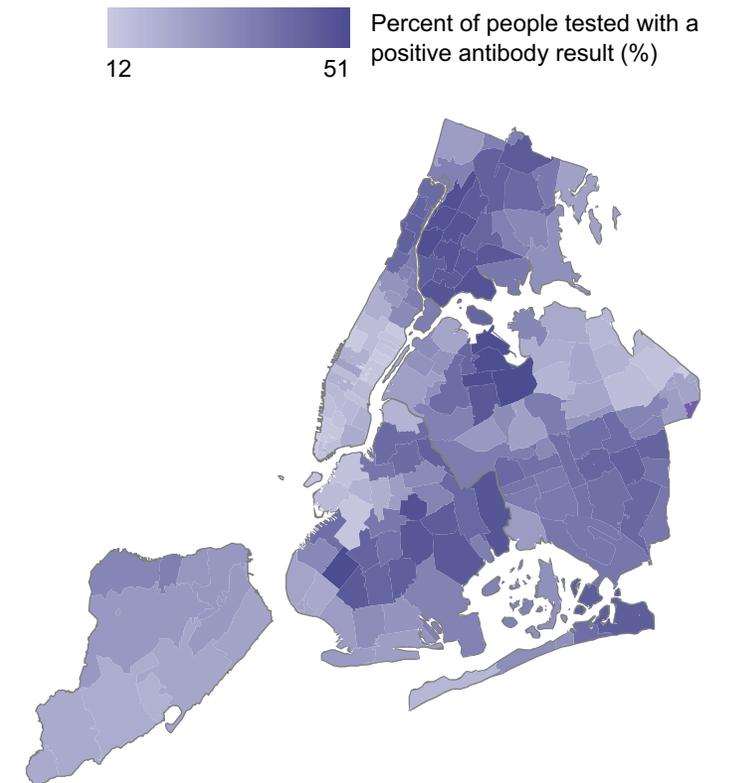
 **Queens, NY:** NYC Health has released data on 1.46M antibody tests, which shows some neighborhoods (e.g. Corona, Queens) had 52% antibody prevalence, whereas other neighborhoods in Queens had 12%³

Areas with high rates of exposure and high levels of adoption of an eventual vaccine are **likely to stabilize more quickly**⁴, whereas areas with low exposure and low levels of adoption of an eventual vaccine are **likely to see prolonged case burden as they progress towards**

Antibody prevalence varies across US sites, especially in NYC...¹



... and varies further within NYC at a zip code level³

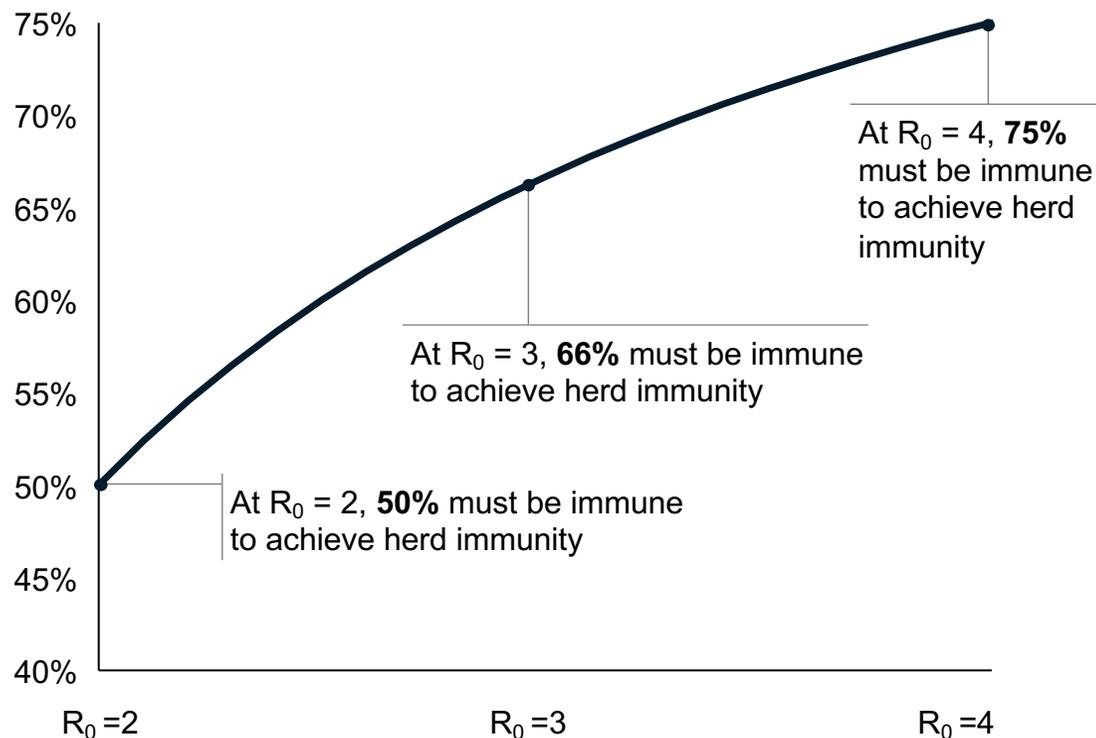


Source: 1. [CDC](#) (as of July 21, 2020 – commercial laboratory seroprevalence data, most recent sample for each site); 2. [NITI-BMC-TIFR](#); 3. [NYC Health](#); 4. Assuming that immunity has meaningful length/durability

R₀ is an important driver of the threshold for achieving herd immunity

R₀ is a measure of the contagiousness or transmissibility of Sars-Cov-2, and can be generally thought of as the expected number of COVID-19 cases directly generated by a single case in a population where all people are susceptible

Basic formula for herd immunity threshold implies that 50-80% of population needs immunity if COVID-19 has R₀ = 2-4¹



Key takeaways

The R₀ of Sars-Cov-2 is currently estimated to be 2 to 4, which implies the threshold for herd immunity will be reached when **50-75% of the population has some form of immunity**

These calculations are based on the following **basic formula**:

$$\text{Threshold for achieving herd immunity} = 1 - \frac{1}{R}$$

This formula implies that as R₀ increases, so does the threshold for herd immunity, albeit at a decelerating pace at higher values of R₀

R₀ is driven by a number of **biological, socio-behavioral, and environmental factors**. For example, the R₀ on a cruise ship may be 14+ but may be lower than 2 in rural areas of most countries²

This formula is imperfect and relies on several broad **assumptions** – one of which is that each member of the population mixes randomly with all other population members. In reality, large variations exist in patterns and levels of interaction. Therefore, the overall threshold for herd immunity can be lower

1. The range of R₀ values is debated. Sources for the range of 2-4 include: i) Low end range, [NYTimes](#) (R₀ = 2.0-2.5); ii) High end range: [Nature](#) – Early estimates of R_t when no restrictions were imposed (analog for R₀ = 3.0-5.0)
 2. Several studies have estimated varying levels of R₀ of SARS-Cov-2 -- [one study](#) modeled the initial pre-intervention R₀ on the Diamond Princess as 14.8

Heterogeneity of population mixing might reduce the herd immunity threshold

Heterogeneity of population mixing is a key factor in determining herd immunity thresholds

The assumption of the basic formula ($1-1/R_0$) that each member of the population mixes randomly with all other population members **does not hold true** in the real world

In reality, **large variations** exist in patterns and levels of interaction. People mix disproportionately with others whose patterns of interaction are similar to their own

Those with fewer interactions have a **lower threshold** for herd immunity than those with more interactions

Therefore, the overall threshold for herd immunity can be lower when taking into account:

- Individuals who have fewer interactions might **drive down the overall threshold**
- Individuals who have greater interactions have disproportionately **already been infected**

Implications

Some dynamic models that incorporate heterogeneity of population mixing predict thresholds for herd immunity **closer to 40-50%**

The lower the actual threshold for herd immunity is, **the sooner herd immunity could potentially be achieved** and functionally end the epidemic

Other epidemiologists have called into question these hopeful estimates, cautioning that certain models producing low herd immunity thresholds have produced wide ranges in various jurisdictions and that some extremely low predictions are not consistent with other respiratory viruses

Reduced COVID-19-related mortality might be achieved through many factors simultaneously

Shift in focus from cases to mortality

Society has grown used to tracking the number of COVID-19 infections. But case counts matter primarily because people are dying from the disease and because those who survive it may suffer long-term health consequences after infection¹

A transition to the next normal will likely come gradually when people have confidence that they can do what they used to do without endangering themselves or others.

Factors that could reduce COVID-19 related mortality



Immunity through COVID-19 vaccine

Rolling out an effective COVID-19 vaccine in high-risk populations could significantly reduce related mortality



Cross-immunity

Potential T-cell cross-reactivity immunity of SARS-CoV-2 and other coronaviruses being researched



Immunity through other vaccines

Potential correlation between BCGI vaccination and lower COVID-19 case counts and related mortality being researched



Decreased rate of transmission

Faster identification of COVID-19 and isolation measures through rapid, accurate testing could reduce related mortality and allow quicker resumption of activities (e.g., air travel)



Better treatment

Improved understanding of COVID-19 and advances in its treatment could significantly decrease related mortality



Natural immunity

A larger population with COVID-19 immunity through exposure could reduce related mortality

1. The latter is an area of scientific uncertainty that requires further study, but there is concern that some recovered patients will face long-term effects

2. Bacille Calmette – Guérin (BCG) vaccine is widely used as a prevention strategy against tuberculosis

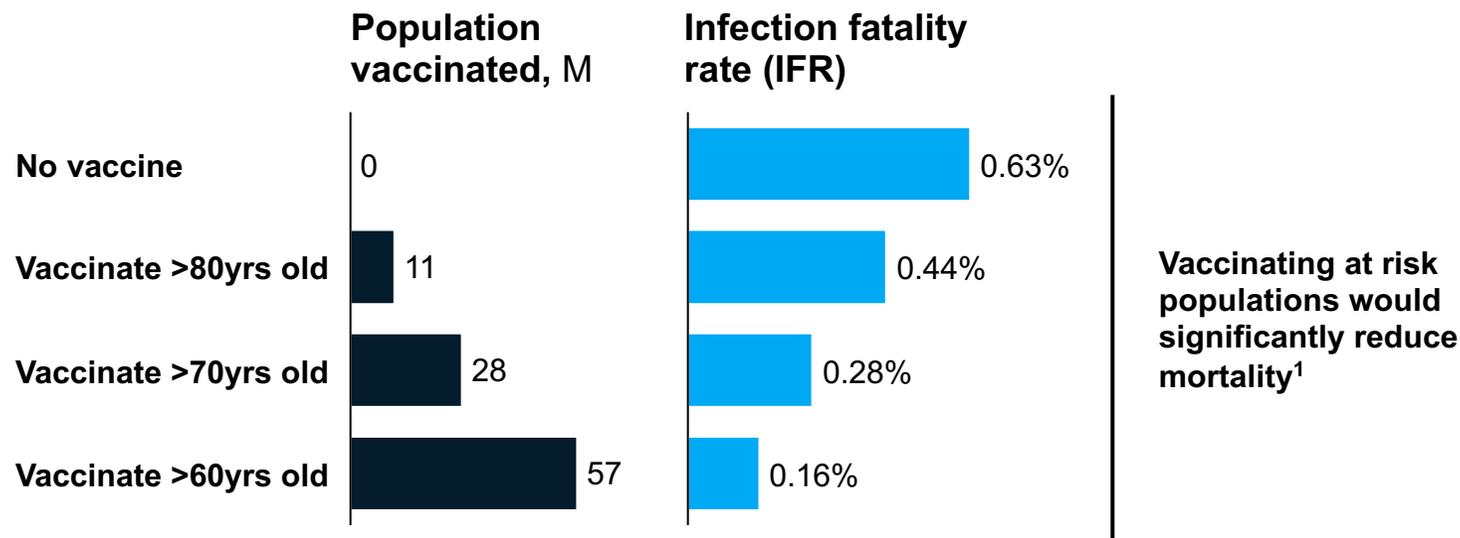
Vaccinating at risk population has potential to significantly reduce total fatality rate

US

Different age groups have very different case fatality rates (CFRs)

Age group	CFR	Population, M (% of total)
<9	0.1%	40.6 (13%)
10-19	0.1%	42.7 (14%)
20-29	0.1%	42.7 (14%)
30-39	0.4%	40.1 (13%)
40-49	1.0%	43.6 (14%)
50-59	2.4%	42.0 (14%)
60-69	6.7%	29.3 (9%)
70-79	16.6%	16.6 (5%)
>80	28.7%	11.2 (4%)
Total	3.1%	308.7

Different vaccination scenarios lead to different estimated average infection fatality rates (IFRs)



Assumptions used in above illustrative scenario

- Optimistic vaccine scenario (efficacy = 80%, coverage = 70%)
- Efficacy and coverage same across age groups
- Herd immunity (with R_0 of 2.4)² = 58%
- Assumes population mixing occurs until herd immunity is reached, does not account for cases and deaths to date
- No heterogeneity of population mixing
- Age used as proxy for at risk populations

1. Not meant to suggest prioritization for vaccination strategy – strategies may start with vaccinating populations at higher risk of getting infected (e.g., healthcare workers) and not those with higher mortality (e.g., older population)

2. Herd immunity threshold is calculated as $1 - (1/R_0)$; higher R_0 values would drive higher thresholds to reach herd immunity

Other therapeutics could offer an alternative route back to the next normal

Even if herd thresholds remain high and progress is relationally far off, therapeutics could represent an alternative path to normal that do not require herd immunity

The arrival of an effective, accessible pre- or post-exposure prophylactic or therapy with minimal side-effects could enable a fast return to normal

- **Illustrative example:** *Before or after interacting with people at an office or bar, one might take a simple drug that stops COVID-19 from replicating itself in the body*

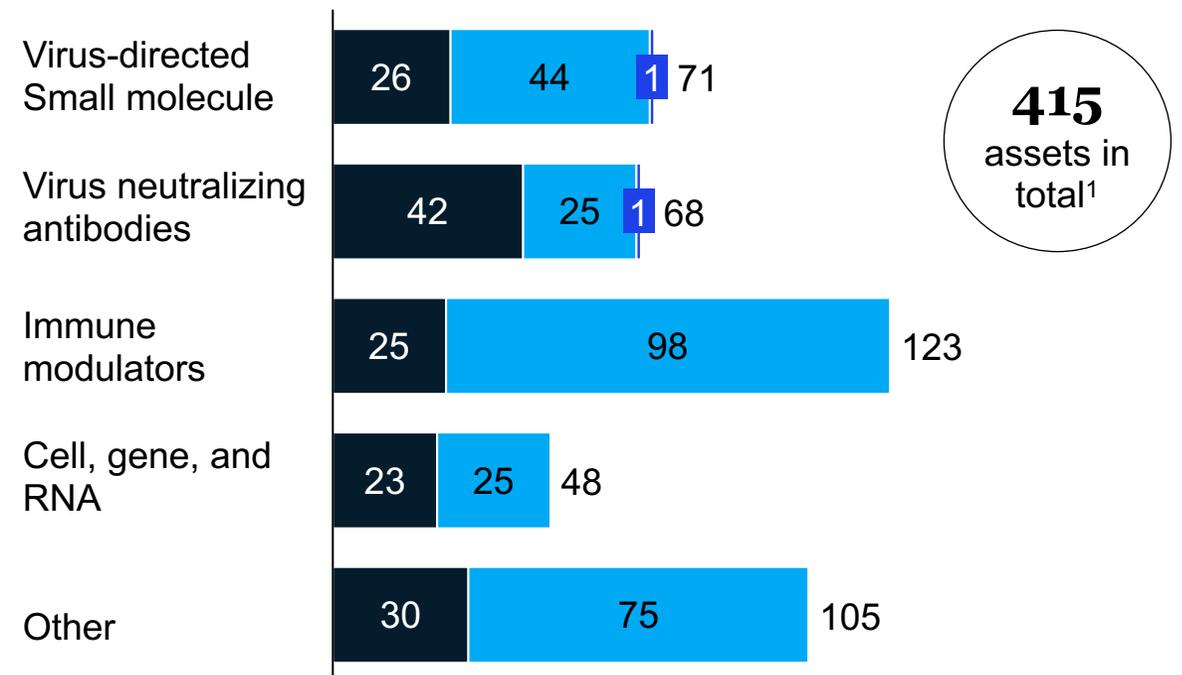
Such a treatment could provide a “side-door” back to normal, where we do not reach herd immunity, but rather live with high levels of exposure but dramatically lower levels of risk

Similar to vaccines, these treatments would also require both high efficacy and widespread coverage in order to quickly enable a return to normal

■ Preclinical ■ Clinical ■ Approved or EUA in the US

400+ candidates are in the pipeline for COVID-19 therapeutics; however, none have yet demonstrated that they could enable a return to normal in the near-term

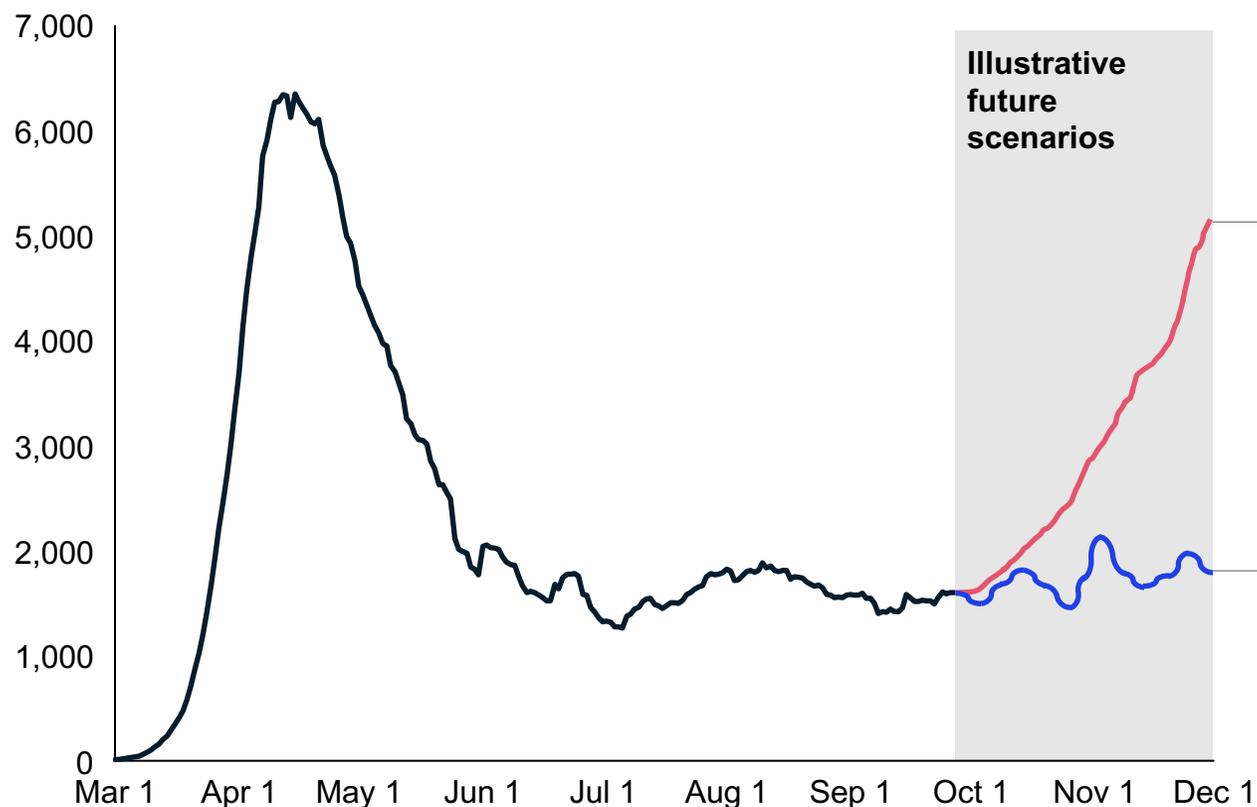
Number of therapeutic candidates



1. Clinical trial information may not have been captured if not registered at CT.gov or published otherwise

There is uncertainty around Q4 '20 even given vaccines driving medium-term optimism

Daily deaths¹ for northern hemisphere OECD countries²



Severity of fall/winter wave will depend on several factors

A spike in cases and deaths may come driven by:

- Colder weather leading to higher fraction of interactions taking place indoors where risk is higher
- Population fatigue driving a decrease in compliance with public health measures
- Economic pressures driving governments not to implement more restrictive public health measures

A continued balancing act with steady or decreasing mortality may come driven by:

- Continued improvements in care driving lower case mortality
- Disease transmission decreases from heterogeneity in population mixing (e.g., “superspreaders” already infected)
- General populations practice self-adjusting behaviors, intensifying public health behaviors as local spikes occur
- Natural immunity contributing to slowing in transmission in some areas (e.g. NYC)

Severity of fall/winter wave will vary by location, and there will likely be hotspots in either scenario

1. 7 day rolling average; 2. Austria, Belgium, Canada, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Latvia, Lithuania, Luxembourg, Mexico, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, South Korea, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States of America

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**Unprecedented
momentum in pace
and scale of
development for
COVID-19 vaccines**

275+

Vaccine candidates in development with 55+ already in clinical trials

4X

Faster development timelines than any prior vaccine

>11B

Capacity for COVID-19 vaccine doses globally

\$17+B

Investment in vaccine development & procurement of supply

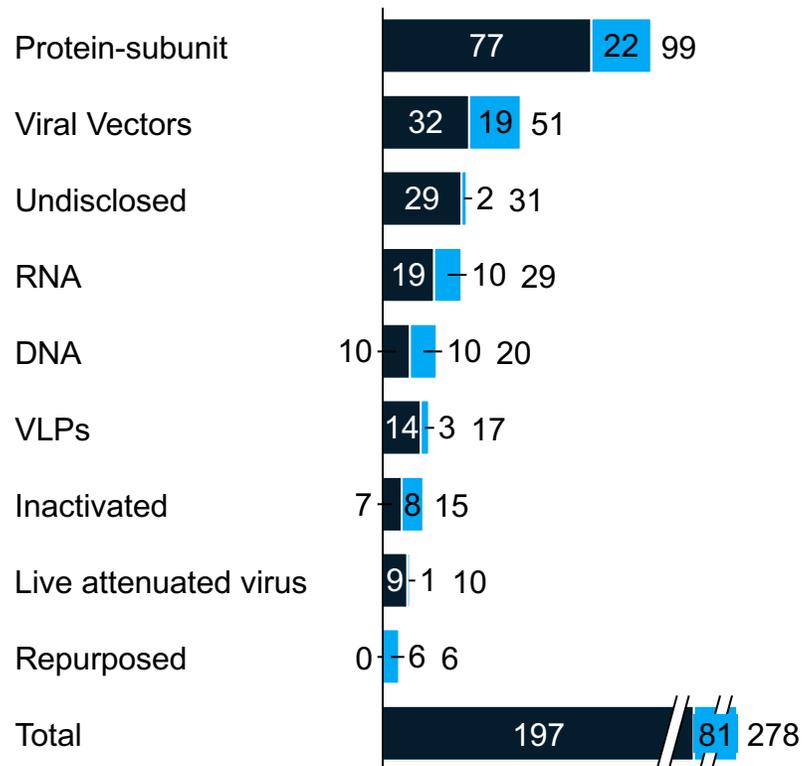
Current information suggests cautious optimism – more information on safety and efficacy to come in the next months

COVID-19 vaccines development effort overview

278 vaccines are currently in development

■ Trials started or expected to start in 2020 ■ No announced start date

Pipeline overview



Recent developments – Oct 8 - 29, 2020

J&J announced it is resuming its late-stage vaccine trial, which had been paused earlier this month over safety concerns. Results from that study are expected by end of the year.¹

AZ has received approval from the FDA to continue the US arm of its Phase 3 trial. This follows previous authorizations to restart clinical trials in the UK, Brazil, India, Japan and South Africa.²

Novavax is delaying the start of its late-stage study in the US to November, due to delays in manufacturing scale-up. Interim data from its UK phase 3 trial is expected by early 2021.³

A lower-than-expected number of COVID-19 infections in Pfizer's phase 3 vaccine trial means data aren't yet ready for an interim analysis, pushing a readout into the first week of November at the earliest. CEO Albert Bourla said the company still hopes to launch its vaccine by year-end.⁴

The European Medicines Agency (EMA) may accept a vaccine that works in less than 50% of patients, as long as the benefits outweigh the safety risks. The EMA guidance differs from that of the FDA, which requires at least 50% efficacy for EUA approval.⁵

California, Washington, Oregon, Nevada and New York are planning to conduct independent evaluations of FDA-approved vaccines, citing public concern over the FDA approval process.^{6,7}

Russia has approved a second COVID-19 vaccine, developed by the Vector State Virology and Biotechnology Center. No clinical trial data have been released.⁸

1. [Endpoints](#)
2. [AstraZeneca](#)

3. [Reuters](#)
4. [FiercePharma](#)

5. [WSJ](#)
6. [Reuters](#)

7. [NYT](#)
8. [The Moscow Times](#)

There are 278 candidates in the pipeline for COVID-19 vaccines

			Not covered in this document
	Description	Example companies / compounds	Number of candidates profiled ¹
RNA	Nucleic acid RNA packaged within a vector (e.g. lipid nanoparticles).	  	29
DNA	Plasmid containing the DNA sequence encoding the antigen(s) against which an immune response is sought		20
Inactivated	Killed version of the virus that causes the disease, providing shorter-term protection and requiring boosts	 	15
Viral vectors	Chemically weakened virus to transport pieces of the pathogen – usually antigen coding surface proteins	  	51
Attenuated virus	Weakened virus to stimulate immune response		10
VLPs	Virus-like-particles - molecules that closely resemble viruses, but are non-infectious because they contain no viral genetic material	 	17
Protein subunit	Purified or recombinant proteinaceous antigens from a pathogen to elicit immune response. Some assets employ a nanoparticles-delivery system for enhanced antigen presentation	  	99
Repurposed	Repurposed vaccines already on the market		6
Undisclosed ²	Additional candidates with little public information	 	31

1. Compiled across multiple lists (Milken Institute, BioCentury, WHO, Nature) and supplemented with press

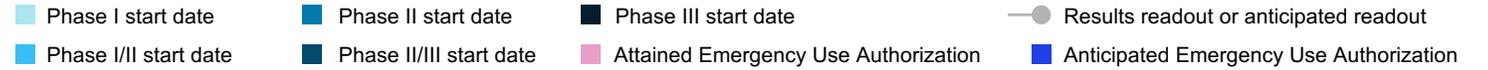
2. Not profiled moving forward. Vaccine type cannot be delineated due to lack of public information; typically in research setting or small biotech

Source: [Milken Institute](#), [BioCentury](#), [WHO](#), [Nature](#)

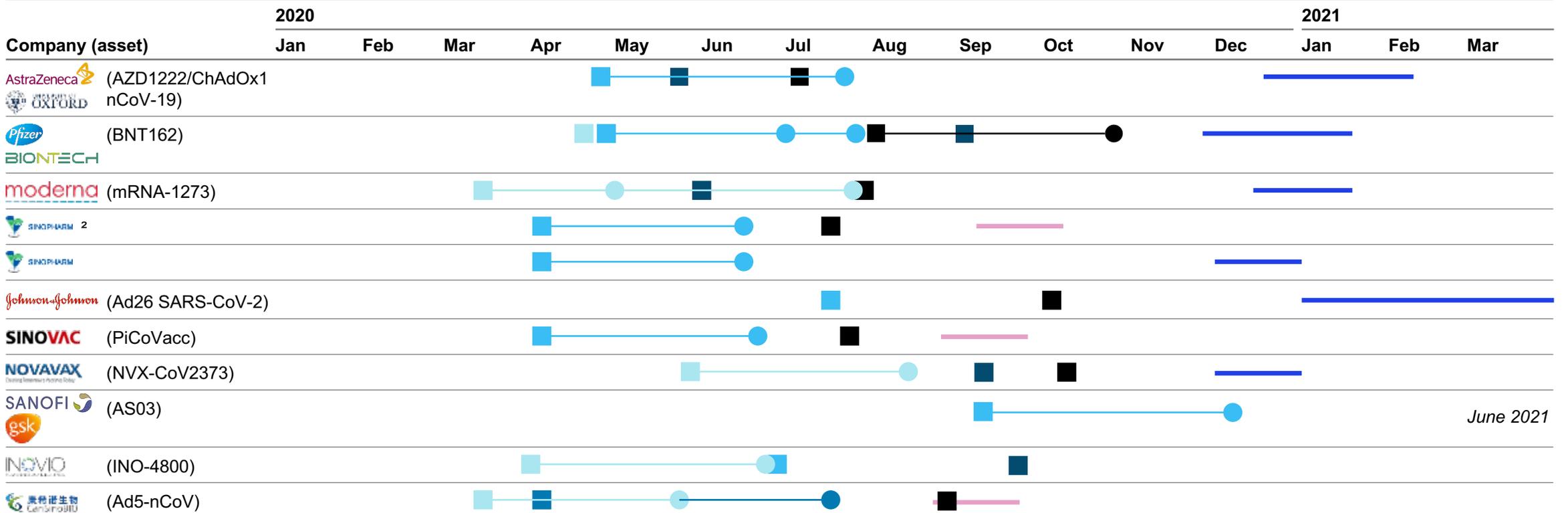
McKinsey & Company 48

Several developers have announced potential for interim data to inform emergency use authorization in late 2020 and/or early 2021

Not Comprehensive



Announced clinical-trial timelines for COVID-19-vaccine candidates¹



1. When the announced start date is given as a range, start dates are shown across multiple months. The first start date is listed if multiple trials are in the same phase. Includes vaccines under Emergency Use Authorization.

2. China National Pharmaceutical.

Consumer willingness to vaccinate varies significantly by ethnicity and has been declining overall



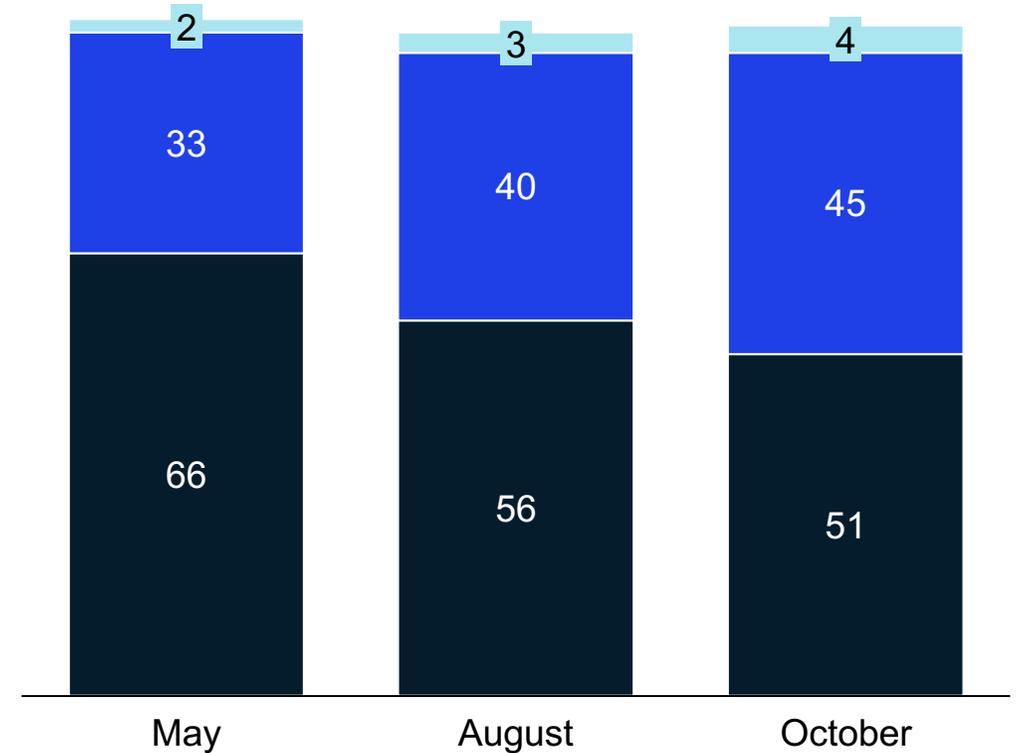
Willingness to adopt vaccine by ethnicity¹

% respondents (McKinsey, Aug '20, n= 1,003)



Willingness to adopt vaccine over time²

% respondents (CNN/SSRS, May-Oct '20, n= 1,205)



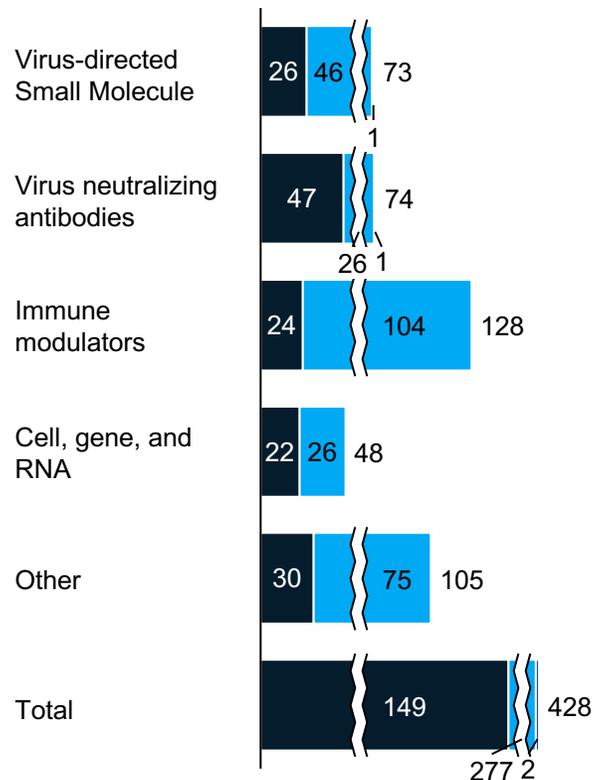
1. Question: Assume a COVID-19 vaccine is approved and CDC guidelines recommend that individuals with your profile (e.g., age, health status, etc.) get vaccinated. In this scenario, how likely are you to get a COVID-19 vaccine?; 2. Question: If a vaccine to prevent coronavirus infection were widely available at a low cost, would you, personally, try to get that vaccine, or not?

COVID-19 Therapeutics landscape update

■ Preclinical ■ Clinical ■ Approved or EUA in the US

Pipeline snapshot

Number of candidates¹



Recent developments – Oct 8 - Oct 29, 2020

Phase II/III data from Regeneron REGN-COV2 indicate that the drug **decreased COVID-19-related medical visits by 57%** in 29 days post-treatment (2.8% vs. 6.5% in placebo group).²

The NIH halted its combination trial of Eli Lilly's LY-CoV555 antibody and Remdesivir citing a lack of benefit in hospitalized patients. The decision comes after the trial was paused earlier in October over safety concerns, although an independent review found similar safety outcomes for intervention and placebo arms of the trial³

The US government and Eli Lilly agreed to a \$375M USD deal to supply 300,000 vials of LY-CoV555. The agreement is contingent on EUA approval and contains an option to purchase 650,000 more vials through June 2020⁴

Gilead obtained FDA approval for Veklury (remdesivir) in the treatment of adult and pediatric COVID-19 patients requiring hospitalization. The FDA referenced data from three randomized, controlled clinical trials, including an NIAID trial showing that Veklury significantly improved time to recovery as compared to placebo. Interim results from the WHO SOLIDARITY trial had previously suggested that remdesivir 'appeared to have little or no effect on hospitalized COVID-19'^{5,6,7}

Key takeaways

Over 425 candidates are being considered across a range of modalities and use cases. **Remdesivir and Dexamethasone** are two drugs with clinically proven benefits.

None have been approved globally for COVID-19, but some countries approved specific drugs (not comprehensive):

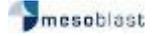
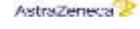
- **Veklury (remdesivir)** is approved in the US,⁶ EU, Japan, Taiwan, India, UAE, Australia, and Singapore, UK, and Canada⁸
- **Favipiravir** is approved in China, India, and Russia⁹
- **Coronavir** is approved in Russia¹⁰
- **Dexamethasone** is approved in Japan and the UK and provisionally approved in Taiwan¹¹
- **Itolizumab** is approved for emergency use in India¹²
- **Convalescent plasma** from COVID-19 patients received emergency use authorization in the US¹³

1. Clinical trial information may not have been captured if not registered at CT.gov or published otherwise; 2. [Regeneron](#); 3. [NIH](#); 4. [Lilly](#); 5. [Gilead](#); 6. [FDA](#); 7. [medRxiv](#); 8. [Gilead](#), [Reuters](#), [Reuters](#), [Reuters](#), [Press](#), [Department of Health](#), [Reuters](#), [gov.uk](#); 9. [RDIE](#), [HospiMedica](#), [Pmlive](#); 10. [CGTN](#); 11. [Fiercepharma](#); [Reuters](#); 12. [Indiatvnews](#); 13. [FDA](#), [STATNews](#)

Source: [Milken Institute](#), [BioCentury](#), [WHO](#), [Nature](#), CT.gov, ChiCTR, press as of July 14, 2020

There are over 425 candidates in the pipeline for COVID-19 therapeutics

F Not covered in this document

		Description	Candidates profiled	Example candidates/companies
A	Virus-directed small molecule	Largely repurposed compounds, including antivirals (HIV, Influenza), antimalarials , antiprotozoals , and more	73	Remdesivir Kaletra Chloroquine  GILEAD  abbvie
B	Antibodies (to neutralize virus)	Monoclonal antibodies (mAbs)	74	New development using survivor samples , genetically engineered mice and synthetic routes ; often a cocktail    REGENERON
		Polyclonal antibodies / plasma		New development using survivor plasma (convalescent plasma) or genetically engineered cows for hyper-immunized globulin. Also called plasma-derived therapy or IVIG.  Takeda  CSL Behring  SAB BIOTHERAPEUTICS
C	Immune modulators	IL inhibitors , alpha or beta- interferon and other therapies often repurposed . Targets host immune response with severe and critical disease (e.g. cytokine release syndrome)	128	Actemra Kevzara  REGENERON  Roche  SANOFI
D	Cell, gene and RNA therapies	Stem cells , T-cells , cord blood cells and RNA-based therapies	48	remestemcel-L siRNA  mesoblast  VIR  Alnylam
E	Other	Steroids , surfactants , oxygen carriers , immunotherapies , and other modalities not included in the above	105	Losartan Methylprednisolone Bevacizumab  Roche  Takeda  AstraZeneca
F	Traditional Chinese Medicine	Traditional herbal formulas and medicines	n/a	maxingshigan-yinqiaosan

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**Appendix:
Scenarios deep-
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Safeguarding our lives and our livelihoods

The imperatives of our time

Imperatives

1

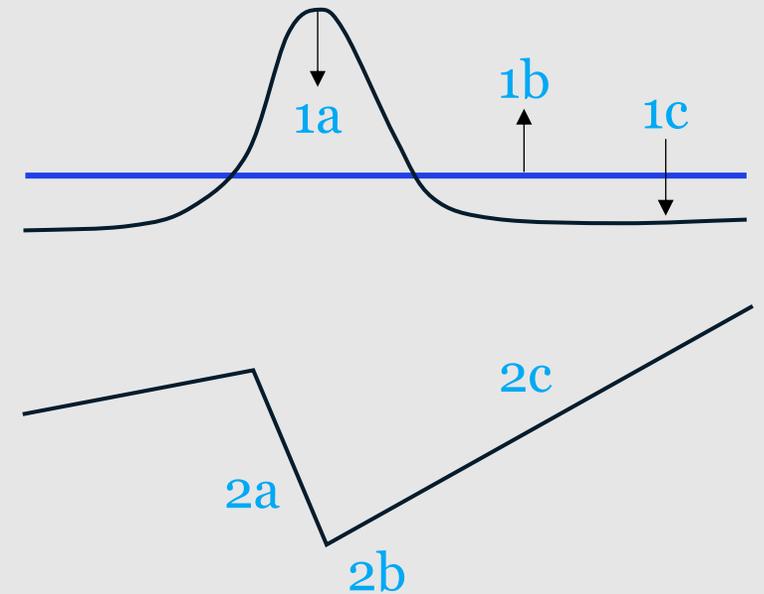
Safeguard our lives

- 1a. **Suppress the virus** as fast as possible
- 1b. **Expand testing, quarantining and treatment** capacity
- 1c. **Find “cures”**; treatment, drugs, vaccines

2

Safeguard our livelihoods

- 2a. **Support people and businesses** affected by lockdowns
- 2b. **Prepare to get back to work safely** when the virus abates
- 2c. **Prepare to scale the recovery** away from a -8 to -13% trough



The virus and the economy remains the central frame of reference

GDP scenarios for the economic impact of the COVID-19 pandemic, October 2020

Virus Health Impact & Public Health Response

Effectiveness of the public health response in controlling the health impact of COVID-19

Effective control of virus health impact

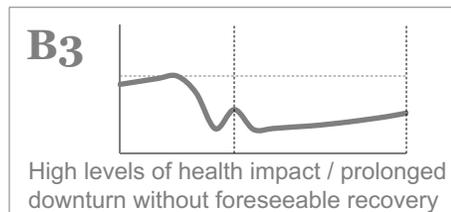
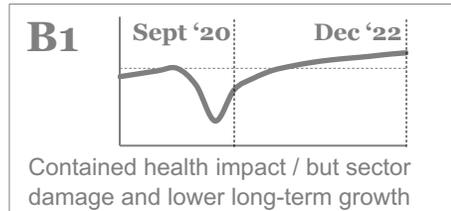
Strong public health response succeeds in minimizing health impact within 2-3 months and then maintaining control

Effective response, but (regional) recurring adverse health impact

Initial public health response generally succeeds but localized increases in health impact occur periodically requiring ongoing intervention

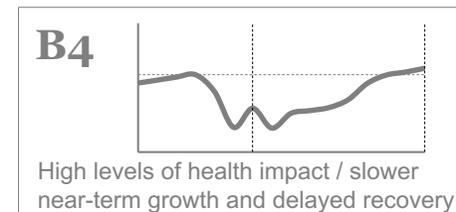
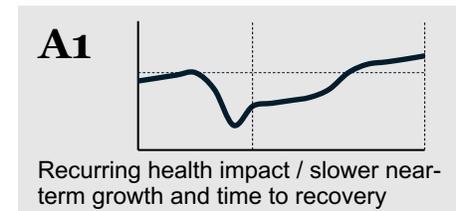
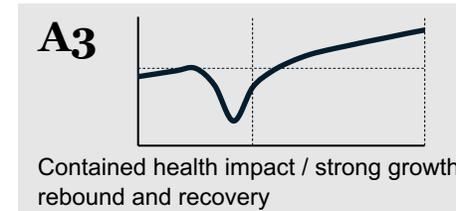
Material failure of public health interventions

Response fails to prevent sustained high levels of health impact that may wax and wane, potentially rolling into 2022



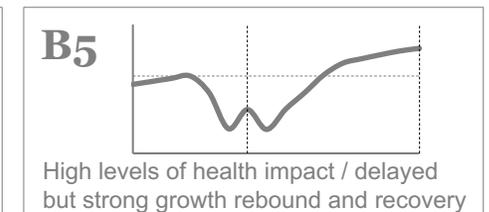
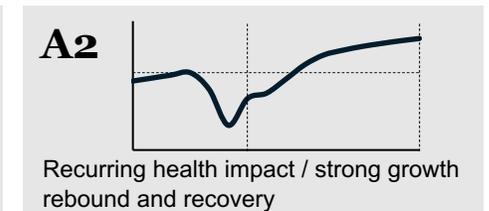
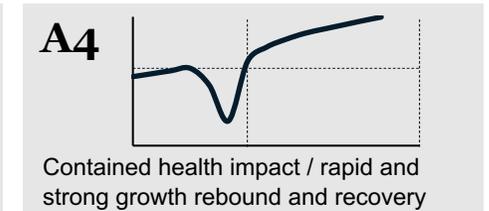
Ineffective economic interventions

Self-reinforcing recession dynamics kick-in; widespread bankruptcies and credit defaults; potential banking crisis



Partially effective economic interventions

Policy responses partially offset economic damage; banking crisis is avoided; recovery levels muted



Highly effective economic interventions

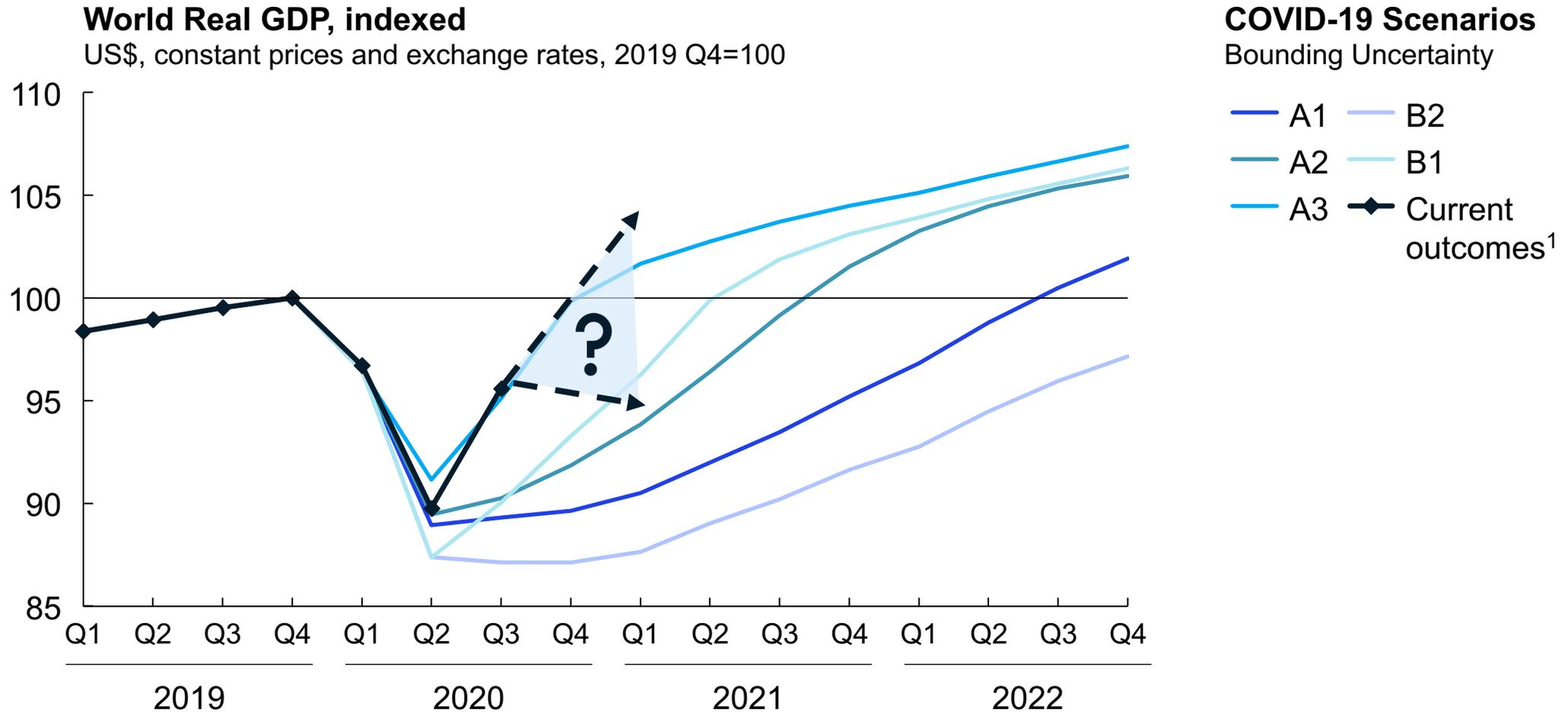
Strong policy responses prevent structural damage; recovery to pre-crisis fundamentals and momentum

Knock-on Effects & Economic Policy Response

Speed and strength of recovery depends on whether policy moves can mitigate self-reinforcing recessionary dynamics (e.g., corporate defaults, credit crunch)

Global Economy tracking towards “A3 Outcome” in Q3

Will the positive tailwind continue or is COVID-19 going to create further headwinds?



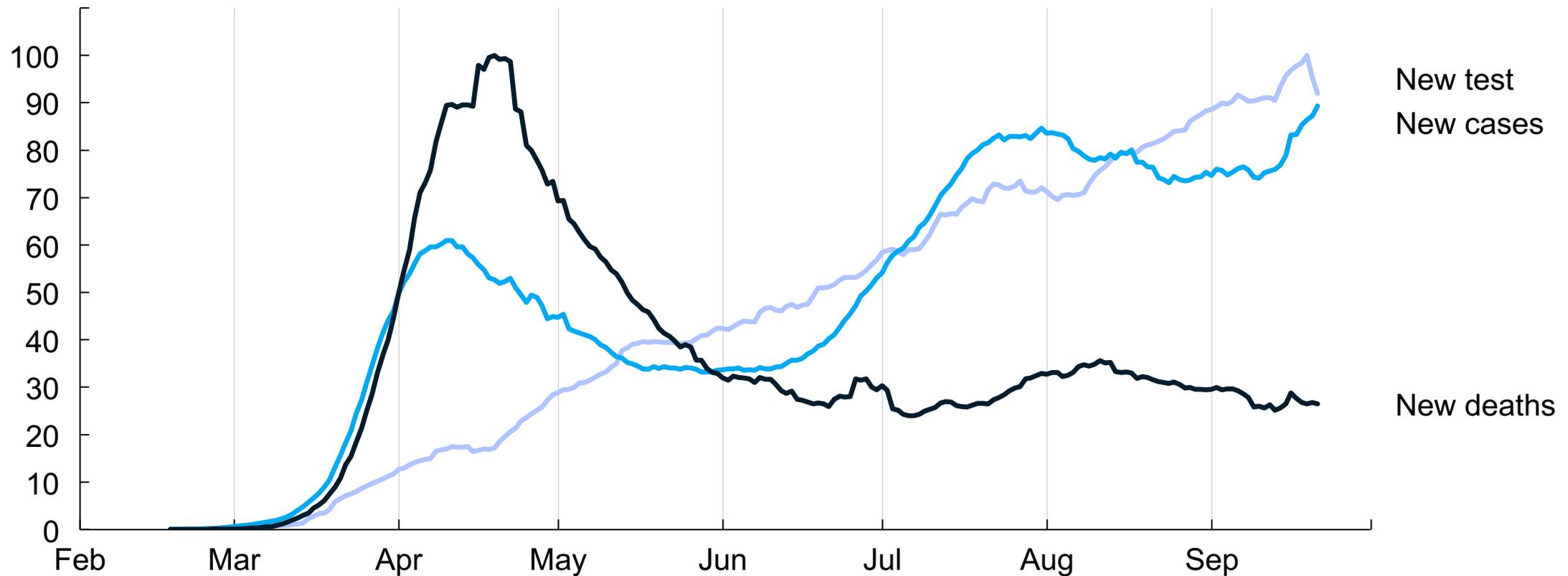
1. Reported data through Q2, Oxford Economics estimate for Q3

OECD mortality rates stabilized in summer amidst rising infections

Testing has been accelerated with new case development

Pre-COVID-19 level of activity = 0, Post-COVID-19 peak/trough = +/-100, through September 21st

OECD countries

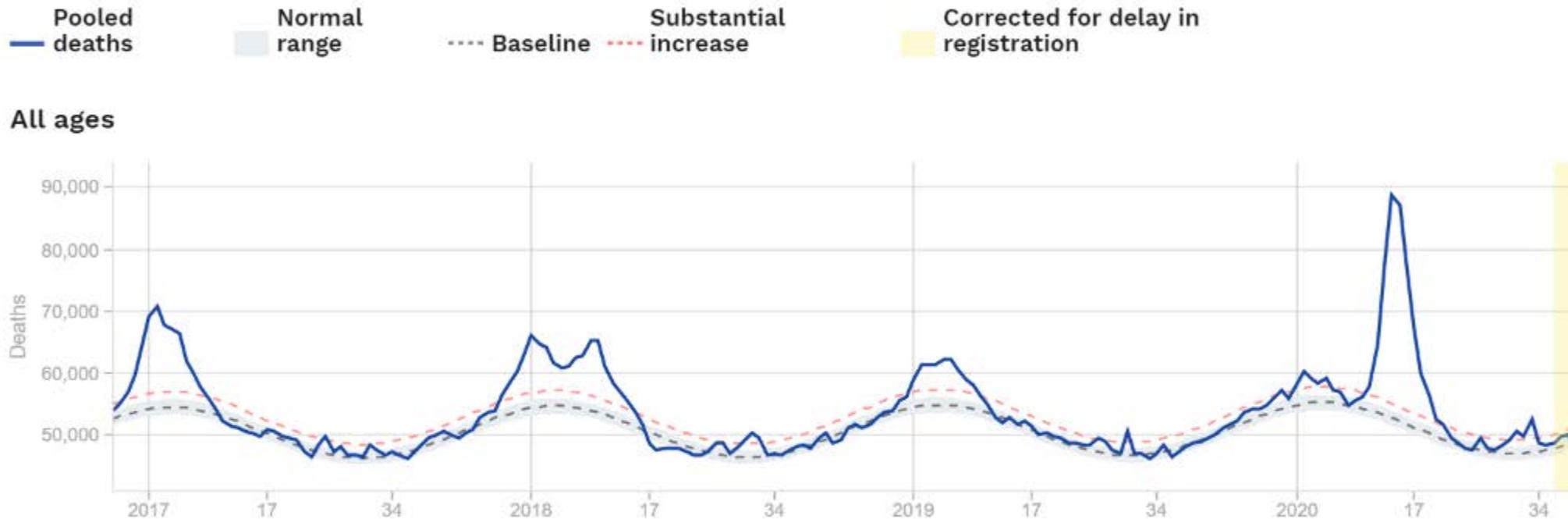


Excess mortality rates have come back down

As reported by individual countries and aggregated by EUROMOMO¹

Excess mortality, Europe

Deaths relative to expected outcomes, through September 27th



1. Austria, Belgium, Denmark, Estonia, Finland, France, Germany (Berlin), Germany (Hesse), Greece, Hungary, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, UK (England), UK (Northern Ireland), UK (Scotland), UK (Wales)

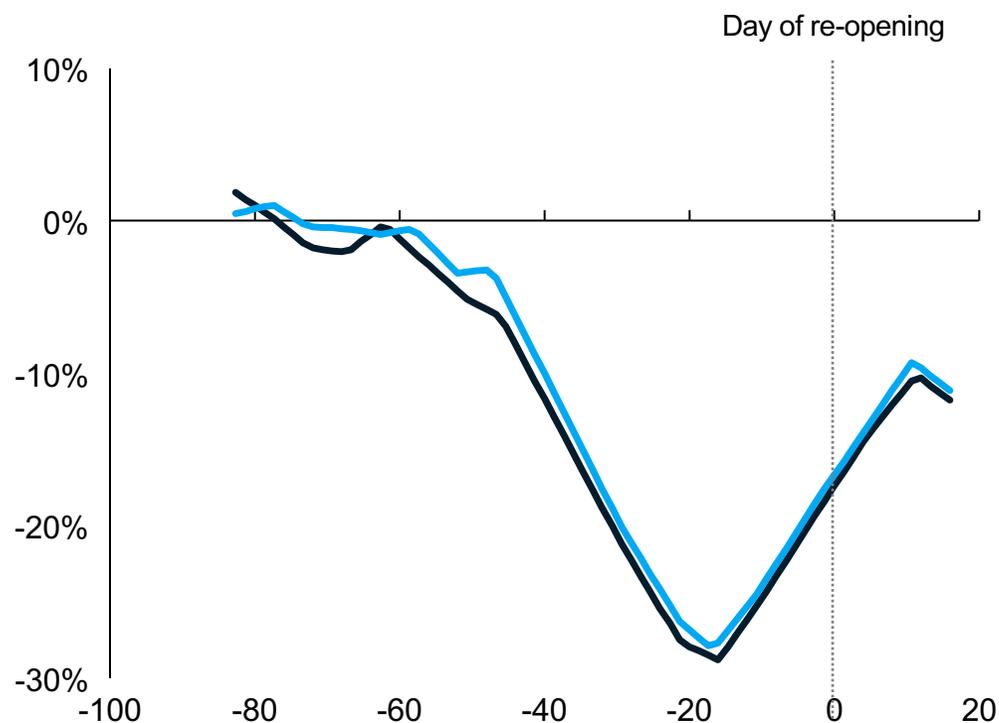
Similar economic behavior regardless of reopening strategies

Average impact of typical reopening efforts on aggregate economic activity¹

— States that did not order re-opening
— States that ordered re-opening

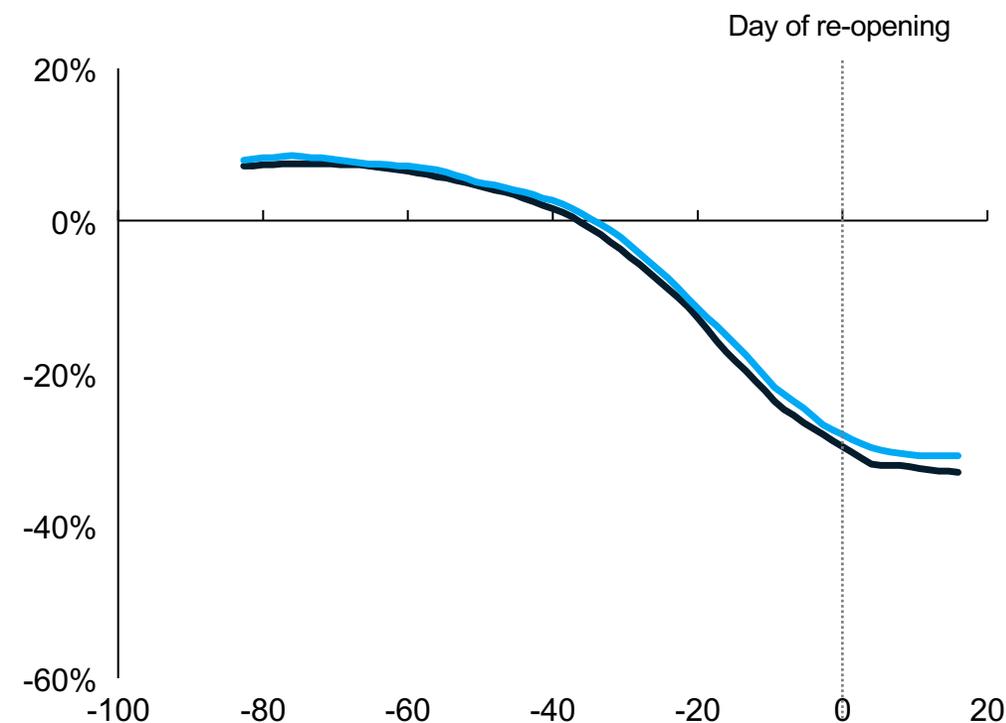
Change in consumer spending²

Indexed to Jan 2020, days relative to reopening



Change in employment² among low-wage workers

Indexed to Jan 2020, days relative to reopening



1. Based on analysis of 20 states that issued partial reopening orders on or before May 4. For each reopening date (April 20, 24, 27 and May 1, 4), the trajectory of spending in states that issued reopening orders was compared to a group of 13 control states that did not issue reopening orders until after May 18

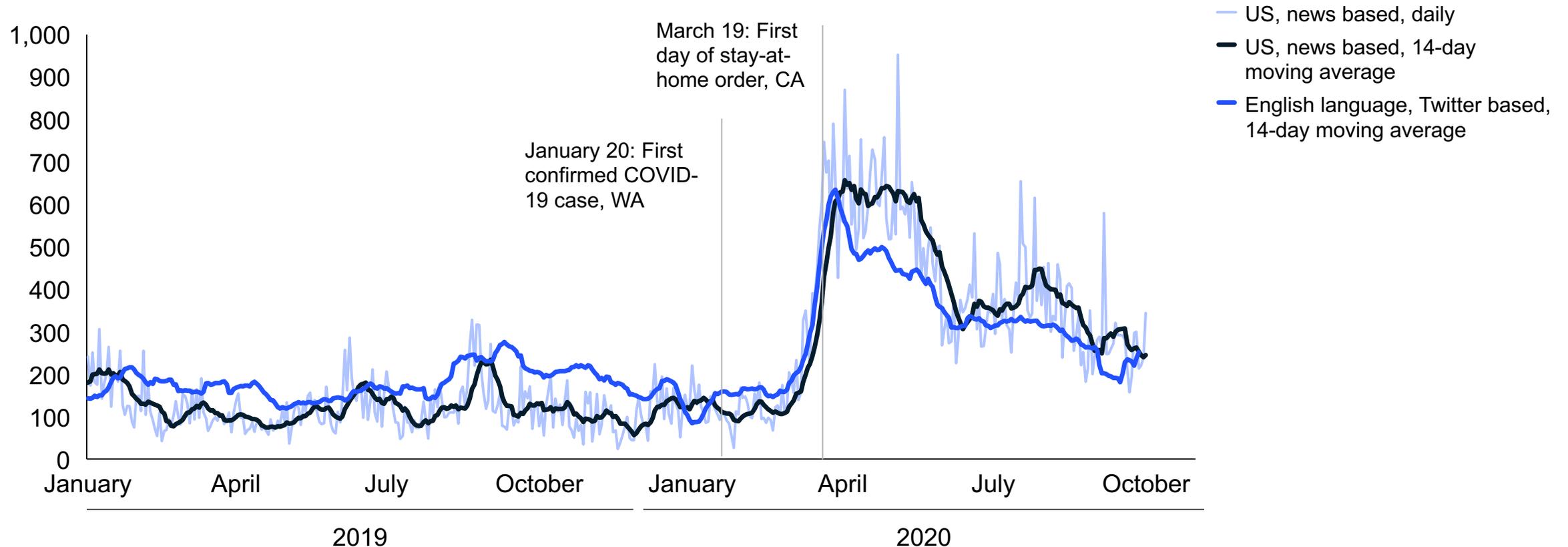
2. Consumer spending represented by credit and debit spending data from Affinity Solutions; employment figures represented by Earnin, Intuit, and Homebase

Uncertainty is starting to fall – could ‘collapse’ in Q4/Q1

Degree of uncertainty has fallen by more than half as initial unknowns about the virus have dissipated

Economic Uncertainty

Daily index, 2015-2019 = 100, through October 1st



COVID-19-Exit 2022 considered most likely by surveyed Executives

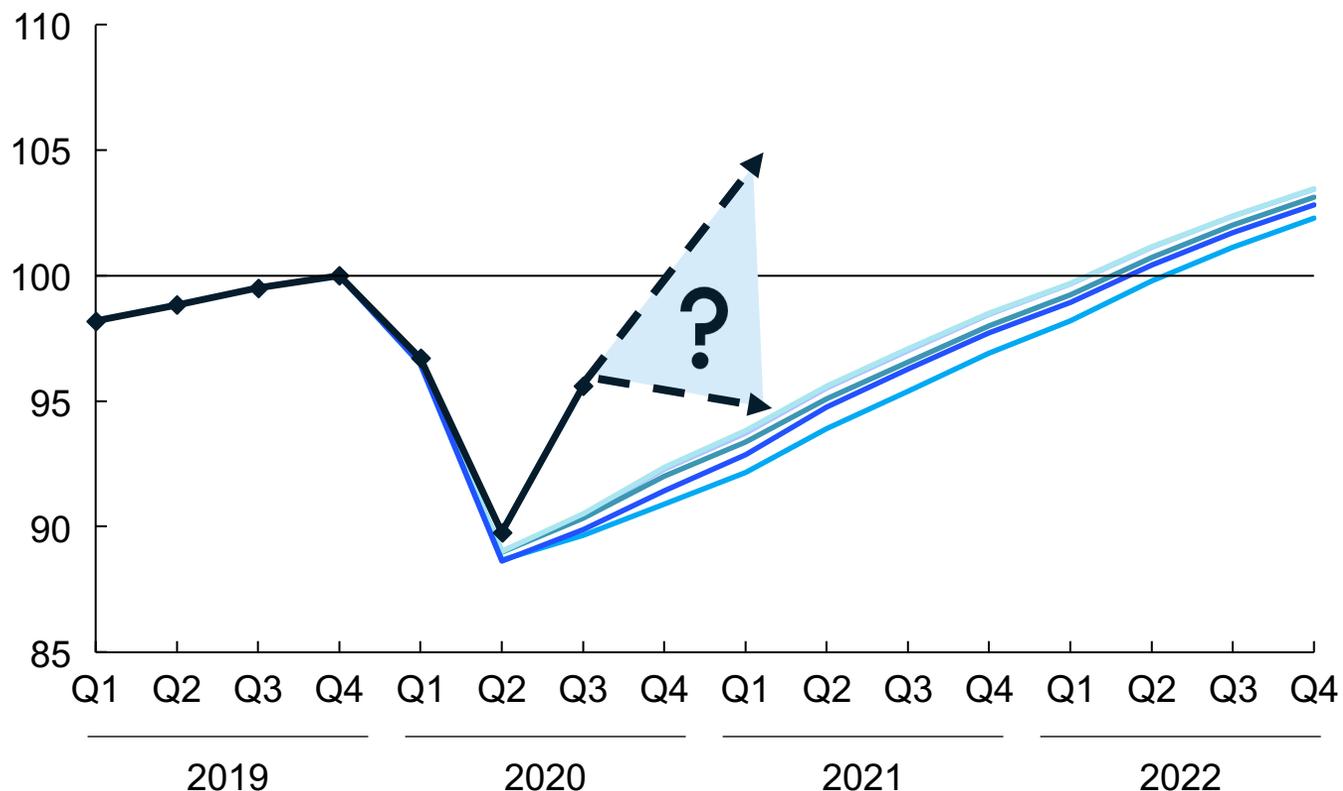
Average of Executive responses to the question of what scenario would be most likely (April – August 2020)

Global Real GDP, indexed

US\$, constant prices and exchange rates, 2019 Q4=100

Survey Month

— April — June — August
— May — July —◆ Current outcomes¹



1. Reported data through Q2, Oxford Economics estimate for Q3

Source: McKinsey analysis, in partnership with Oxford Economics

Are you thinking about...

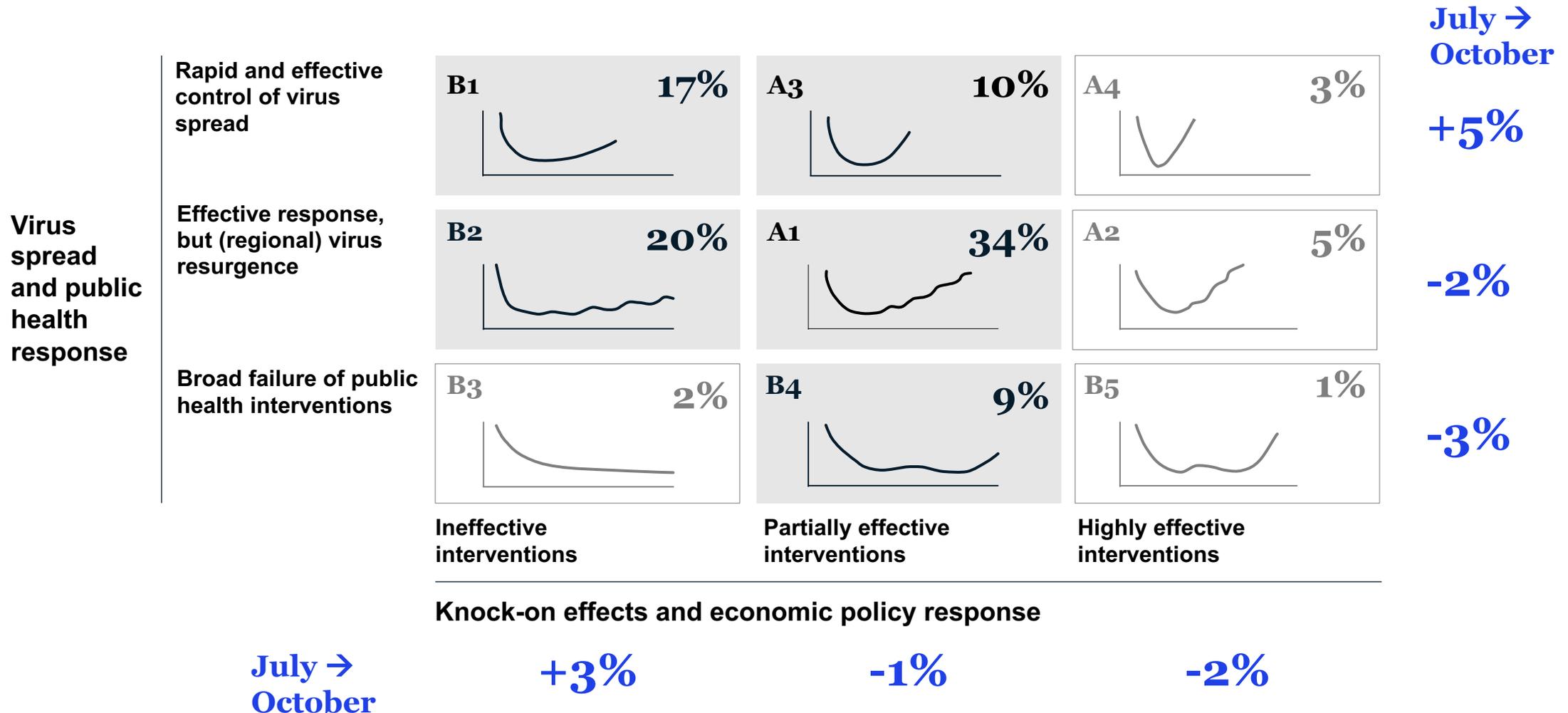
...what a 2022 **COVID-19-Exit Trajectory** could look like for your business?

...what **Transformation Initiatives** you need execute now to ensure you hit your COVID-19-Exit trajectory in stride?

...how to handle the **2021 Transition Year** with the opportunity to move on overdue actions (e.g., divestitures), establishing your new, post-COVID-19 operating model, and driving the transformation of the business?

Global executives' sentiment about potential virus health impacts improved by early October

Results from survey of ~2,000 global executives about "most likely scenario"



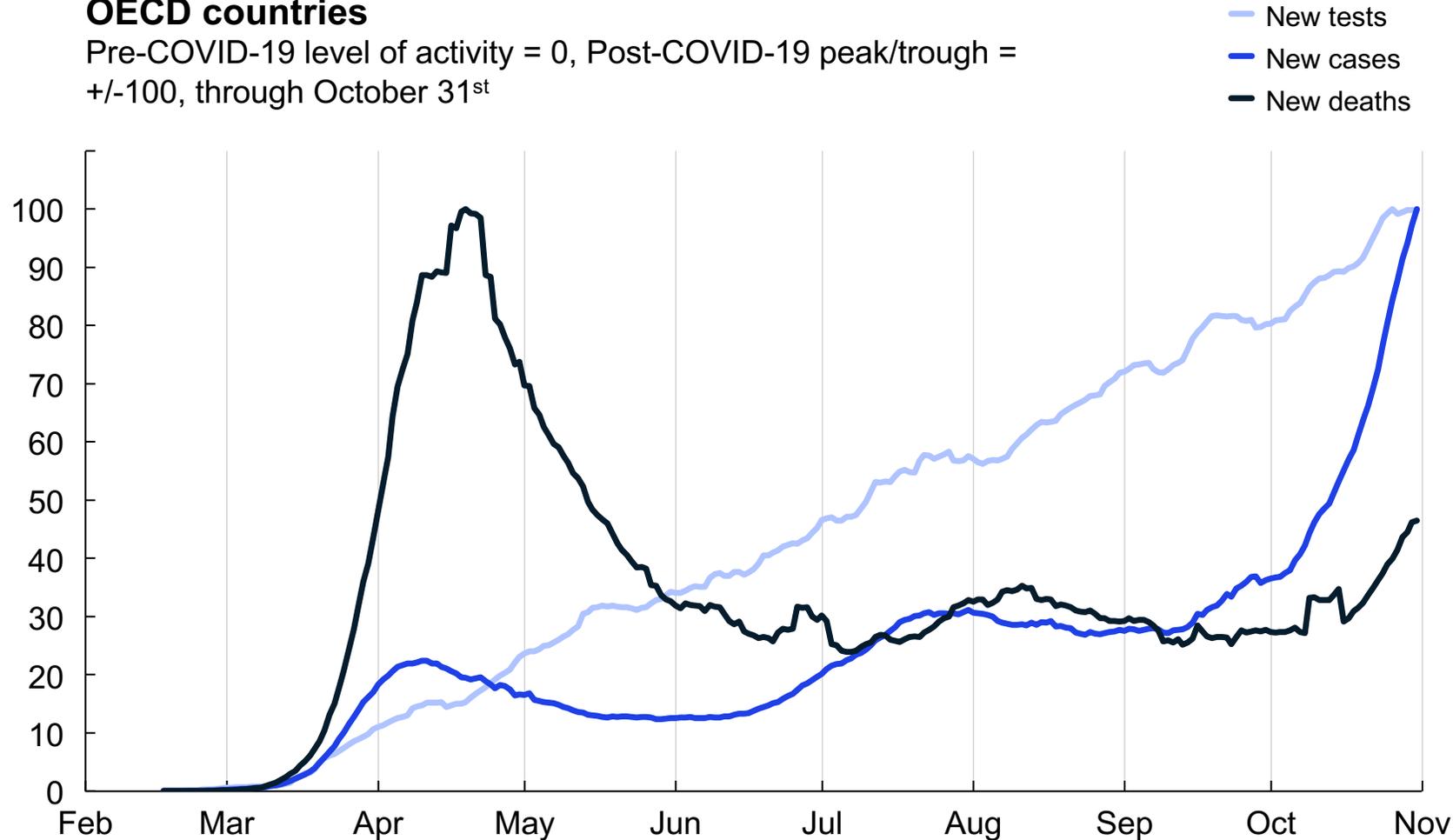
1. Survey question: Thinking globally, please rank the following scenarios in order of how likely you think they are to occur over the course of the next year.(choice of 9 scenarios)

Renewed headwinds from new wave of COVID-19 health impacts?

Mortality rates increased 60% from October 16th-October 31st

OECD countries

Pre-COVID-19 level of activity = 0, Post-COVID-19 peak/trough = +/-100, through October 31st



4.5 X

Current high of ~305,000 daily new cases vs. number recorded in April “first peak”

3.0 M

Current high of daily new tests

+60 %

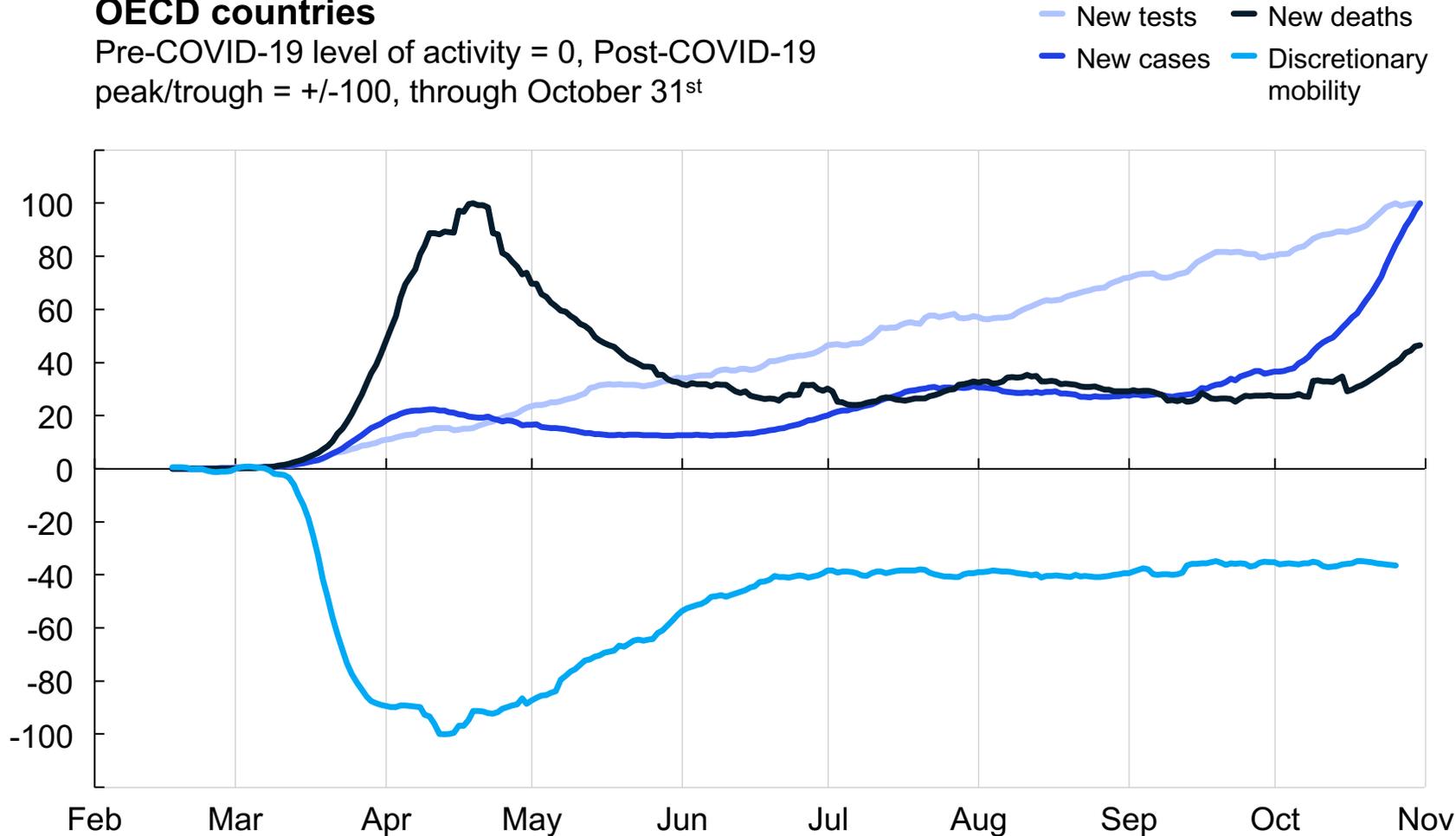
Current ~3,000 daily average deaths vs. mid-October

Discretionary mobility tracking mortality rates

Consumer activity around retail & entertainment, groceries & pharmacies, transit stations and workplaces

OECD countries

Pre-COVID-19 level of activity = 0, Post-COVID-19 peak/trough = +/-100, through October 31st



Discretionary mobility remains ~40% below pre-pandemic levels—commercial activity has yet to be restored for the OECD as a whole

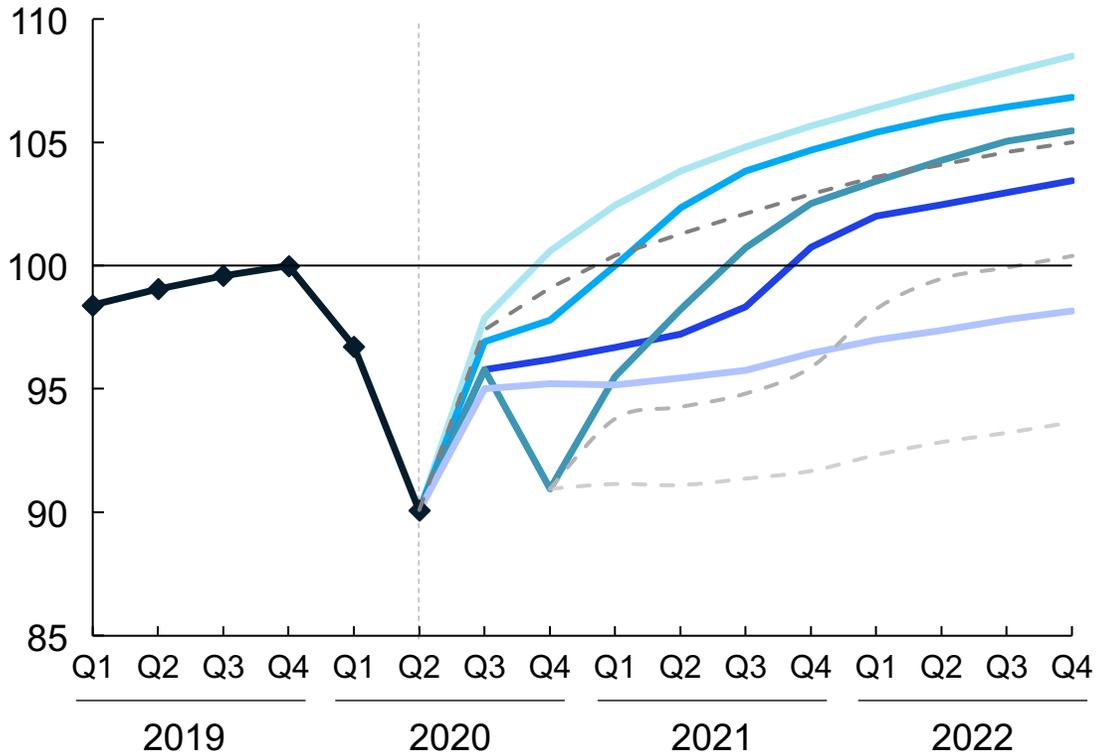
OECD-wide discretionary mobility has been low because of continued high case loads and mortality across some large countries (e.g., US, UK, Canada, Australia)

Increases in mortality may decrease discretionary mobility and commercial activity

COVID-19 scenario pathways, October 2020

World real GDP, indexed
Constant prices and US\$
exchange rates, 2019 Q4=100

— A3' — B5' - - B1'
— A2' — B2' - - B3'
— A1' —◆ Reported - - B4'



A3' Effective control of virus health impacts is achieved across most large economies. Jump in Q3 growth signals strong economic momentum that naturally continues

A2' Recurring adverse health impacts largely controlled by end-2020 with public health measures. Renewed fiscal stimulus in Q1 2021 supports consumers and lifts activity

A1' Recurring adverse health impacts largely controlled by mid-2021 with public health measures and/or vaccine. Growth returns as consumers and business revert to pre-pandemic activity

B5' 2020 Q4 sees escalation of virus health impacts and decline in GDP. Aggressive new health and fiscal programs are launched, which sets economies on sustained recovery

B2' Structural damage has been done as business failures, personal bankruptcies and long-term unemployment take hold even as virus health impacts are largely controlled

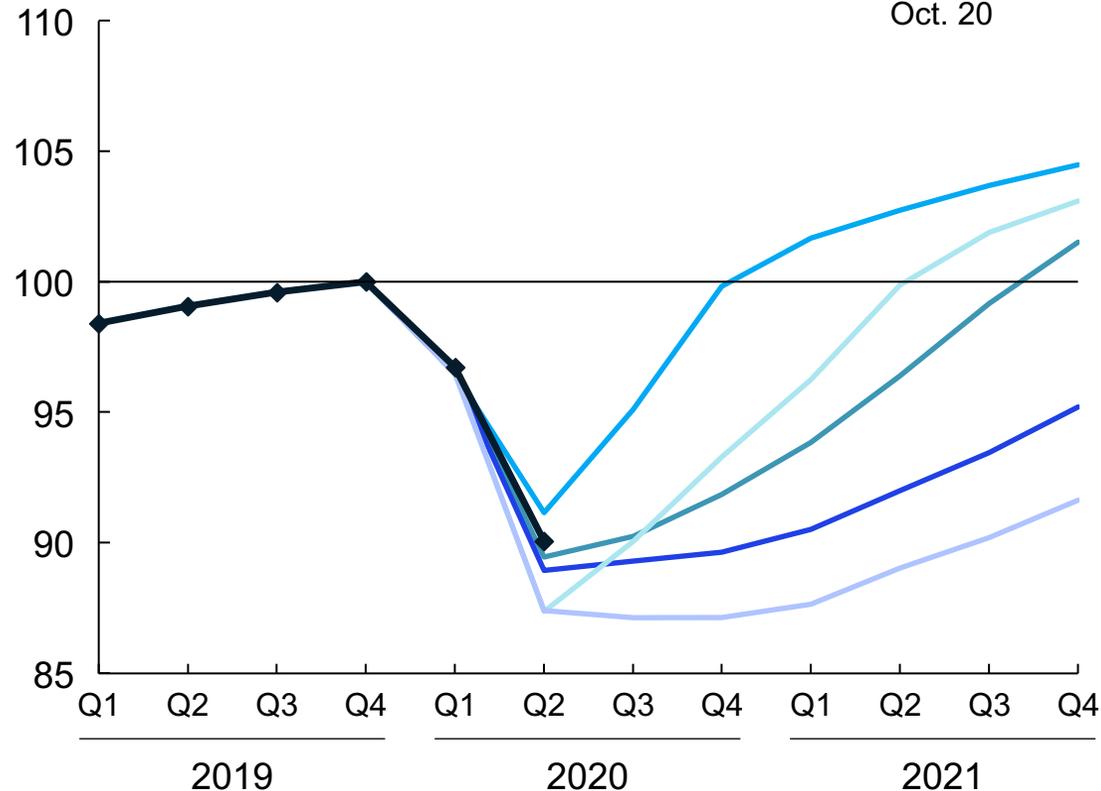
World

COVID-19 scenarios, April/June 2020

Real GDP, indexed

Constant prices and US\$ exchange rates, 2019 Q4=100

— A3 — B1
— A2 — B2
— A1 ◆ OE estimate, Oct. 20



Source: Bloomberg, McKinsey analysis, in partnership with Oxford Economics

	Real GDP Drop 2019Q4-2020Q2 % Change	2020 GDP Growth % Change	Return to Pre- Crisis Level Quarter (+/- 1Q)
A3	-8.9%	-3.5%	2021 Q1
OE estimate Oct. 20	-9.9%		
A2	-10.5%	-7.2%	2021 Q4
A1	-11.1%	-8.1%	2022 Q3
B1	-12.6%	-7.4%	2021 Q3
B2	-12.6%	-9.7%	2023 Q3

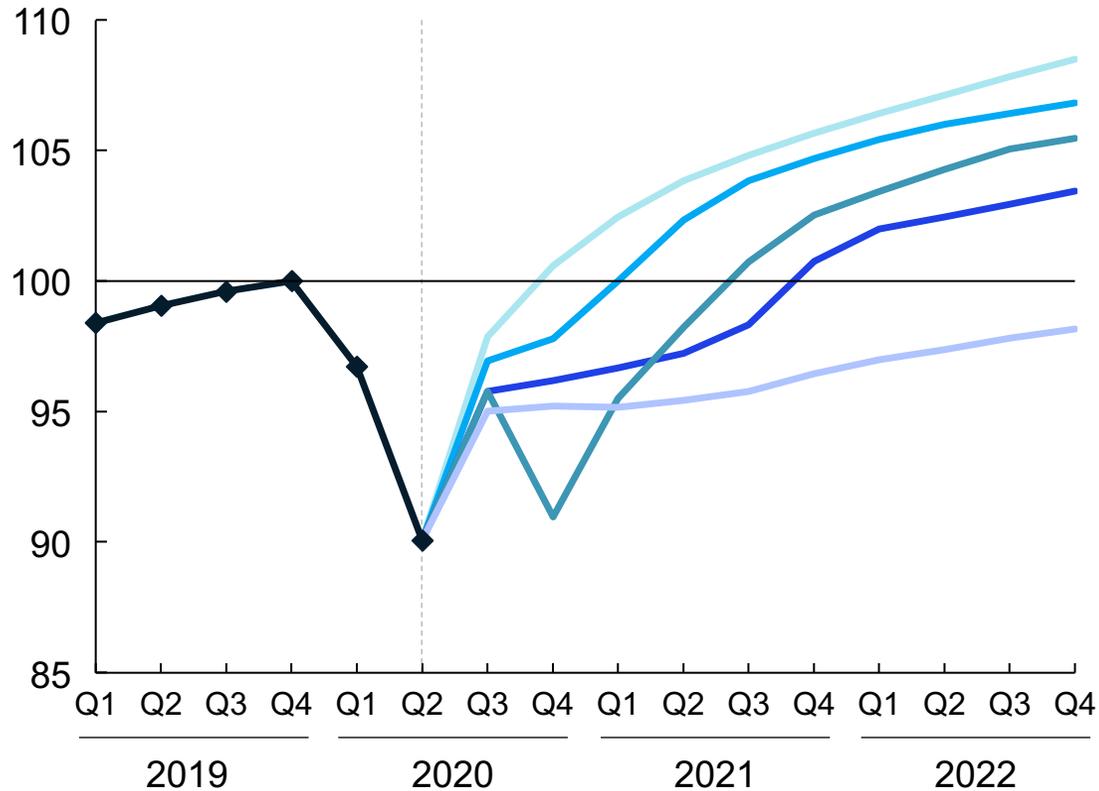
World

COVID-19 scenario pathways, October 2020

Real GDP, indexed

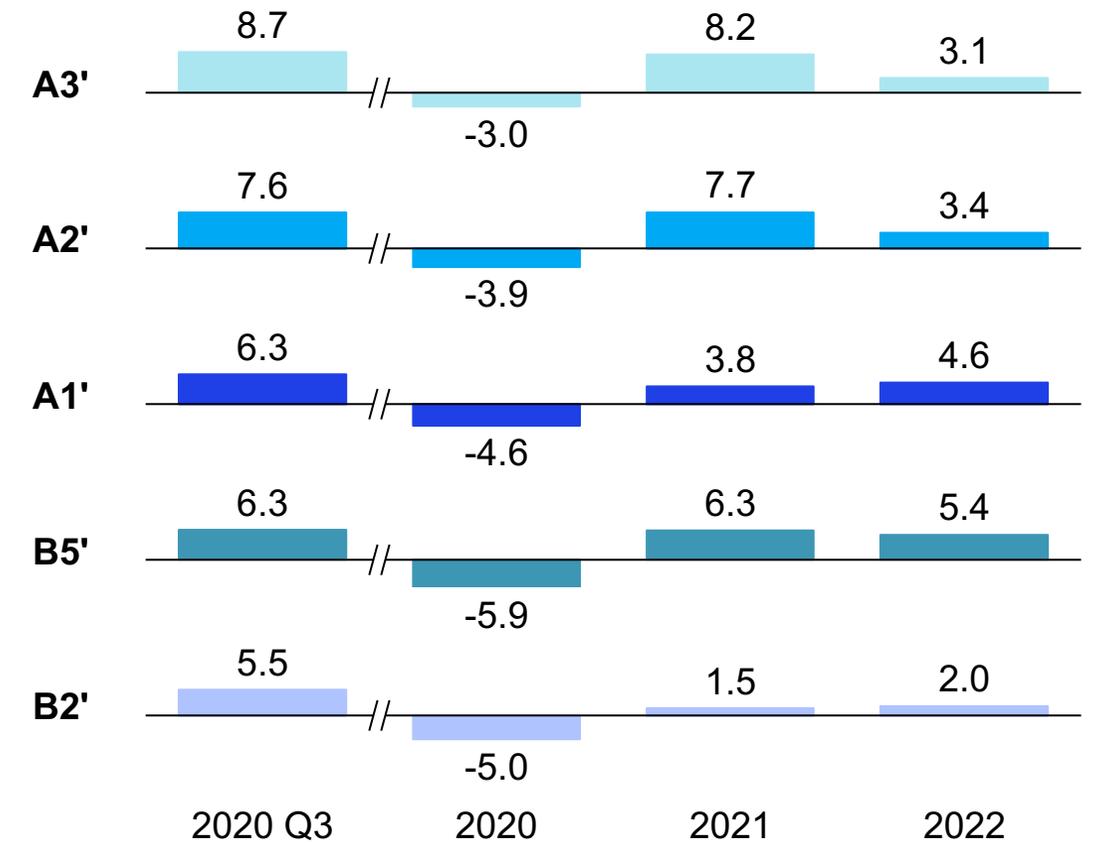
Constant prices and US\$ exchange rates, 2019 Q4=100

— A3' — B5'
— A2' — B2'
— A1' ◆ Reported



Real GDP growth

%, Q3 q/q change; 2020-2022, annual change



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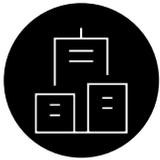
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**Appendix:
Scenarios deep-
dives**

In 2019, leaders were asked to prepare for a downturn

Analyzed 1,500 public companies in the US and EU to define what the Resilients did well



Top **1,500**¹ NA+EU companies over the last economic cycle



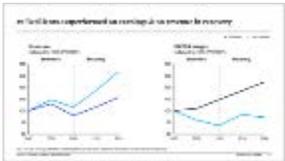
Identified what top **20%** TSR companies (resilients) did differently

¹ Includes all companies that were publicly traded between 2006-2011, and that had Revenue in 2007 and Revenue in 2009 > \$1B; ² The downturn is defined as FY2007 to FY2009, and Recovery is defined as FY2009 to FY2011

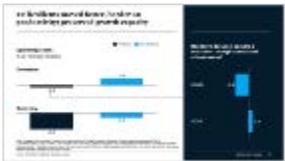


What we learned in the last recession

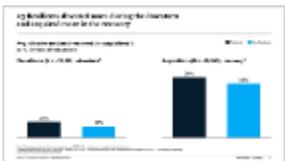
Resilients in the last recession successfully drove both speed and discipline...



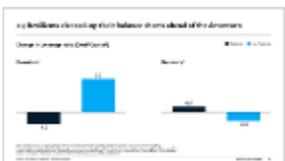
1. Resilients outperformed on earnings throughout; revenue in the recovery



2. Resilients moved faster and consistently increased earnings

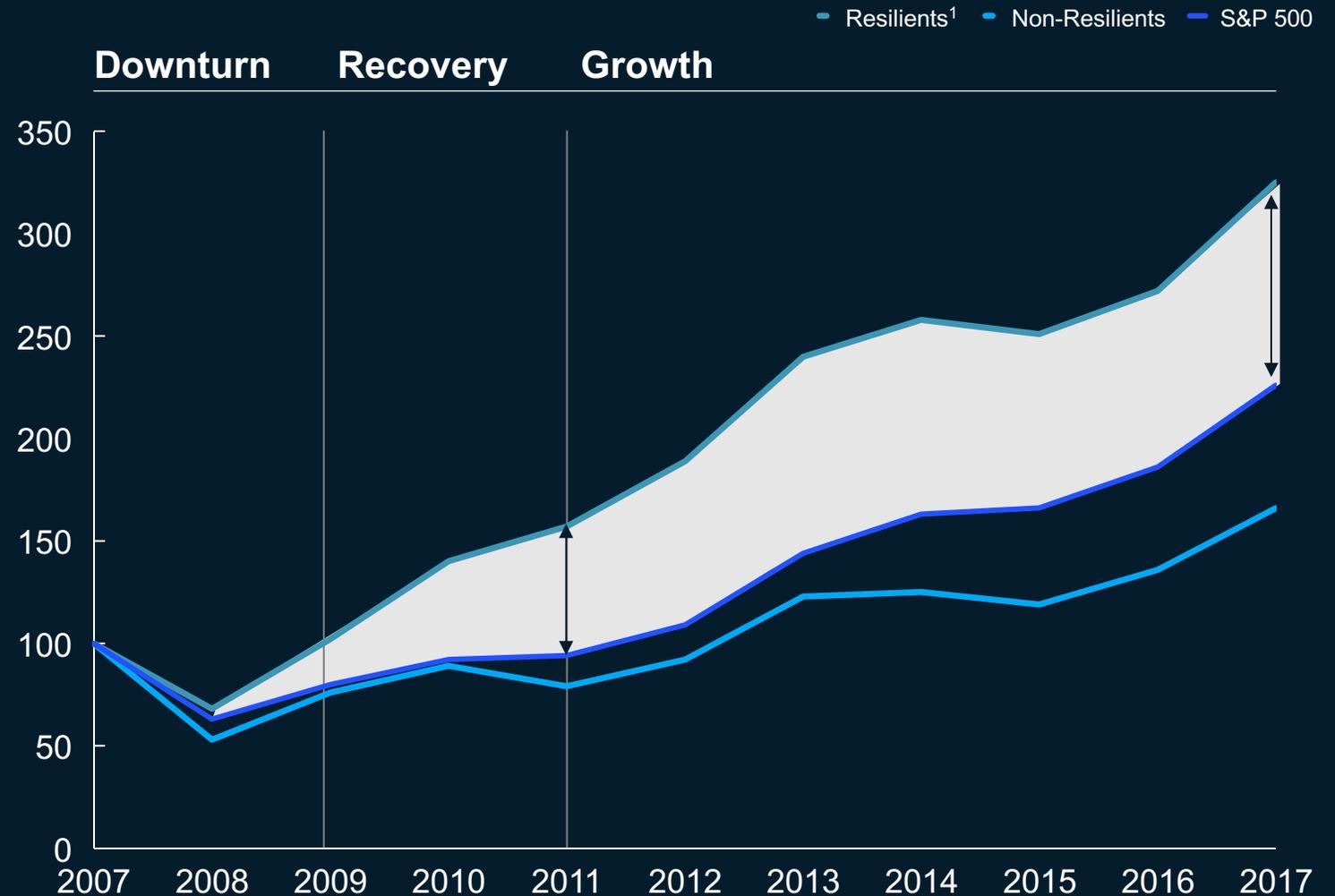


3. Resilients had stronger Divestiture and M&A Programs



4. Resilients created optionality early in the recession – operational and financial

Source: Resilience in a Downturn (“Bubbles Pop, Downturns Stop”) – McKinsey Quarterly, May 2019; CPAAnalytics; McKinsey analysis



Note: Calculated as average of sector medians performance of Resilients and Non-Resilients across ~1,200 companies (excl. financial companies)

1. Resilient companies defined as Excess TSR top quintile by sector

With Q2 2020 results declared, the original research was refreshed

Goal: Assess what the winners of tomorrow will need to do today

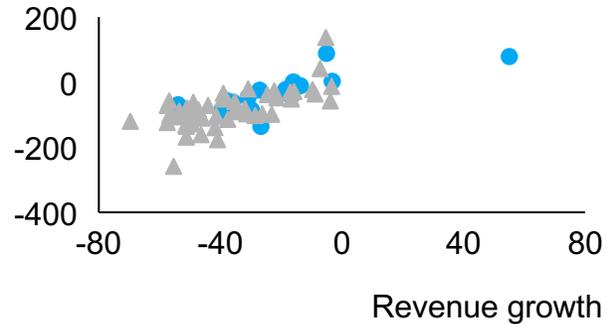
Sample sectors (Q2 '20 vs. Q2 '19 performance)

● Top 20% of TSR¹ ▲ Bottom 80% of TSR¹

Across sectors, ~1,500 companies were studied to assess what are emerging attributes of tomorrow's "resilients" – COVID-19 has affected companies in many different ways, and we analyzed many quantitative and qualitative variables to isolate the hallmarks

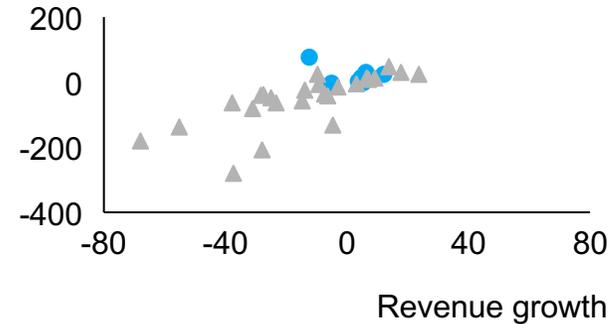
Automobile

EBITDA growth



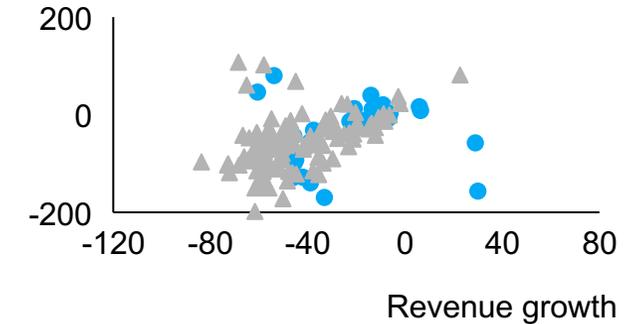
Aerospace & Defence

EBITDA growth



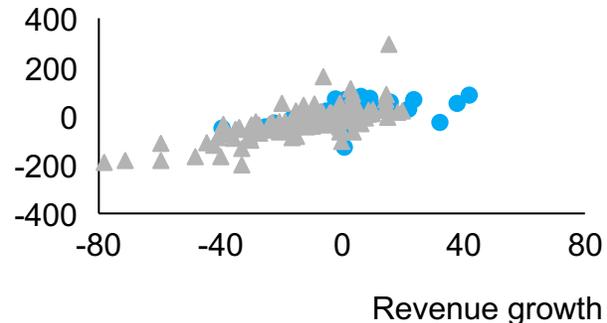
Oil & Gas

EBITDA growth



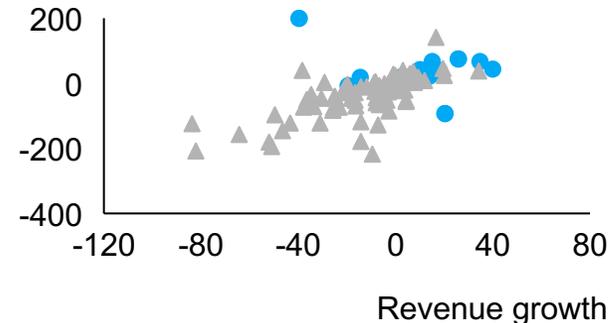
CPG

EBITDA growth



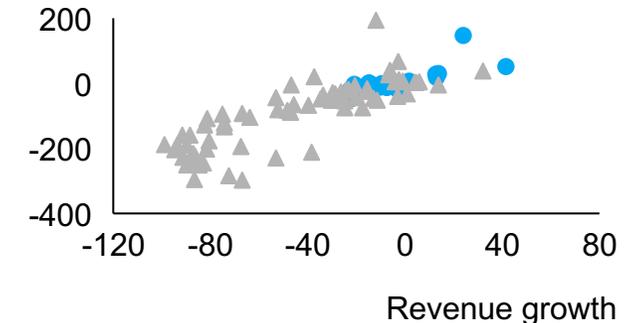
Retail

EBITDA growth



TTL

EBITDA growth

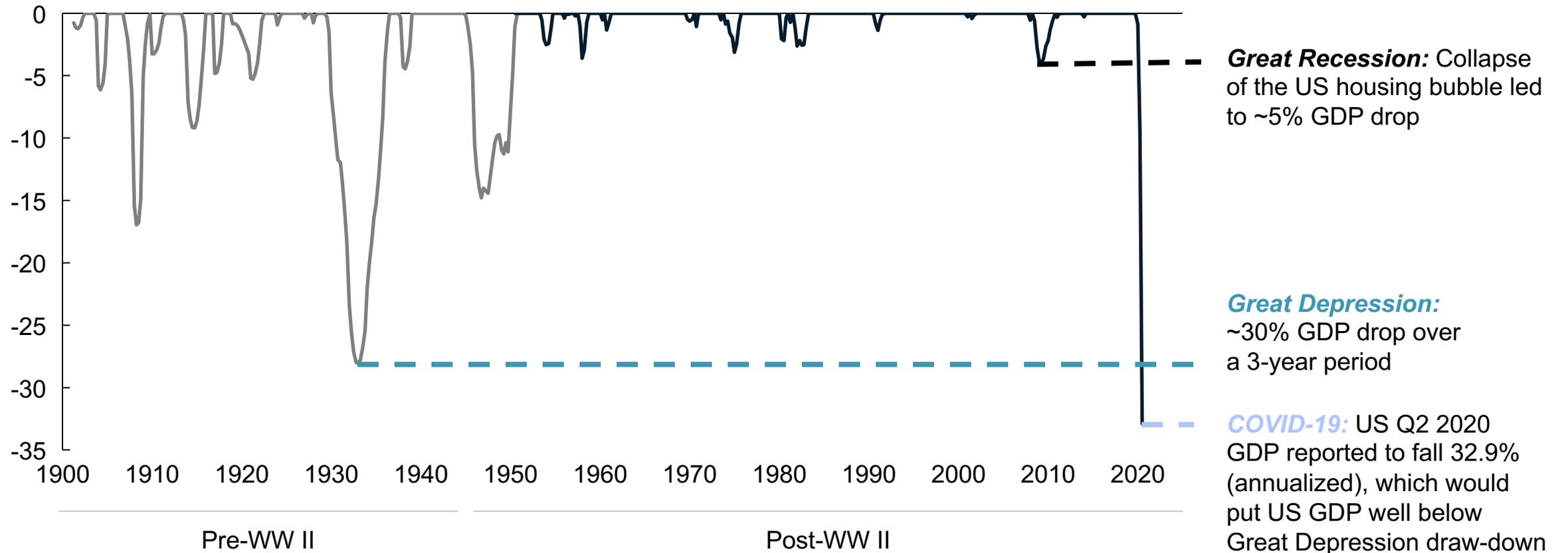


1. YTD TSR - 2020

COVID-19 led to one of the largest GDP drawdowns in memory

United States Real GDP

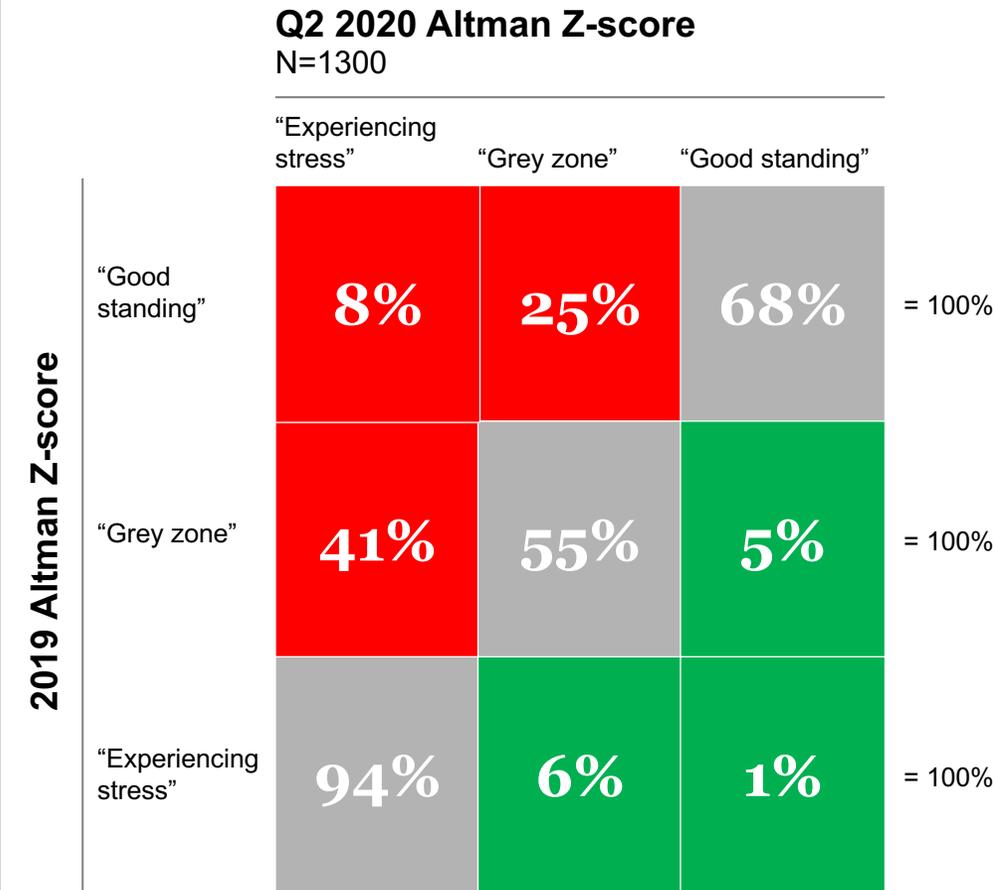
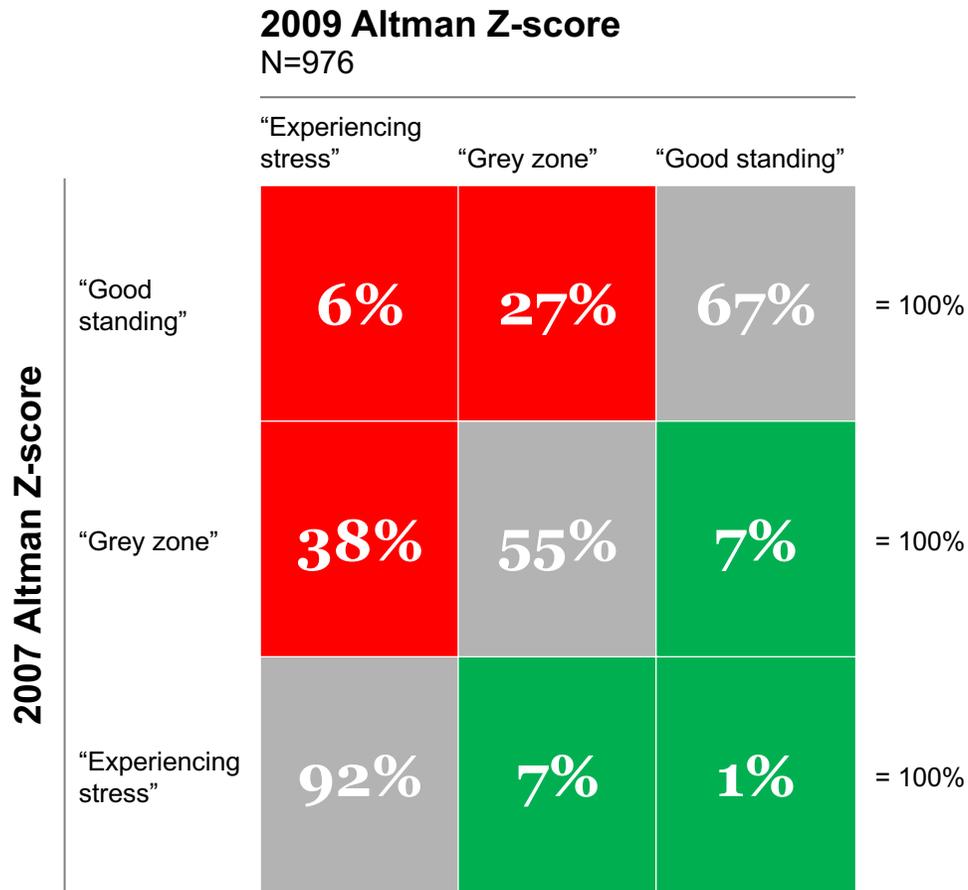
%, total draw-down from previous peak



The cycle is 6X accelerated

Corporate stress in Q2 2020 is at the same point as the 2009 trough, but in only months vs. 2 years

■ Reduced stress
 ■ Took on stress
 ■ Stayed roughly the same



In only two quarters, the current recession has led to stress than comparable to two-year period of the 2007-2009 Great Recession (e.g., companies that in 2019 were in good standing or grey zone now experiencing stress)

Note: For 2020 vs 2019 analysis, excluded companies which do not have reported numbers for 2020Q2, z-scores >10 or <-10, as well as Banks, FIG, Insurance, Others, Utilities and Utilities; For 2009 vs 2007 analysis, excluded companies in sectors like Banks, FIG, Insurance, Other, Utilities and z-scores >10 or <-10; “Good Standing” is Z-score of >3.0, “Grey Zone” is 1.8 to 3.0, and “Experiencing Stress” is < 1.8

2021 is likely to be a dynamic year, with a new set of disruptions

The 2021 planning cycle will have to make assumptions on key uncertainties



COVID-19 & Vaccines

- Will repeat lockdowns (e.g., across Europe) be complied with and reduce spread, or will a fatigued populace engage in riskier activities in spite of lockdowns in an attempt at normalcy?
- Will flu and COVID-19 combine as indoor mingling increases, or will cases and fatalities reduce as precautions around COVID-19 help reduce flu related fatalities?
- Will new interventions that allow greater normal movement and interactions (e.g., masks, rapid tests, therapeutics) allow reopening measures (schools, back-to-work) to be effective?
- Will a Dec. 2020 vaccine EUA drive concrete Rt reduction by mid 2021, or will safety, effectiveness and cold-chain concerns reduce adoption?



Economic & Political

- What will be the impact on taxation as a result of recent bailout and other recovery measures?
- How will consumer demand continue to evolve throughout the recovery, and to what extent will these demand shifts “stick”?
- What will be the economic impact of upcoming geopolitical events (e.g., US election, Brexit, escalating trade issues)?
- What is the role of environmental and other requirements in shaping recovery?



**How can business leaders make real choices in the face of this uncertainty?
What do they need to do to today to be a resilient when the next growth cycle begins?**

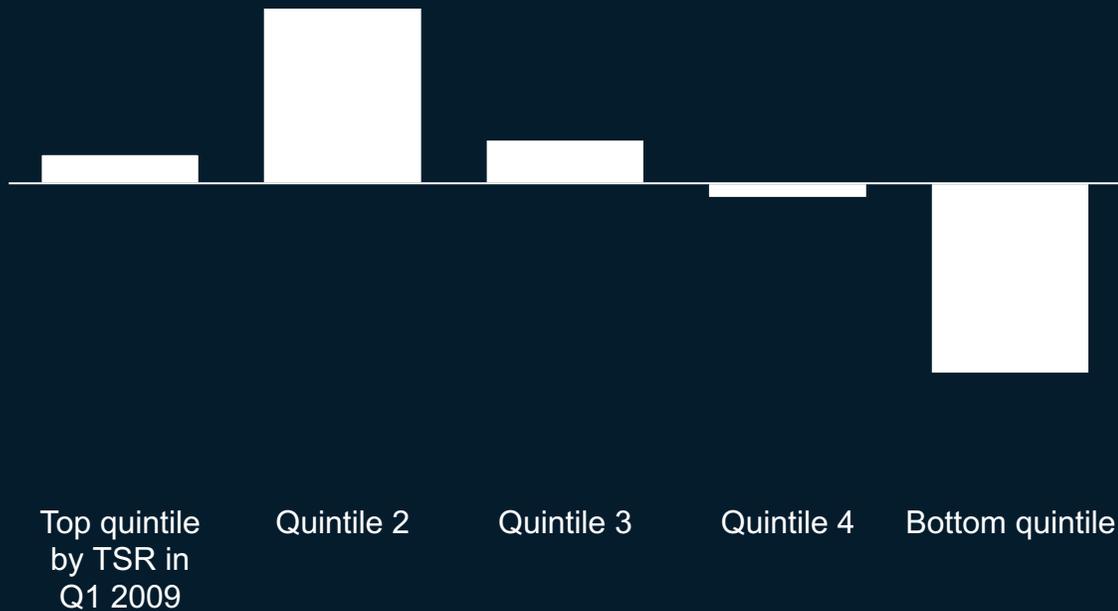


See our recent publication ‘As you return from the summer break, can you lead towards a COVID-19-Exit?’ for what it will take to plan for a ‘COVID-19-Exit’ in 2021.

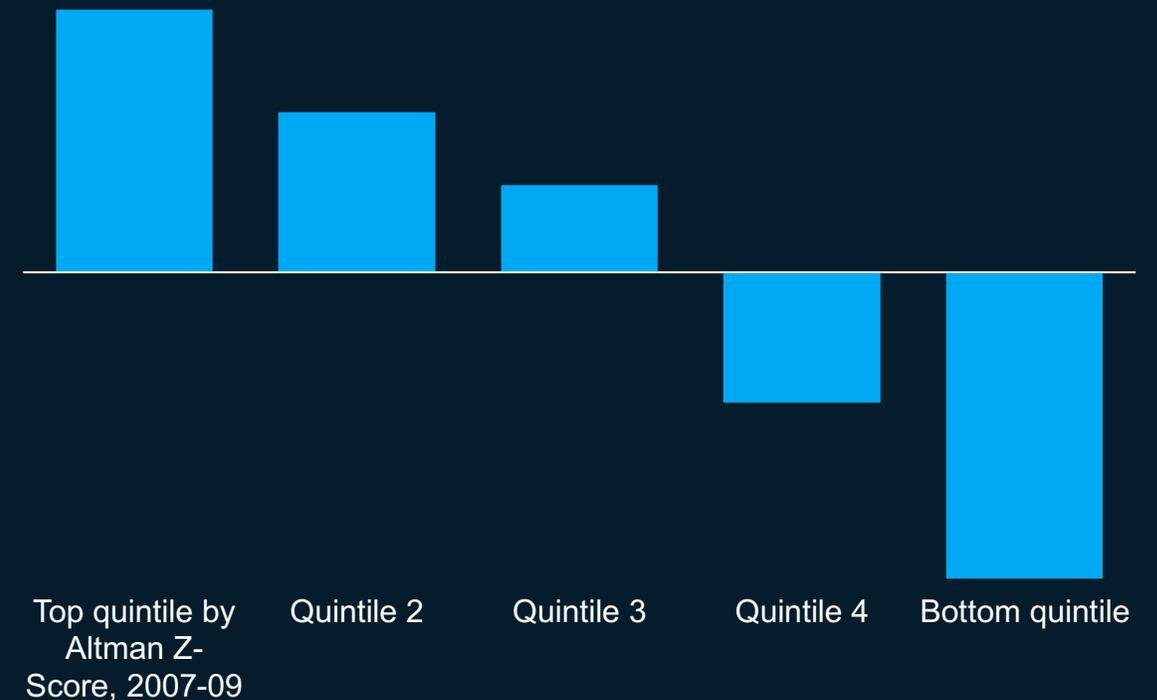
The Altman Z-Score is a better leading indicator of company strength through a crisis than is stock-market performance

Excess shareholder return, 2007-11, %

Companies grouped by market performance (TSR¹) in the trough of the 2007-09 financial crisis (Q1 2009)



Companies grouped by Altman Z-Score movement, 2007-09



1. Total shareholder return (TSR) for Q1 2009 was calculated as an average of medians for each industry sector of ~1,000 companies in total; excess shareholder return over the 2007-11 period was derived by subtracting the median of TSR for each industry sector with actual TSR for each company.

What outperformers in each sector are getting right

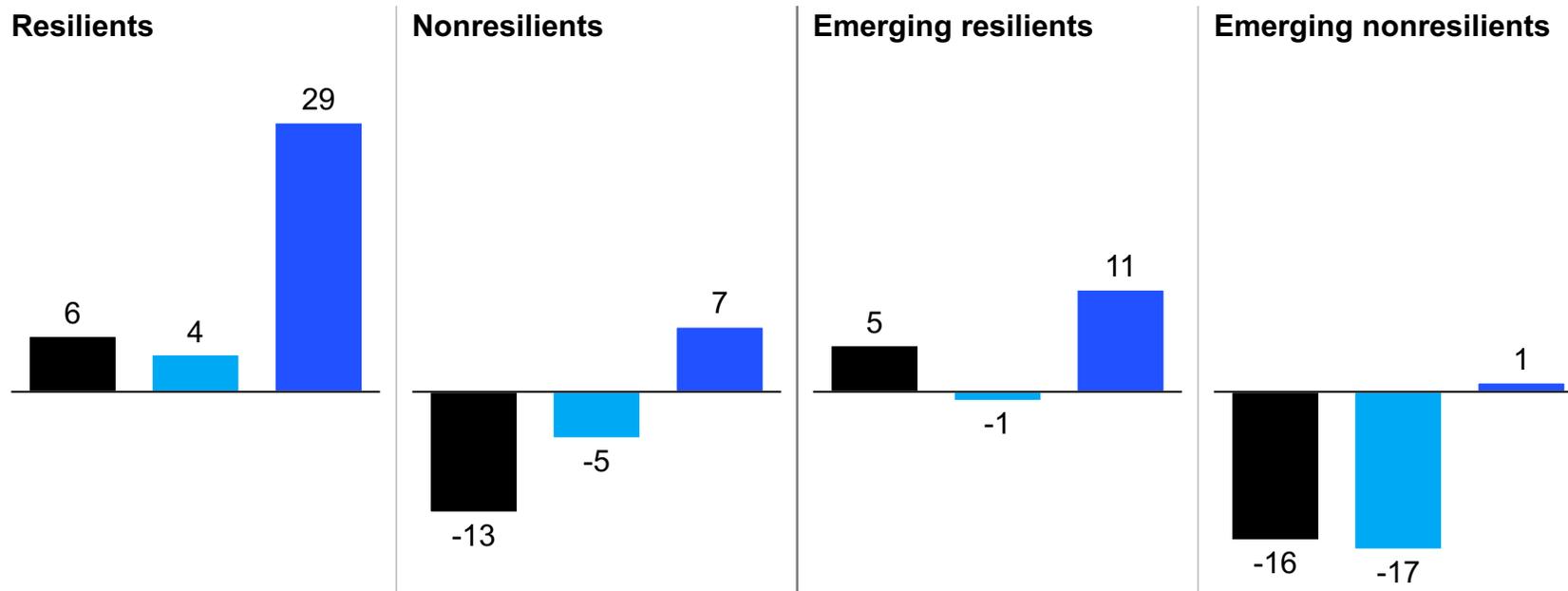
Resilients demonstrate balance in margin, growth, and optionality

■ Margin: EBITDA margin ■ Growth: Revenues ■ Optionality: Profits retained for reinvestment

Change in EBITDA¹ margin, growth, and optionality, resilients vs nonresilients,² in last and current recessions

2007–09, %

Q2 2020 vs Q2 2019, %³



1. Earnings before interest, taxes, depreciation, and amortization

2. Resilients in the last recession (2007-09) are defined as those companies in each sector in the top 20% in excess total return to shareholders (TSR); nonresilients are defined as the remaining 80%

3. For the current recession, emerging resilients are defined as those companies in each sector in the top 20% on the Altman Z-score (Q2 '20 v. Q2 '19); emerging nonresilients are defined as the remaining 80%

Source: CapIQ, McKinsey analysis



Across sectors, outperformers have consistently outperformed on:

- **Margin:** Driven EBITDA
- **Growth:** Led on revenue
- **Optionality:** Retained profits to be re-invested in the business

Progressing past Q2 results into Q3 and onwards, it is expected to see more impact of intentional decision-making on recovery; therefore, the challenge to execute resiliency measures is now

Balanced performers across margin, growth, optionality are more likely to emerge as resilient than top performers in only 1 metric

Composite ranking of company grading on margin, growth, and optionality

Share of total, %	Probability of being in emerging resilient, %	Margins	Growth	Optionality	Typical grades ¹
9	59	A	A	A	Top performer (A in two or more metrics)
11	39	B	B	B	Balanced (B in all metrics, or A in one and B in at least one)
24	23	A	C	C	Mixed or spiky (A in one and C in at least one other)
56	9	B	C	C	Underperformer (B or below on all with at least one C)

1. A=top 20%, B=20th to 40th percentile, C below 40th percentile

What are emerging resilientents doing today...

Emerging resilientents



Riding the tailwinds of sustainable agriculture and a strengthening hobby market, a US agriculture machinery manufacturer transitioned into segments into which they had previously only made seed investments (e.g., IoT “farmer marketplace”, precision agriculture)



US CPG manufacturer accelerated divestitures of struggling assets and repurposed capital to strengthen supply chain capacity and invest in eCommerce to support previously non-core parts of the business (e.g., frozen foods) where pandemic-induced demand is expected to sustain

Emerging non-resilientents



European electronics manufacturer announced 100m EUR in cost cuts in March 2020 and retracted its 2020 market outlook; because this company sells to a narrow range of customers, it struggled to pivot into adjacencies or new customer segments



US fashion manufacturer has directed capital to be paid out to shareholders while still holding onto >\$1B in inventory; unclear investments in eCommerce / digital while many flagship stores remain closed / under-capacity

3 steps towards becoming a resilient

The steps you make today may have implications that last for years to come



I Set starting point & ambition

Use a rapid Resilients assessment to define starting point relative to peers; conduct executive session to set-up roadmap and structure to achieve resiliency



II Define trigger-based plan that 'covers waterfront'

Poise org to move based on specific triggers that ensure balance across Margin, Growth, Optionality in a way that "covers the waterfront"



III Rewire 2021 operating model

Ensure speed by design, not adrenaline, in a way that incorporates future of work, regular health monitoring, and execution teams, in adherence with predefined trigger points

I: “Full potential” diagnostic starts with an Altman Z-score scorecard

Below sector median Between sector median and top quintile At or above sector top quintile

Altman Z-score ¹	Current recession		Last recession	
	Company X	Sector median (N = 189)	Company X	Sector median (N = 165)
Q2 '19:	1.8	3.2	3.4	3.2
Q2 '20:	1.6	2.7	2.1	3.0

Metrics		Current recession (Q2 '20 vs. Q2 '19)			Last recession (FY2009 vs. FY2007)		
		Company X	Sector median	Sector top ² quintile	Company X	Sector median	Sector top ² quintile
Margin 	EBIT	+23%	-5%	+37%	-10%	+1%	+43%
	EBIT Margin	+29%	-3%	+31%	-2%	-5%	+20%
Growth 	Revenue	-4%	-3%	+9%	-8%	+5%	+25%
	R&D ³	NA	-2%	+15%	NA	+6%	+36%
Optionality 	Retained earnings	-20%	-2%	+26%	-6%	+14%	+47%
	Working capital	+44%	-5%	+4%	18%	-6%	+22%

1. Below 1.8 = Experiencing Stress, between 1.8-3.0 = Grey zone, above 3.0 = Good standing; 2. Top quintile is computed based on individual metrics; 3. R&D not reported for all companies

Source: CPAnalytics; Capital IQ; McKinsey analysis

DOCUMENT INTENDED TO PROVIDE INSIGHT BASED ON CURRENTLY AVAILABLE INFORMATION FOR CONSIDERATION AND NOT SPECIFIC ADVICE



Is Company X a future resilient?

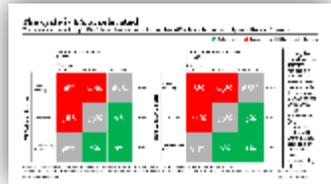
Not likely, because:

- Although close to top quintile on *margins*, very little of Company X's margin performance comes from *growth* – it is coming from cost-cutting
- However, Company X has **high optionality** in the form of working capital relative to peers

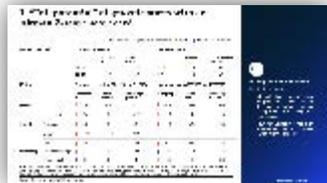


I. The next step is to call an executive session to plan a 2021 roadmap based on these learnings

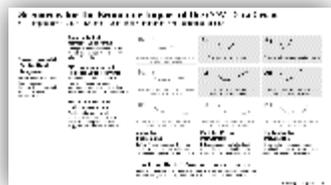
Inputs:



Altman Z-score benchmark to peers



Performance benchmark relative to last recession



Latest marcoecon / epi scenario forecasts

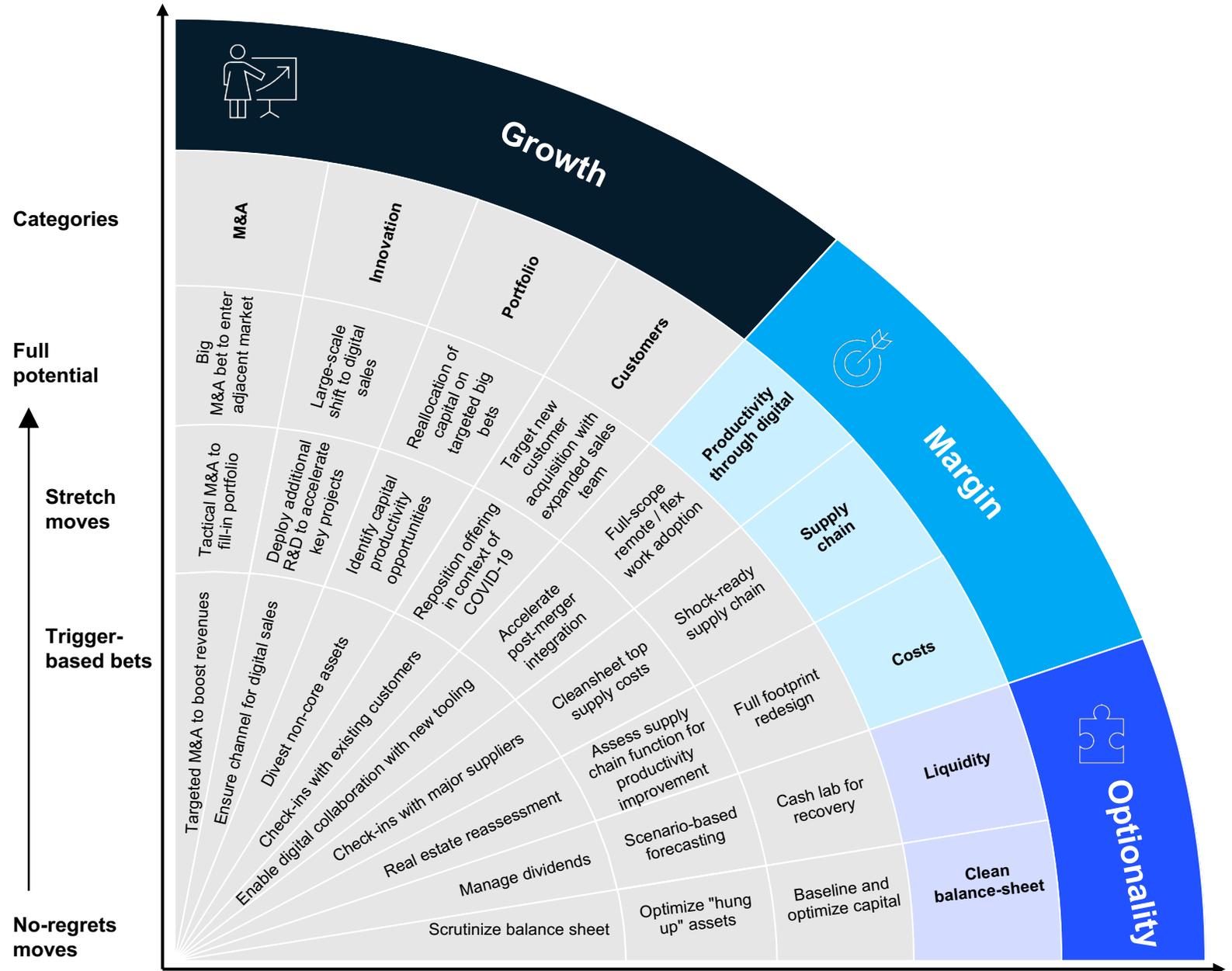


Outputs:

- Defined resiliency aspiration for 2021 to position business for 'full potential' in 2022
- Plan to integrate resiliency aspiration into 2021 planning cycle (incl. recommended 'reinventions', e.g., zero-base budgeting, stress-testing, "wartime councils")¹
- Resiliency KPIs and a monthly check-in cadence on achieving resiliency objectives

1. Read more in our "Memo to the CFO: A New Approach" article (<https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/memo-to-the-cfo-a-new-approach-to-2021-budgeting-starts-now>), September 2020

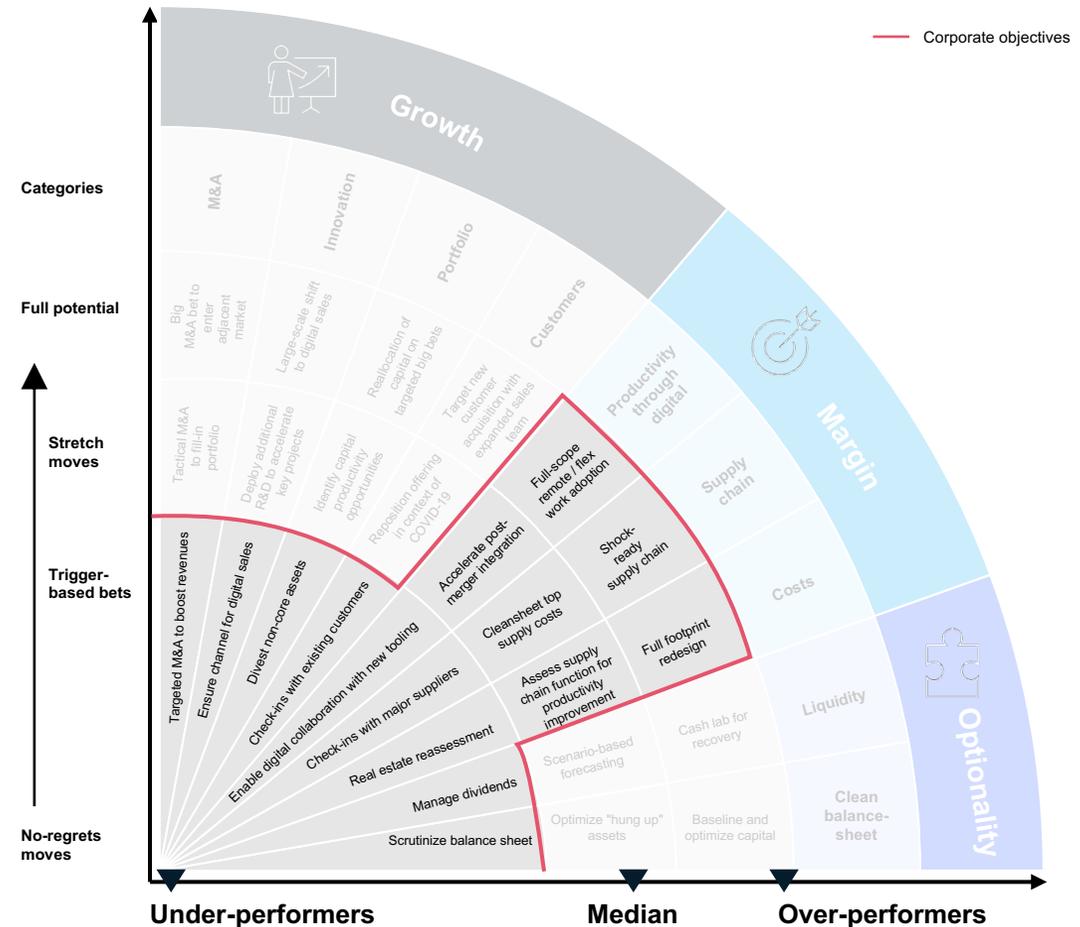
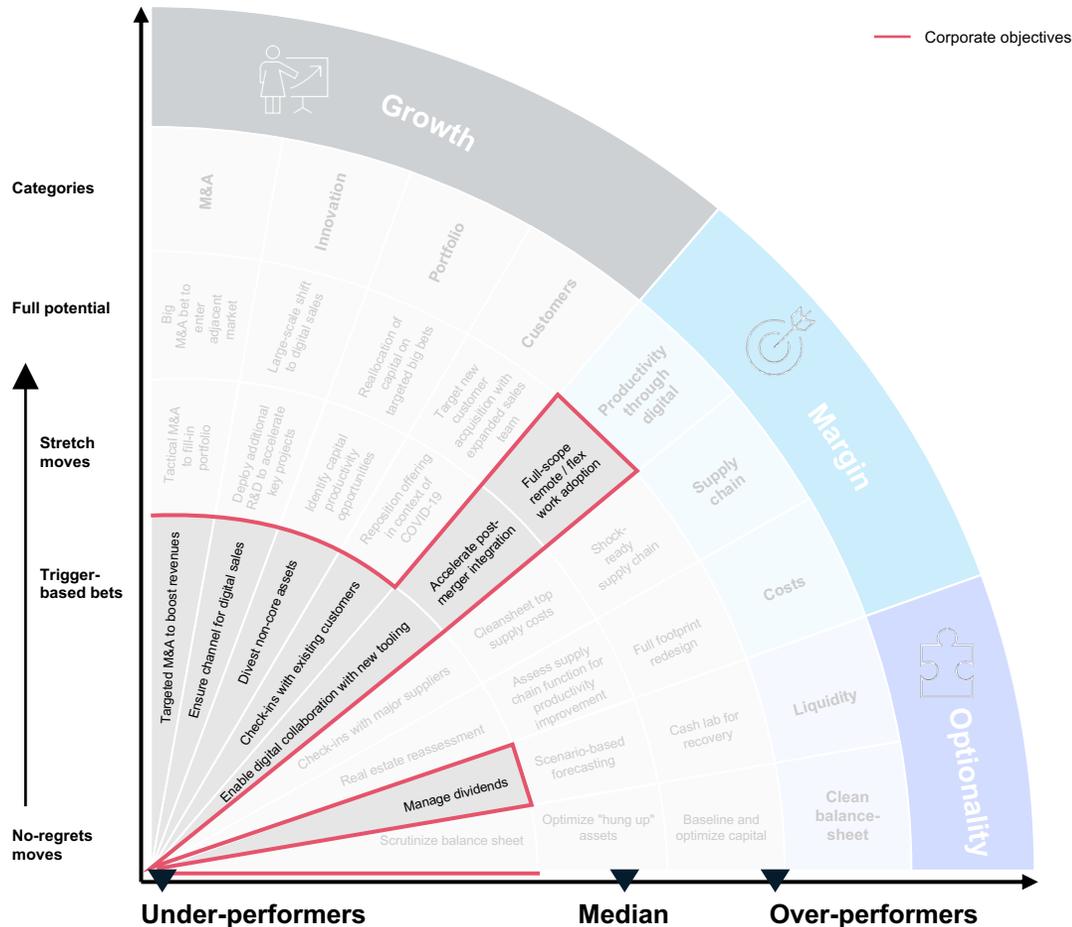
II: Full potential is achieved by pushing Growth, Margin, and Optionality to their limits based on a series of triggers



II: How to increase chances of your being a resilient: Evenly cover the waterfront across Margin, Growth, Optionality; avoid spikes

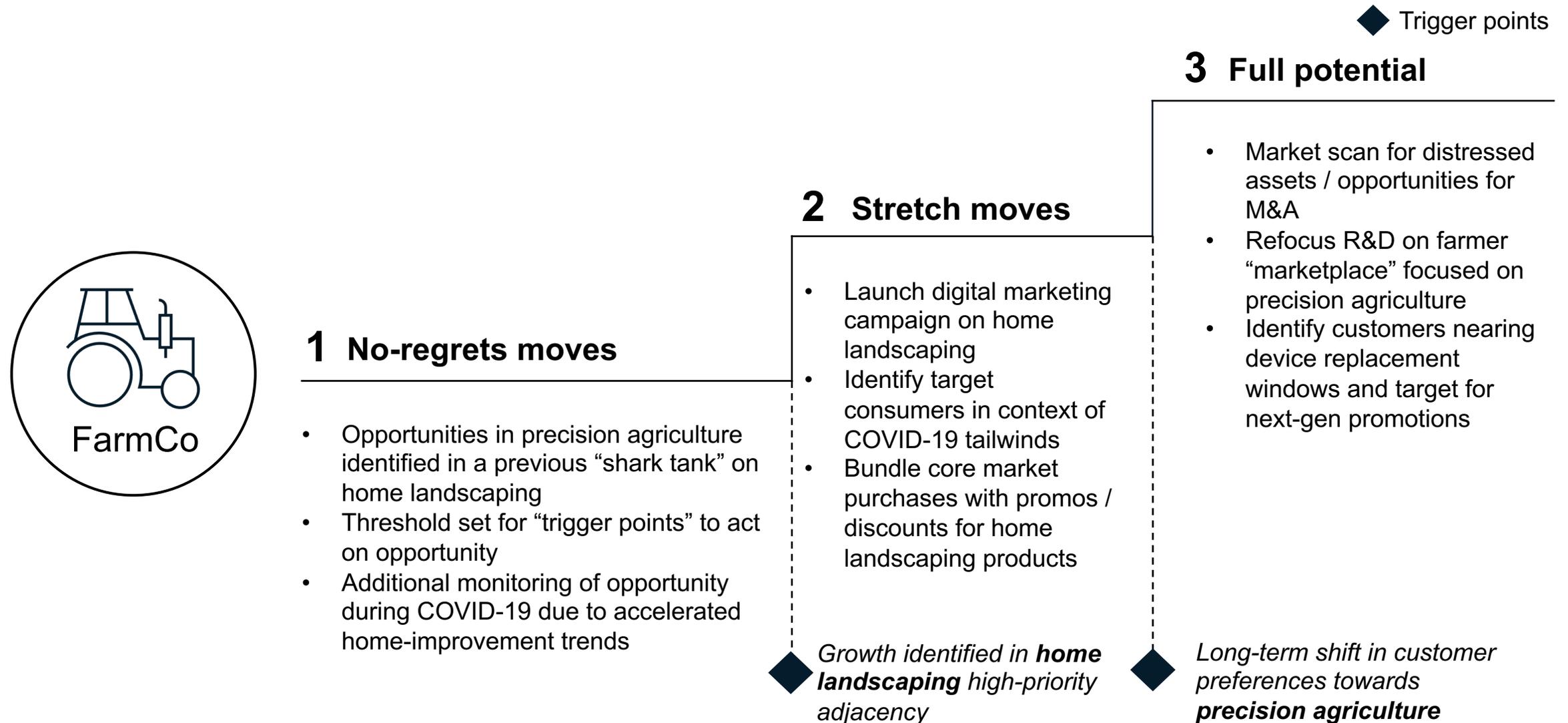
Pre-COVID-19 strategic planning – spiky in nature – less likely to craft a new resilient

Balanced resilient plan that targets effort to maximize probability of becoming a new resilient



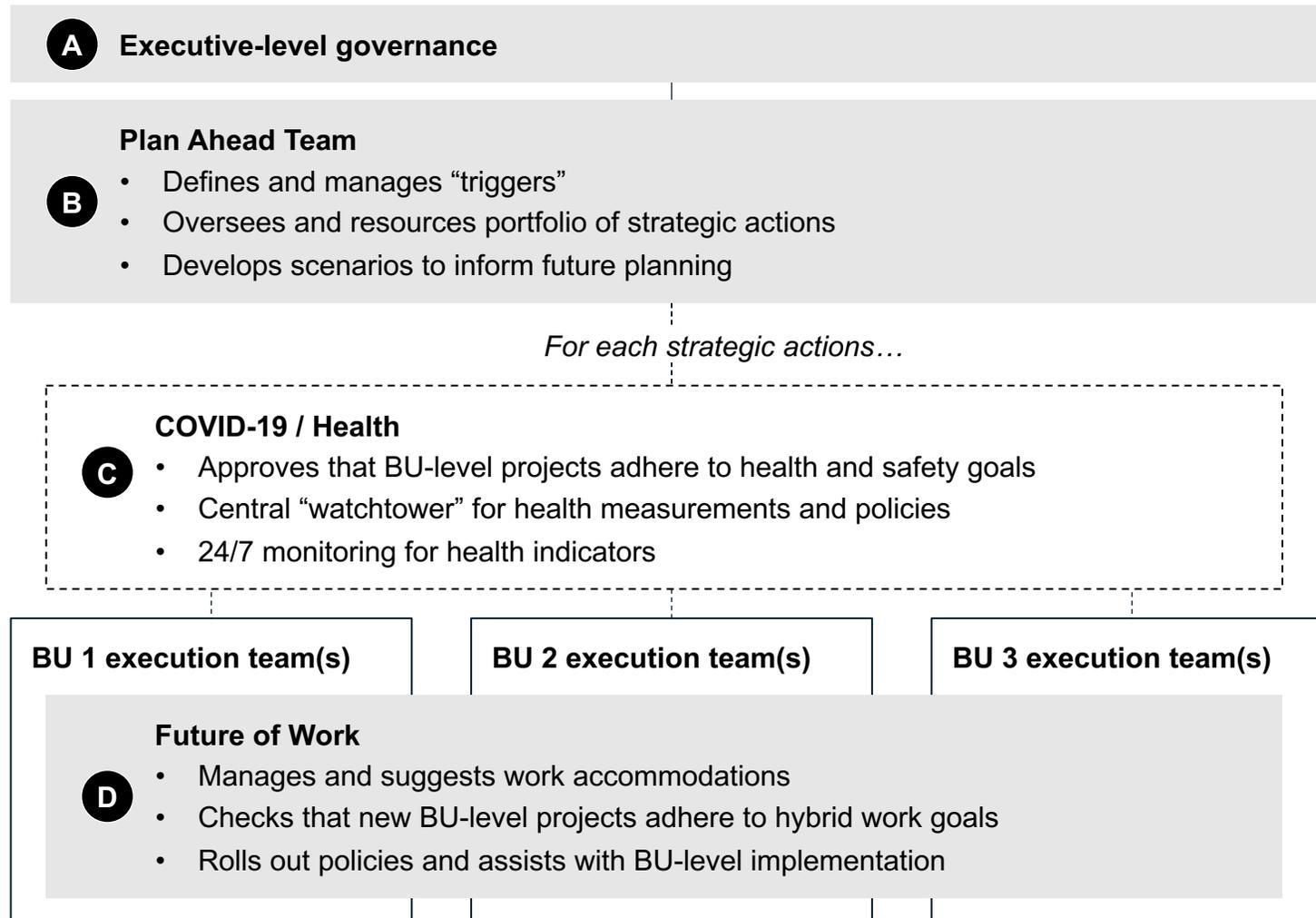
II. Sample resilience journey: Monitoring triggers to advance an idea from no-regrets move to full potential

Based on a real example



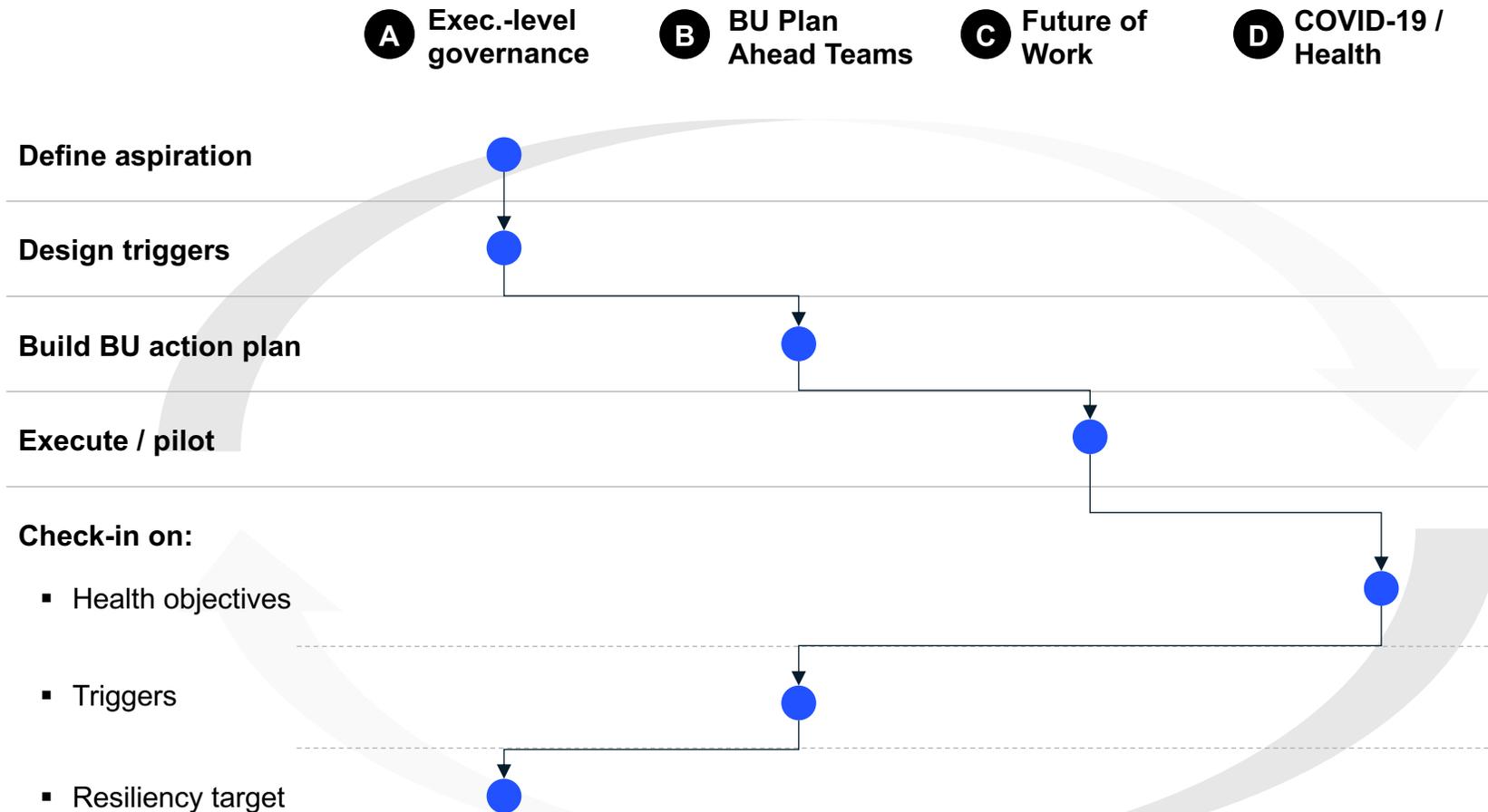
III: Seed a new operating model for 2021

Speed through design, not adrenaline



- A** Clear **governance structure** with sub-committees / functions to oversee **planning, approve enterprise decisions, and communicate** internally and externally
- B** At an enterprise level, the Plan Ahead Team **prioritizes actions based on external and internal listening to balance Z-score objectives**, and then hands down initiatives to **BU- and function-level teams for execution**
- C** Central COVID-19 control tower manages **day-to-day response in accordance with regulations and guidelines** and determines what **workforce readiness investments** are needed for long-term success
- D** Future of Work teams organized into clusters **tracking key metrics, regularly assessing employee satisfaction, and piloting initiatives** within clusters according to a “**fail-fast**” methodology

III: Build a an operating model to support the resiliency journey



1. Read more in our “As you return from the summer break, can you lean toward a COVID-19-Exit?” article (<https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/as-you-return-from-the-summer-break-can-you-lead-toward-a-COVID-19-exit>), September 2020

In preparing for a “COVID-19-Exit”, companies should launch all initiatives now to put the business back on track by 2022¹

An operating model that gives executive visibility to the “planners”, the “do-ers”, and the health teams sets up the portfolio for success

Through regular touch-points, continuously monitor for trigger-points to “cover the waterfront”

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The situation now

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landscape
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The ‘Emerging
Resilients’:
Achieving escape
velocity

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latest learnings

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Appendix:
Scenarios deep-
dives

Virtual Work

Virtual work may be a way of achieving some long sought after positive outcomes at work, but is the evidence clear, and do negatives outweigh the positives?

20-30%

of surveyed workers across many organizations asking to work 100% virtually



Six 'most quoted' positives of virtual work

1

Speed by design

Virtual work frees commute & travel time; encourages output driven workflows, faster decisions

2

Greater flexibility

Workforces now know what real flexibility can mean, and expect more of it.

3

A shot at inclusion

Diverse workforces are more valuable. Hybrid done right can drive inclusion.

4

A level playing field

Companies are distributed. 'Virtual first' levels the playing field beyond HQ

5

Site agnostic talent

An ability to source talent across multiple locations

6

Structurally lower RE cost

An ability to shape & reduce the burden of unproductive office space

The current state of evidence

Synthesized data from >25 organizations across multiple sectors & geographies



Speed by design

Mixed

60%+

of milestones met faster in an analysis of 100+ engineering teams

80%+

report difficulty in disconnecting; MSFT analytics show activity outside of work hours



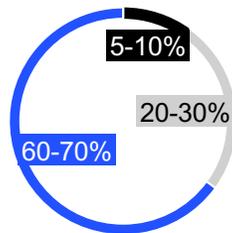
Greater flexibility

High

Typical survey results

“In next normal, what is your ideal work setting?”

■ On-site ■ Virtual ■ Hybrid



A shot at inclusion

Mixed

Anecdotal evidence: Workers requiring flexible workstyles (e.g., working parents, caregivers) can be more productive in a virtual-first environment

D&I advocates interview concerns: Remote work could drive higher levels of unconscious bias that disadvantages diverse workers



A level playing field

High

50%+

of teams across organizations are already geographically dispersed

75%+

believe that advancement depends on HQ proximity



Site agnostic talent

Emerging

Anecdotal evidence: Most CHROs believe that site agnostic talent sourcing is critical unlock to current talent constraints, and core to future workforce strategy

Unclear whether this will be a 'structural' lever



Structurally lower RE cost

High

35-50%

Amount of office space that companies expect to shed in next 1-2 years

Virtual work comes at a cost

1

Less work separation

Surveys universally highlighting a difficulty to disconnect from work

2

A lack of belonging

A sense of belonging is far tougher to establish virtually – will it lead to a lost generation?

3

Reduced trust at work

Trust is more difficult to establish and maintain in virtual collaboration

4

Challenged collaboration

More time needed to achieve the same collaboration outcomes, especially across silos

5

Mental health concerns

Proven challenges with long-term health & isolation issues

An effective future of work program needs to achieve the positives while avoiding significant negatives that could easily occur

Historical virtual shifts – limited success

Pre-COVID-19 experience of virtual work

Many companies around the world achieved a virtual work experience for 'non-core' roles (e.g., call centers; expert networks, others)
Companies in Silicon Valley have had multiple high profile experimentations with virtual work pre-COVID-19

Silicon Valley experience of virtual work

Successful transition

Achieved by smaller companies that were founded in a different ethos

Early in transition

Achieved by medium-sized companies that early in their journey to virtual pre-COVID-19

Reversed course after 2 yrs

Experienced by established corporations that experimented with virtual at scale



Learning from both successful and failed experiments is critical to define the right approach

Lessons learned & approach implications

What we have learnt from >25 future of work efforts across geographies & sectors, as well as lessons from past efforts



Virtual work is a **muscle, not a plan**

Don't let speed of transition exceed speed of capability building

Moving to **distributed work is a bigger lift than moving to virtual work**

Make special accommodations for pockets of the organization that aren't used to distributed work

Define the tradeoffs early – **mitigate downsides of virtual work**

Ensure that your design takes downsides of virtual work into account

Be clear about who decides what - **'flexibility with bounds'**

Define & separate decision-making between management teams, team leaders, and individuals

Collaboration tools can unlock new competencies – **define a vision**

Explosion of data from shift to virtual work – new insights to activities that drive value, and ones that don't

Communications need to provide clarity **while leaving room for learning**

Communicate early what activities will occur in person and remotely; what principles will underpin policies

2 | Tasks that may need to continue to be in person

Negotiations  Negotiations rely on **deep mutual trust** and require interpretation of **non-verbal communication**

Relationship building  Relationship building (e.g., boards, potential customers, interviews, team kick-offs) done in person enable a **trust based connection**

Onboarding and job training  Training new hires with no **previous experience in respective role** presents a significant challenge in a remote setting

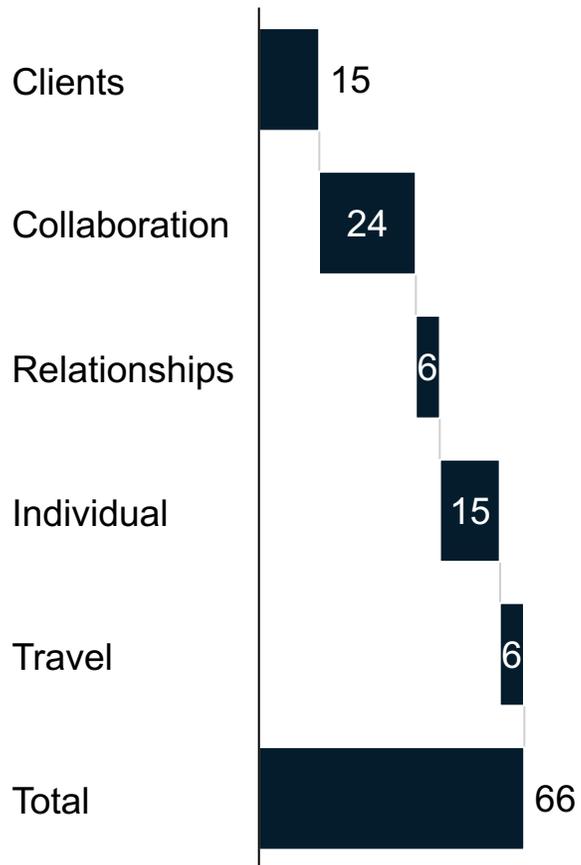
Critical decision meetings  Decision meetings in boards are often based on a **deep mutual knowledge** of board members

Critical conversations  Critical conversations require a **sensitive reaction on emotional and unconscious expressions** of one's counterpart (e.g., body language, facial expressions)

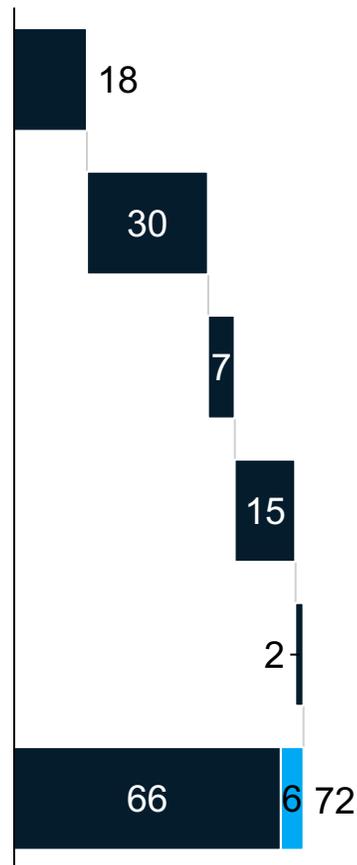
Persona example – Ted, Senior Executive



Pre-pandemic



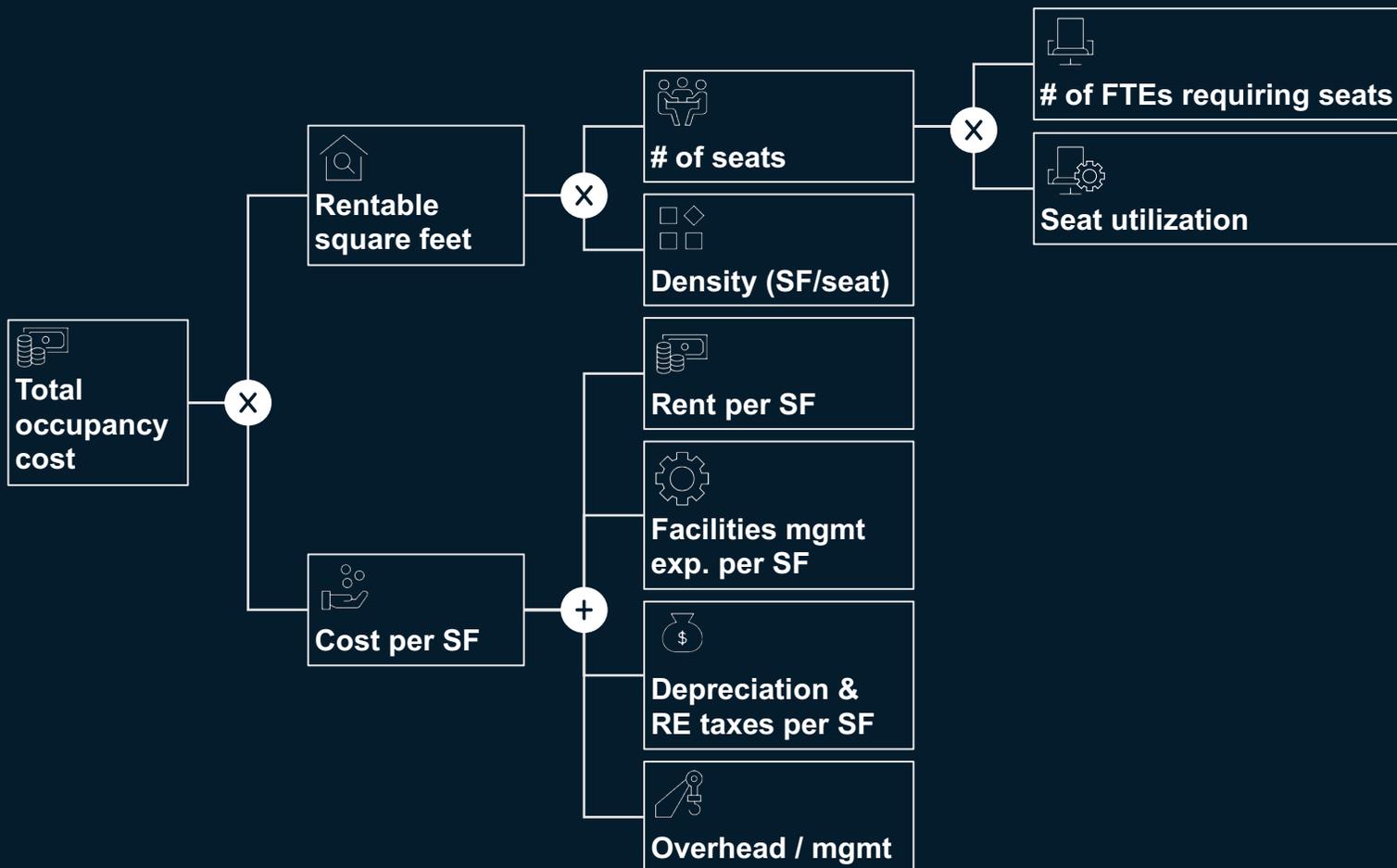
Next normal



Implications

- At least 2D/ wk in office to ensure more efficient collaboration & relationship building time
 - 1D w/ direct report managers & peers
 - 1D mix of cross-silo collaboration & unscheduled catch-ups
- 0.5-1D/ wk for clients in person
- Capability building focused on
 - Better individual productivity
 - Virtual first practices incl. asynchronous work
- No dedicated office needed, but priority conference room access

3| Paths to reduce occupancy costs



Reduce the **number of people** that need to come in office

Reduce the **frequency** with which people come into the office

Find appropriate **density** to maximize safety

Use a rigorous, fact-based analysis to make trade-offs between **owned and leased space**

Choose the right **facilities operating model** – integrated facilities management, bundled, single service providers?

Negotiate effectively with landlords, including taking an aggressive stance towards lease exits and COVID-19 related rent concessions

3 | Options for savings on leases

Potential actions

- 1 **Extend current lease/ negotiate extension**
- 2 **Expand or modify**
- 3 **Continue to use as is**
- 4 **Renegotiate/arbitrate current rents**
- 5 **Sublease**
- 5 **Prepay lease**
- 6 **“Mothball” and write-off**
- 7 **Use until lease expiration**

Key decision criteria

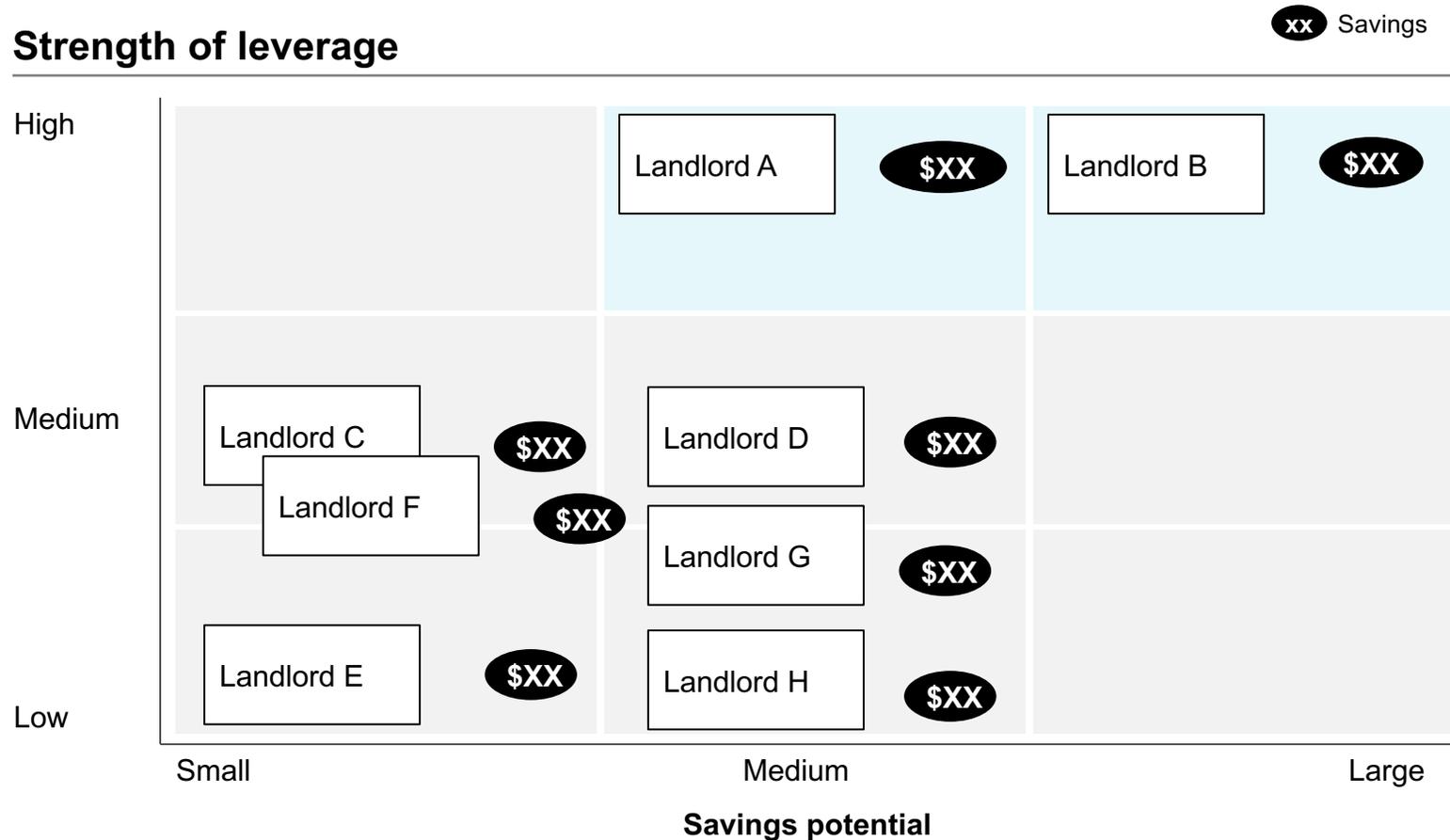
- Strategic importance of location (e.g., proximity to clients and employees)
- Need to accommodate future growth or relocations
- Flexibility of space to accommodate additional seats if needed
- Available space/capacity at current property
- Ability to locate staff and equipment to nearby, lower-cost properties
- Rent rates and terms
- Existence of lease clauses enabling rent adjustments
- Ability to sublease
- Seat/SF ratio and cost/seat relative to market rates
- Demand for comparable space
- Costs of sub-leasing v write-off
- Facilities management costs

In identifying potential savings opportunities, we will **keep multiple options to reduce costs on the table**

These options will be prioritized based on need for **near-term savings vs. longer-term reductions**, your footprint strategy, negotiation strategy, and other factors

We will also focus on **building capabilities in your real estate team** to negotiate with landlords and other players (e.g., services firms) over time

3 | Prioritize landlord negotiations with higher savings opportunities and stronger leverage



Prioritization of landlord A and B

Represent **70% of total savings opportunity** across NA landlord

Credible leverage with 27 closure candidates

Strategic partner with ability to open new stores or concepts

Offices have significant reduction potential and **lease expenses are rising**

3 | Demand management can identify facilities management cost reductions of 10% to 15% in certain categories

	Sample savings levers	Potential savings % (compared to base)
Furniture & depreciation	<ul style="list-style-type: none"> Re-evaluate useful life of assets Consider moves and consolidations to avoid buildout costs associated with certain buildings 	Minimal
Cleaning & maintenance	<ul style="list-style-type: none"> Reduce cleaning and maintenance frequency Change plumbing/electrical maintenance to break/fix Reduce painting and AC repair plans 	10-15
Utilities	<ul style="list-style-type: none"> Adjust space temperatures down in winter and up in summer Reduce HVAC operating hours Reduce lighting/HVAC and make exceptions as needed Retrofit/upgrade facility infrastructure (e.g., HVAC system, light system) 	10-15
Security & reception	<ul style="list-style-type: none"> Re-evaluate security levels and hours 	N/A
Other	<ul style="list-style-type: none"> Reduce landscaping and plant maintenance contracts Continue review of planned moves to capture cost avoidances 	5-10

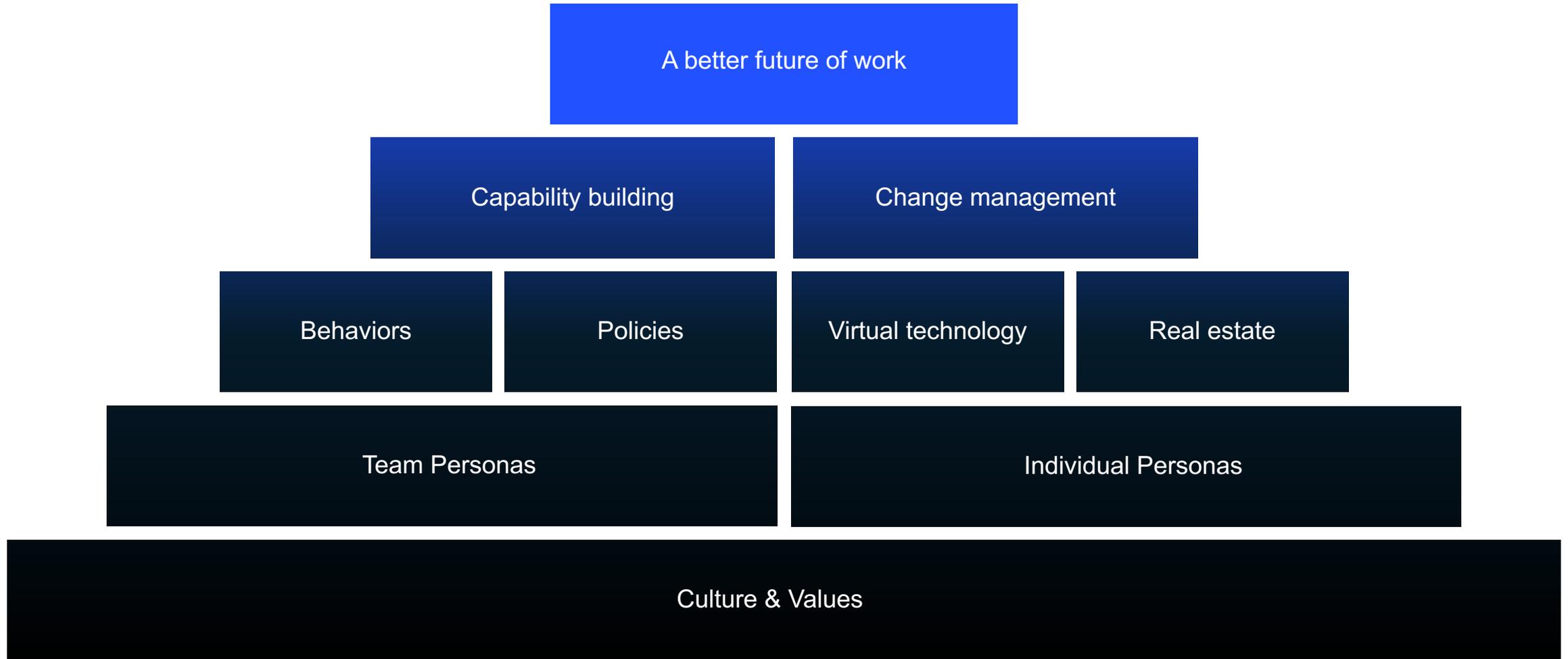
Shifting to next normal

Many businesses are facing challenges defining and making the shift to the next normal; making sure that ambitions on the next normal keep pace with capability is critical to success



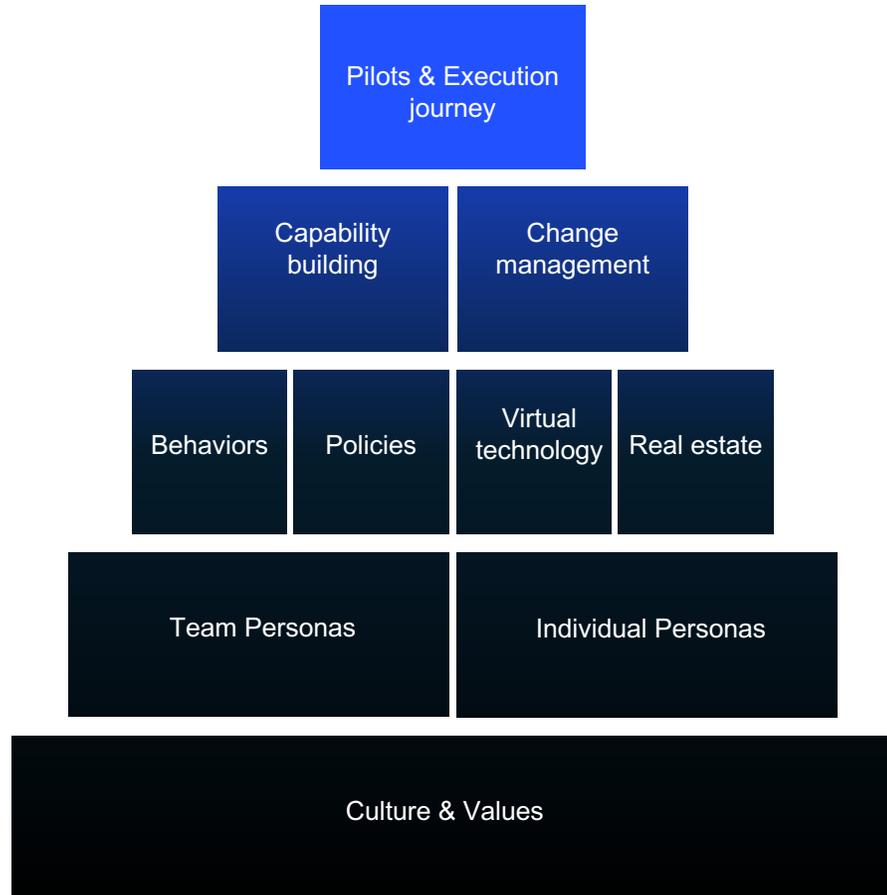
Building blocks of the future of work

Nine workstreams build on each other to define the future of work



Building blocks – detailed view

10 workstreams build on each other to define the future of work



This covers the pilots & long-term execution journey

Pilots need to be both site specific, and role specific

These two workstreams address the execution journey – how the vision will be achieved

Capability building helps define the biggest areas of capability gaps and building – by role

Change management covers levers across the influence model (incentives, role modeling, communications outreach, formal mechanisms for reinforcing the change)

These four workstreams make up the detailed design of what next normal work will look like

Policies & Behavior: Mandates & guidelines for how work is done in new normal (hiring, worker compensation), and how workers and leaders behave in the next normal to maintain the organization's values and culture

Virtual technology: Toolkit to enable collaboration and drive seamless decisions & measurement in next normal

Real estate: Refreshed real estate footprint and workplace design strategy

These two workstreams provides a high-level vision & foundational assumptions that enable detailed design

Use basic segmentation to identify the 'bookends' of 100% hybrid and 100% virtual workers

Have team leaders define the basic working structure of their teams within clear boundaries, based on the nature of collaboration that the team needs to succeed

Use individual persona analysis to identify tradeoffs, define specific requirements & capabilities

This workstream aligns the organization on what change they want to achieve, and what they want to maintain

Define core elements of the organization's culture and values that the company wants to maintain

Define the culture or values that the company would like to evolve or modify in the next normal

The elements of a full potential workforce

Vision, Culture, Values:

Leverage the return to advance your culture and imprint your values without the need for a physical environment

Collaboration tools:

Anticipate & early adoption of future tools that unlock speed, enable remote trust-building, and support mental health and work-life balance objectives



Behaviors and work practices: Digital & in person, customer-facing & internal behaviors that drive value, thoughtful decisions and execution speed

Productivity and analytics: Shift to virtual work will create an explosion of tools that can better measure productivity and create greater insights into organizational barriers for speed

Workplace: Ensure you can get to a workplace model that solves for collaboration rather than historical organizational siloes



1: Vision, Culture and Values

- Do you have a vision for the extent of hybrid work the company may have in 2022** (20%, 50%, 80% remote)?
- Is your top team clear on the rationale for the shift to that hybrid model** – what unlocks will the shift provide and how will you measure it (speed, better decisions, level playing field, location agnostic talent)
- Are multiple levels of the organization aligned on the values, cultural norms and ‘sacred practices’ that you do not want to lose** as you evolve into the new model? Are you aligned on the ones you want to add or modify?
- Have you defined the basic strategy to manage the pervasive issues that more permanent hybrid work could inadvertently create** – low cross-silo collaboration, inadequate organic trust formation, deepened sense of isolation, diversity & inclusion challenges?
- Is top management truly committed to getting to these unlocks in spite of the potential for some of the issues above**, or is there a real debate?
- Do you have a history of intentionally evolving your culture over time?** If not, have you studied other companies that have succeeded and failed?



2: Behaviors and work practices - Empower teams to set clear expectations

- Have you built a detailed, ‘persona-based’ view of value creation** and how work gets done in every part of the organization, and have you mapped it to hybrid practices each persona will need to follow?
- Is there consistency in culture across your organization** (e.g., are team managers everywhere expected to have similar behaviors for success) so that you have a finite set of behaviors to modify?
- Have you built a picture of the critical behavior gaps that your organization has experienced** during the shift to remote (e.g., inadequate integration, lack of personal 1-on-1 interactions, other)?
- Have you conducted an assessment of the core skills you will need** as the organization shifts to more in-person work?
- Do you have mechanisms to set time-bound expectations around new skill development** (e.g., job contracts, incentives, other)?
- Do you have an organizational bias and infrastructure around learning** and capability building?
- Are you able to “democratize” working norms so that individual working teams can set them,** without losing a sense of connectedness to the organization?
- Have you defined a set of in-person practices across the org** to ensure basic personal connectivity?



3: Productivity and analytics – Unlock rapid learning about how work can get done better and faster

- Are your technical & HR leaders aware of how the shift to virtual structurally increases data** on productivity, pace of decisions & work done?
- Do leaders know how to use this data to identify barriers to speed, decision-making and execution**, while protecting employee privacy?
- Do you know how to tune the data to measure speed of decision-making?** Business processes? Corporate functions? Are new targets identified as a result of these measurements?
- Is the HR function prepared to handle these additional inputs as part of professional development** programs, training, and performance reviews?
- Do you have a way to measure productivity in the near term** that provides an ‘early warning system’ for the hybrid model not working out?
- Have conversations taken place with the business to define relevant metrics for successful return to work?**



4: Workplace - Design the employee experience for health, safety, productivity, and collaboration

- Have you modeled how much real estate you are unlikely to need under different scenarios** (i.e., different degrees of remote work), and how much savings it may result over time?
- Do you have a plan to adjust your footprint to match this real estate demand** – both through potential absolute reductions in space and changes to how you acquire that space (e.g., from long-term leases to flex space, short-term leases, shared conferencing facilities and other solutions)? Are you clear on which parts of your space portfolio you can achieve reductions on in the near term (e.g., expiring leases, mothballed facilities) vs. the long term?
- Is there line of sight to creating a wider variety of spaces within the office** (e.g., private offices, cubes, open desks, barstool seating, bookable rooms, modular conferencing) to both foster collaboration and enable greater variability in utilization?
- Have I stocked all offices with the required cleaning and sanitation supplies? Have I erected shields and am I requiring facemasks in public spaces? Have I removed elements from the office that encourage large gatherings?**
 - » Do I know that I will have enough supplies to replenish stocks throughout the day? Can I guarantee “5 9’s” (i.e. 99.999%) of availability of sanitary supplies?
 - » Have I implemented clear signage or other means of engagement that guide employees through this new experience? Do employees have risk-free ways to report violations (e.g., more than 2 people in an elevator)?
- Am I supplementing the employee experience in areas where preventative measures are changing elements of how we used to work** (e.g., how do we encourage participation given office meetings will be held via Zoom, how are new-joiners being integrated to their teams given the lunch-hour experience will be different)?



5: Collaboration tools - Go all-in on collaboration tools and inclusive meeting culture

- Have your leaders considered how to set up early ‘platforms’ that could transform how work gets done** (e.g., talent sharing across companies, Github-style asynchronous work, other)?
- Have we replaced whiteboards with a virtual whiteboard experience?** In what ways does this collaboration tooling level the playing field between in-person vs. work-from-home employees?
- Have we assessed our networks for additional performance needs under strain?**
- Have we supplemented our cybersecurity capabilities to mitigate additional risk** (i.e. work-from-home threats)?
- Are more than 2% of my employees experiencing connectivity issues on any one day?** Are tech support SLAs scaled up to support expected increase in additional workload?
- Have norms been set that allow virtual participants a way to “raise a hand” in case in-room discussion excludes virtual perspectives?** Are we tracking how often that feature is being used, and how it changes over time?
- Have expectations been set on inclusive meeting practices?** Is training provided to all employees on collaboration in a hybrid work environment?

Contents

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COVID-19:
The situation now

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vaccines
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Appendix:
Scenarios deep-
dives

The Imperative of our Time

“Timeboxing” the Virus and the Economic Shock

Imperatives

1

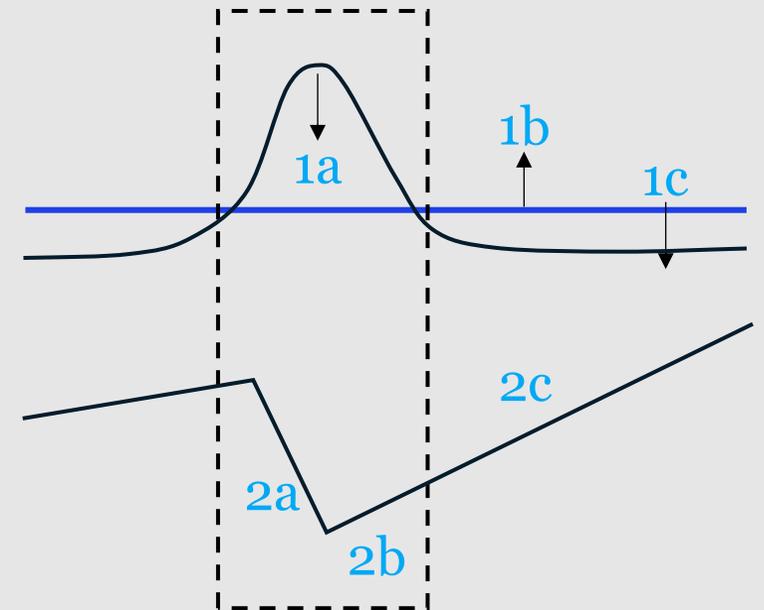
Safeguard our lives

- 1a. **Suppress the virus** as fast as possible
- 1b. **Expand testing, quarantining and treatment** capacity
- 1c. **Find “cures”**; treatment, drugs, vaccines

2

Safeguard livelihoods

- 2a. **Support people and businesses** affected by lockdowns
- 2b. **Prepare to get back to work safely** when the virus abates
- 2c. **Prepare to scale the recovery** away from a -8 to -13% trough



Scenarios for the Economic Impact of the COVID-19 Crisis

GDP impact of COVID-19 spread, public health response, and economic policies

Virus Spread & Public Health Response

Effectiveness of the public health response in controlling the spread and human impact of COVID-19

Rapid and effective control of virus spread

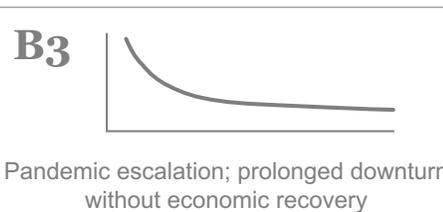
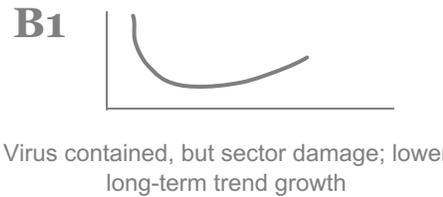
Strong public health response succeeds in controlling spread in each country within 2-3 months

Effective response, but (regional) virus recurrence

Initial response succeeds but is insufficient to prevent localized recurrences; local social distancing restrictions are periodically reintroduced

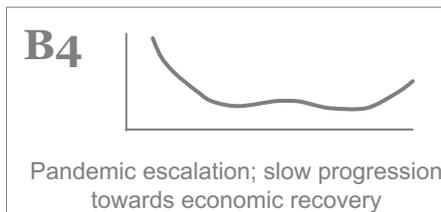
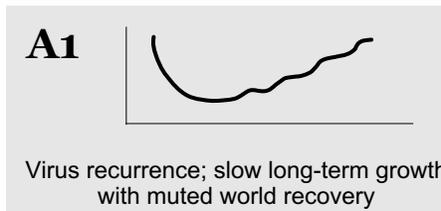
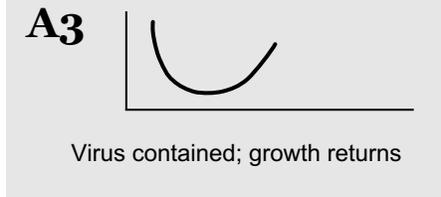
Broad failure of public health interventions

Public health response fails to control the spread of the virus for an extended period of time (e.g., until vaccines are available)



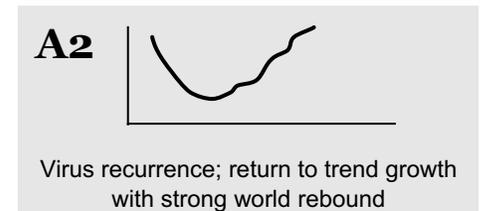
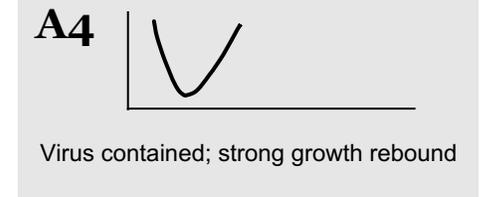
Ineffective interventions

Self-reinforcing recession dynamics kick-in; widespread bankruptcies and credit defaults; potential banking crisis



Partially effective interventions

Policy responses partially offset economic damage; banking crisis is avoided; recovery levels muted



Highly effective interventions

Strong policy responses prevent structural damage; recovery to pre-crisis fundamentals and momentum

Knock-on Effects & Economic Policy Response

Speed and strength of recovery depends on whether policy moves can mitigate self-reinforcing recessionary dynamics (e.g., corporate defaults, credit crunch)

Shape of the COVID-19 impact: the view from global executives

“Thinking globally, please rank the following scenarios in order of how likely you think they are to occur over the course of the next year”; % of total global respondents¹

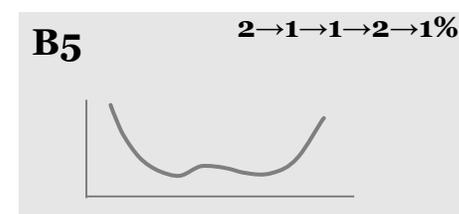
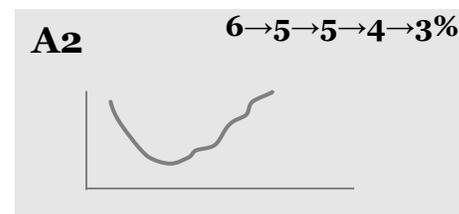
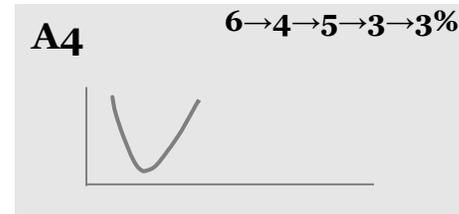
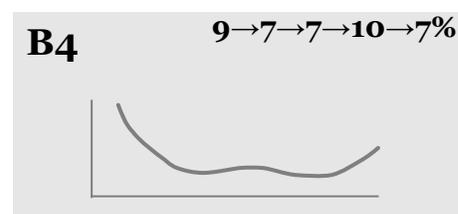
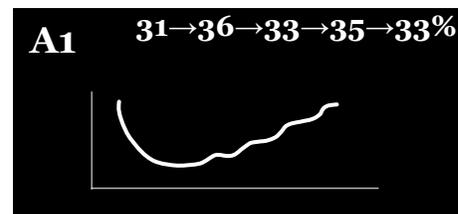
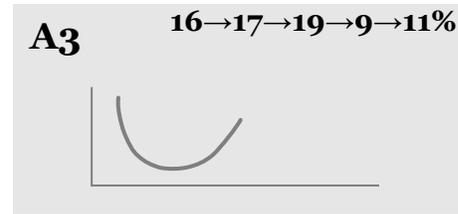
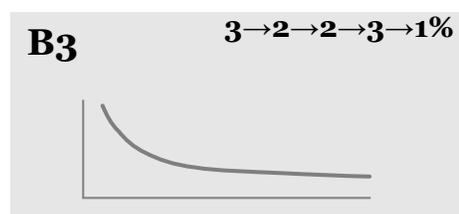
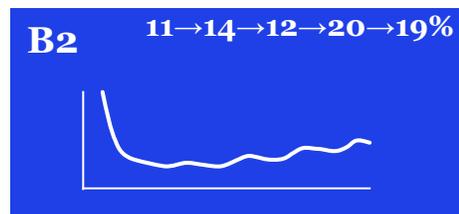
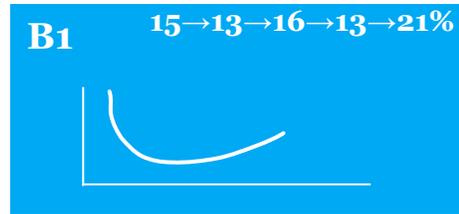
World April → May → June → July → Aug/Sep surveys

Virus spread and public health response

Rapid and effective control of virus spread

Effective response, but (regional) virus resurgence

Broad failure of public health interventions



Ineffective interventions

Partially effective interventions

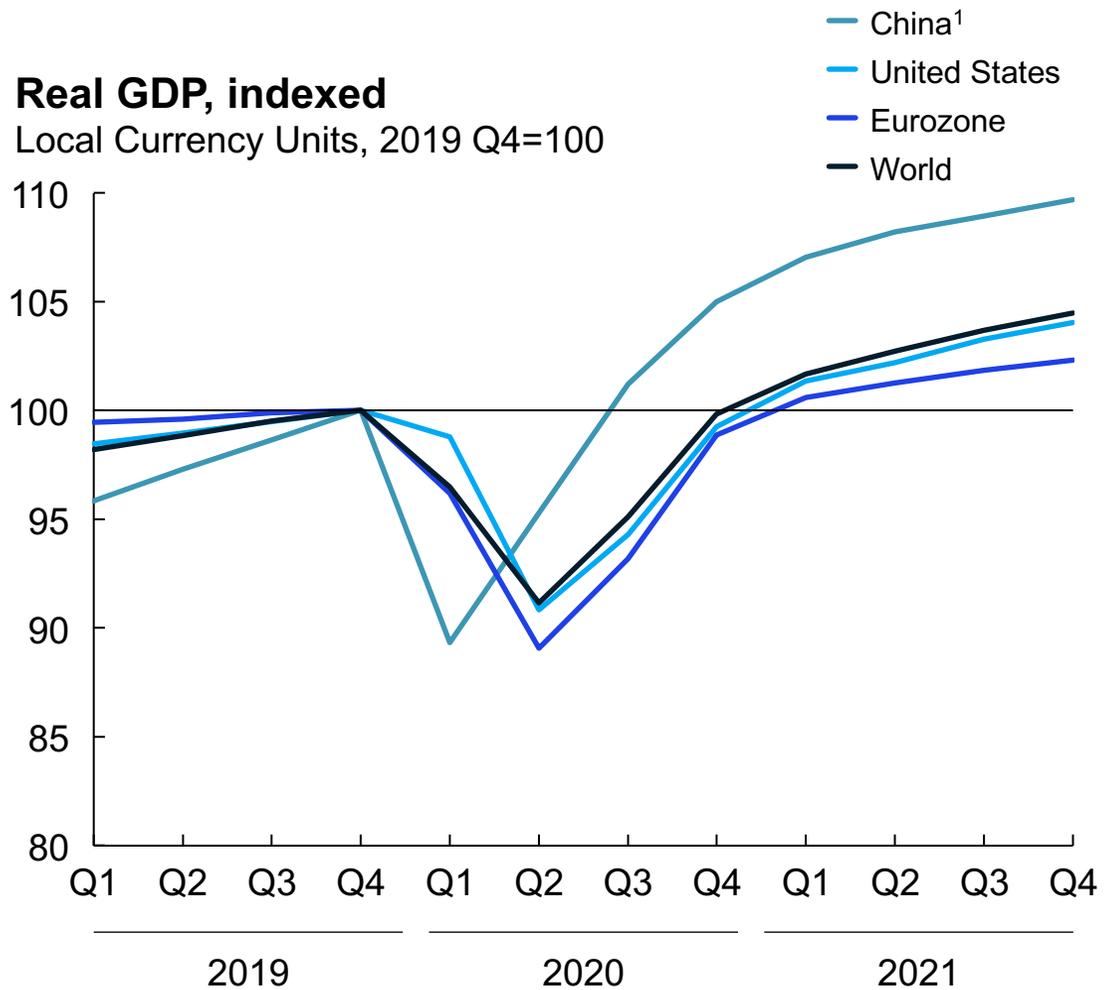
Highly effective interventions

Knock-on effects and economic policy response

1. Monthly surveys: April 2–April 10, 2020, N=2,079; May 4–May 8, 2020, N=2,452; June 1–5, N=2,174; July 13-17, N=2,079; August 31 – September 4, N=1,116

Scenario A3: virus contained, growth returns

Large economies



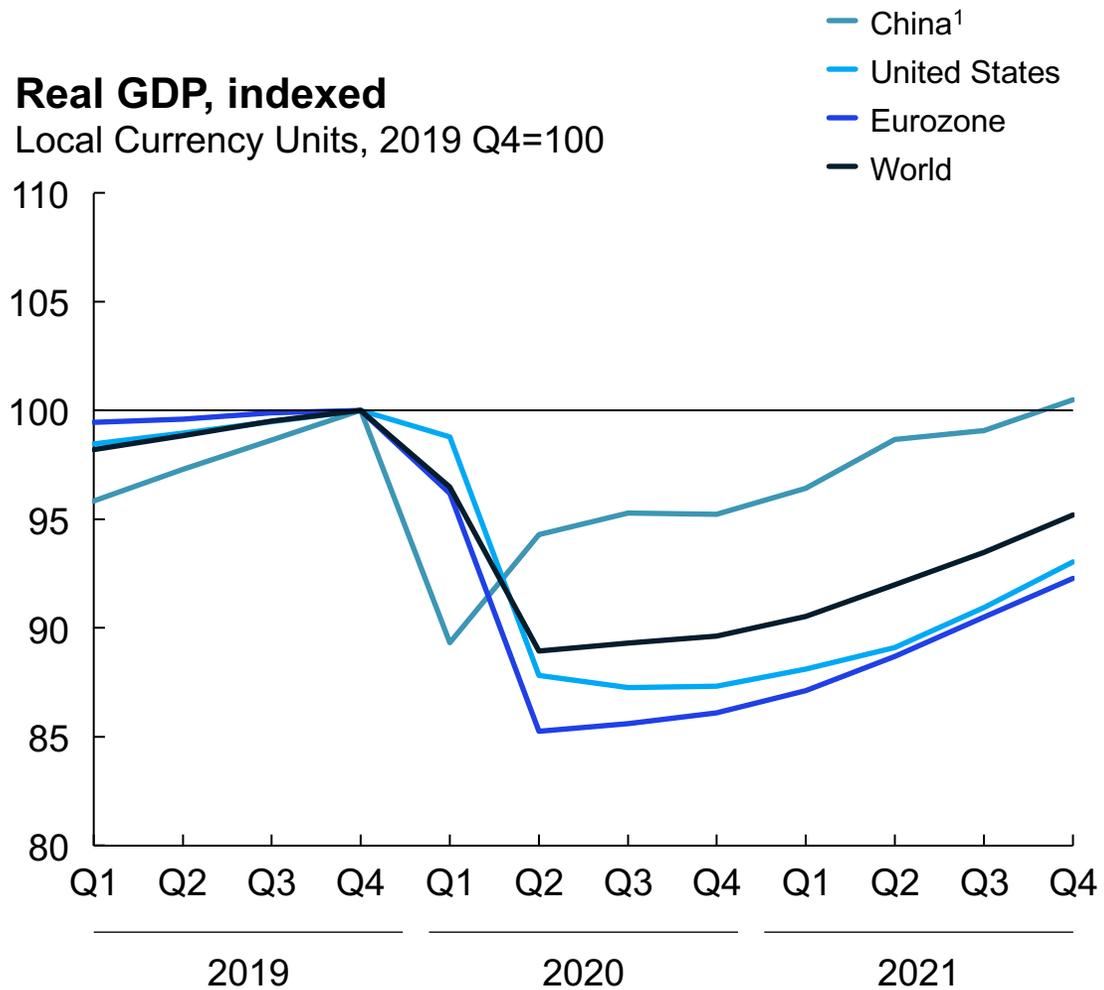
1. Seasonally adjusted by Oxford Economics

Source: McKinsey analysis, in partnership with Oxford Economics
DOCUMENT INTENDED TO PROVIDE INSIGHT BASED ON CURRENTLY AVAILABLE INFORMATION FOR CONSIDERATION AND NOT SPECIFIC ADVICE

	Real GDP Drop 2019Q4-2020Q2 % Change	2020 GDP Growth % Change	Return to Pre- Crisis Level Quarter (+/- 1Q)
China	-4.7%	0.1%	2020 Q3
United States	-9.2%	-3.5%	2021 Q1
Eurozone	-10.9%	-5.4%	2021 Q1
World	-8.9%	-3.5%	2021 Q1

Scenario A1: virus recurrence, with muted recovery

Large economies



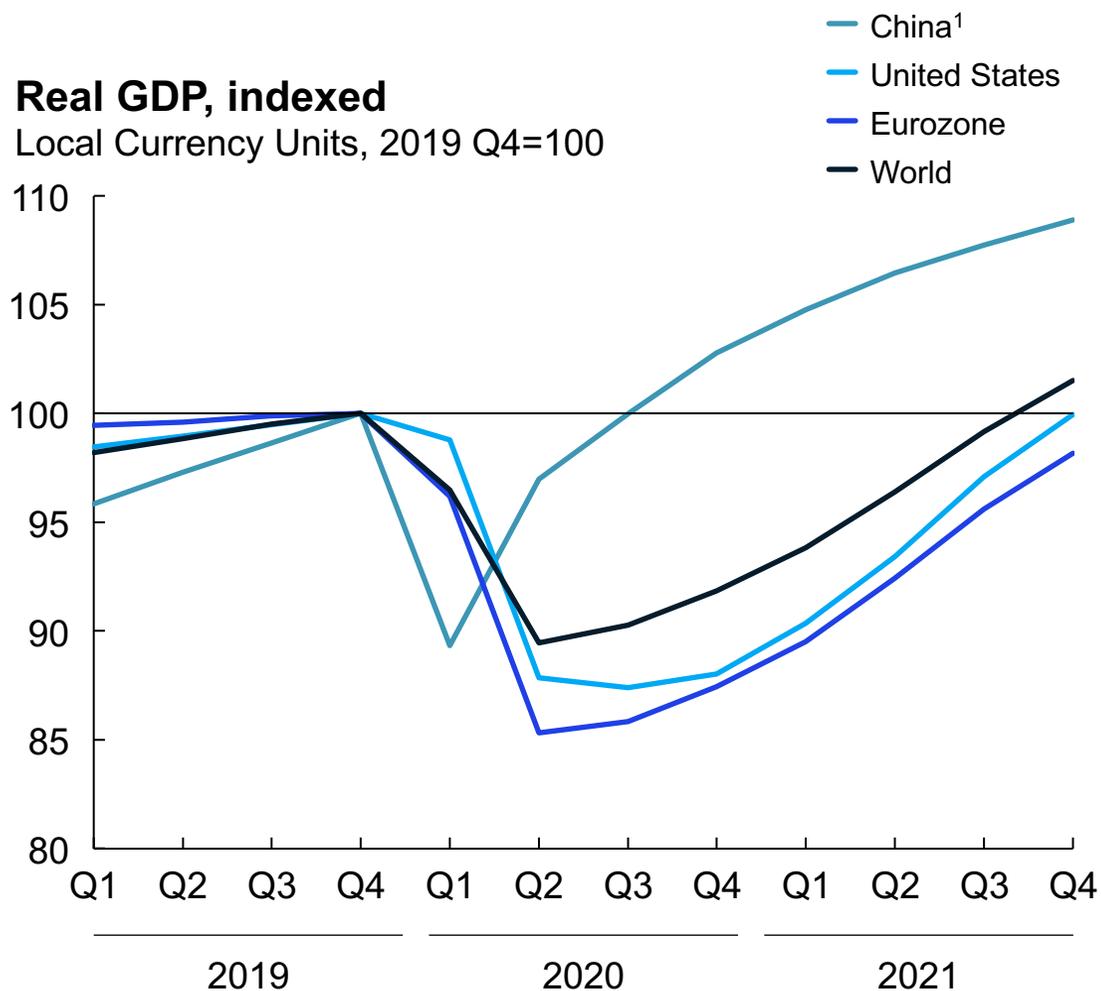
1. Seasonally adjusted by Oxford Economics

Source: McKinsey analysis, in partnership with Oxford Economics
DOCUMENT INTENDED TO PROVIDE INSIGHT BASED ON CURRENTLY AVAILABLE INFORMATION FOR CONSIDERATION AND NOT SPECIFIC ADVICE

	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

Scenario A2: virus recurrence, with strong world rebound

Large economies



1. Seasonally adjusted by Oxford Economics

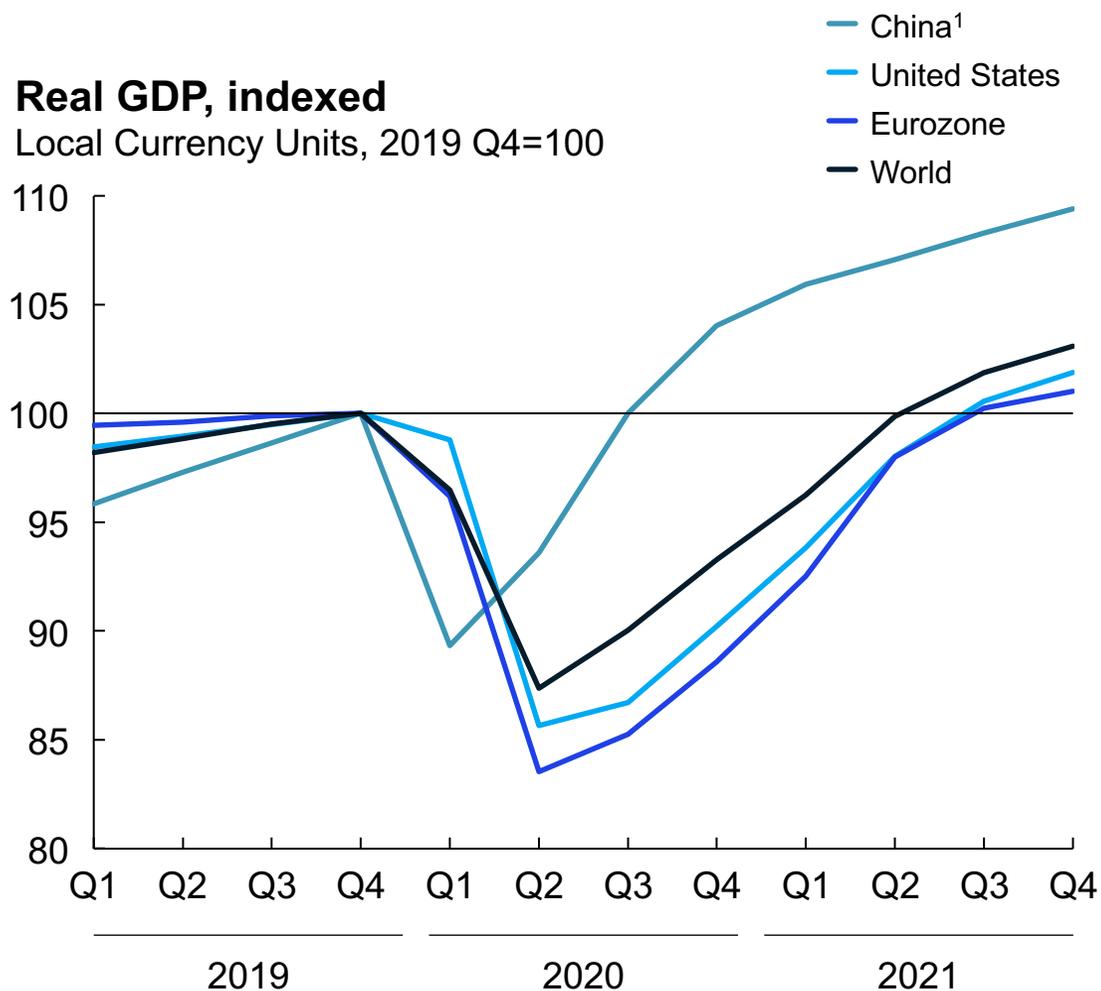
Source: McKinsey analysis, in partnership with Oxford Economics

DOCUMENT INTENDED TO PROVIDE INSIGHT BASED ON CURRENTLY AVAILABLE INFORMATION FOR CONSIDERATION AND NOT SPECIFIC ADVICE

	Real GDP Drop 2019Q4-2020Q2 % Change	2020 GDP Growth % Change	Return to Pre- Crisis Level Quarter (+/- 1Q)
China	-3.0%	-0.4%	2020 Q4
United States	-12.2%	-8.8%	2022 Q1
Eurozone	-14.7%	-11.1%	2022 Q1
World	-10.5%	-7.2%	2021 Q4

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

Large economies



1. Seasonally adjusted by Oxford Economics

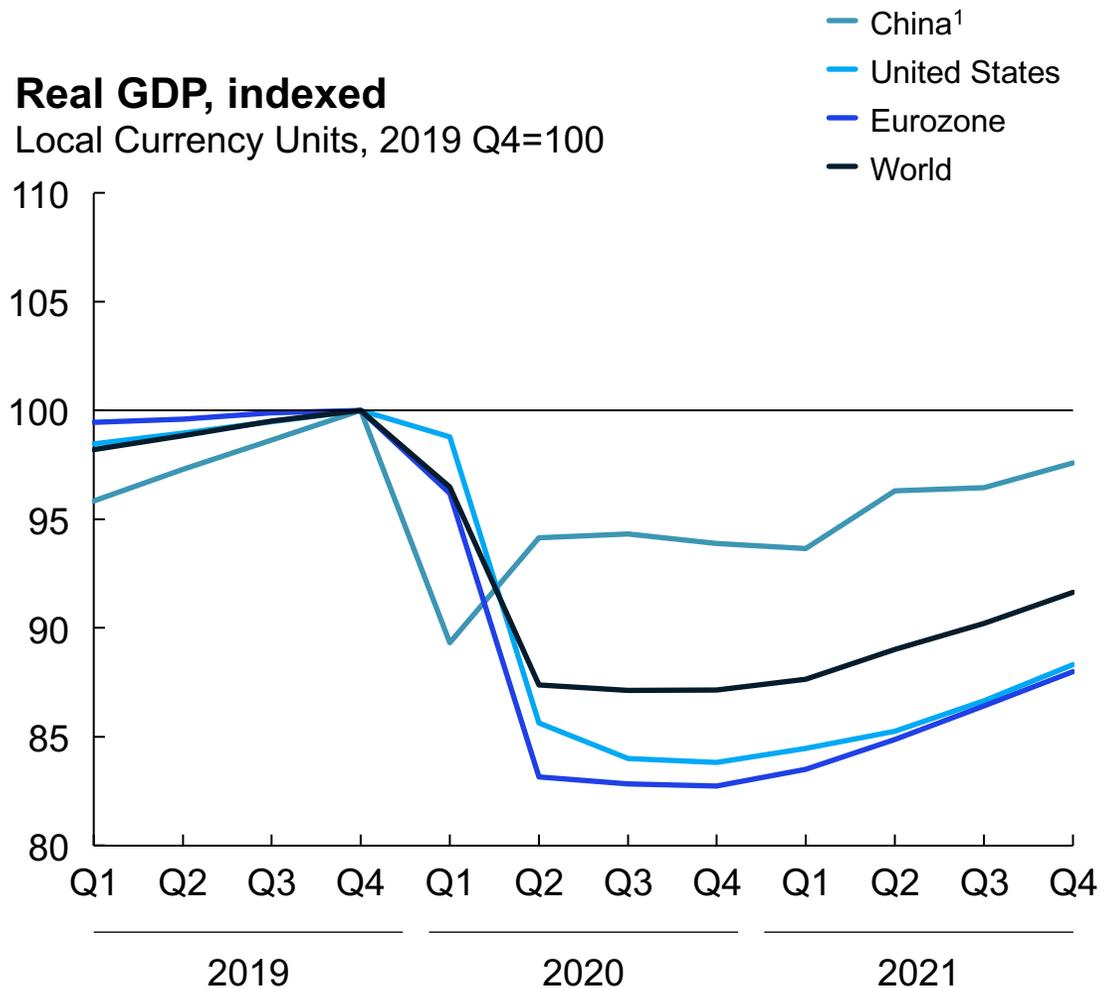
Source: McKinsey analysis, in partnership with Oxford Economics

DOCUMENT INTENDED TO PROVIDE INSIGHT BASED ON CURRENTLY AVAILABLE INFORMATION FOR CONSIDERATION AND NOT SPECIFIC ADVICE

	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

Scenario B2: virus recurrence, with slow long-term growth

Large economies



1. Seasonally adjusted by Oxford Economics

Source: McKinsey analysis, in partnership with Oxford Economics

DOCUMENT INTENDED TO PROVIDE INSIGHT BASED ON CURRENTLY AVAILABLE INFORMATION FOR CONSIDERATION AND NOT SPECIFIC ADVICE

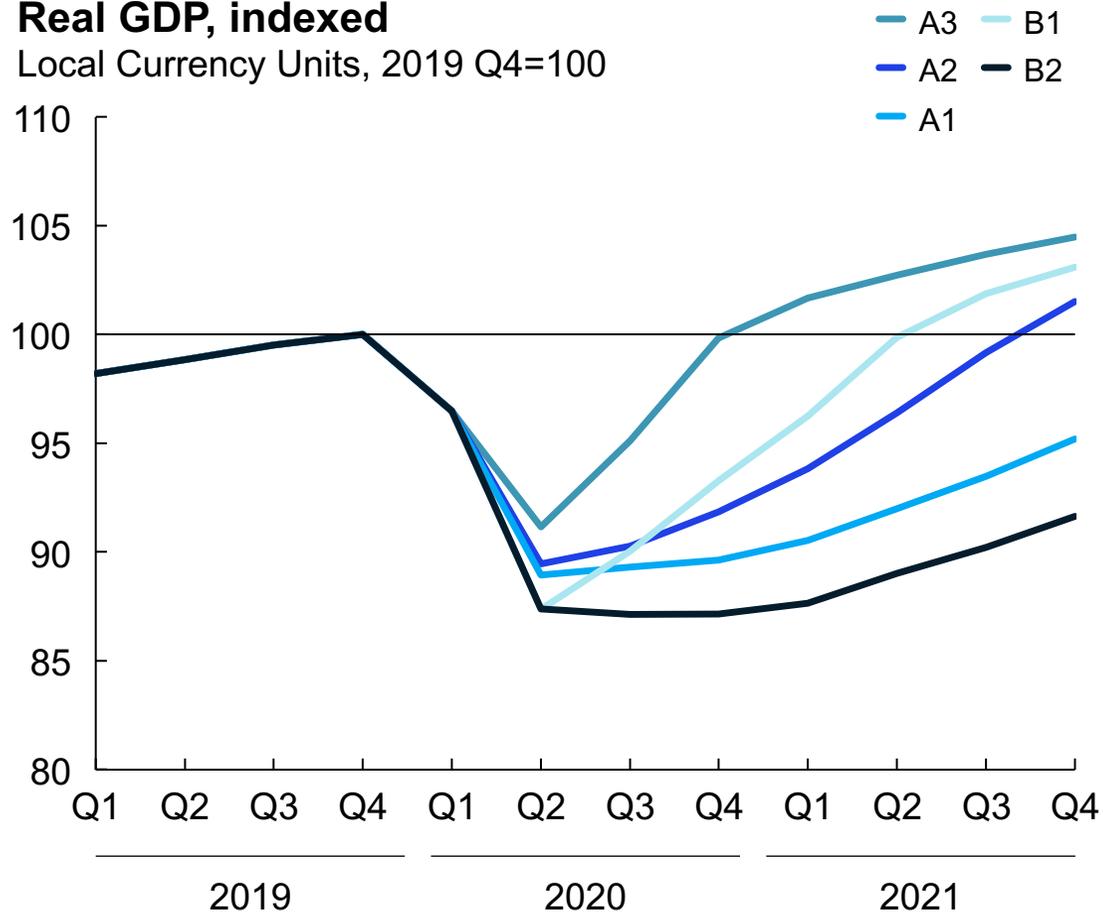
	Real GDP Drop 2019Q4-2020Q2 % Change	2020 GDP Growth % Change	Return to Pre- Crisis Level Quarter (+/- 1Q)
China	-5.8%	-5.1%	2022 Q2
United States	-14.4%	-11.3%	2025+
Eurozone	-16.8%	-13.5%	2025+
World	-12.6%	-9.7%	2023 Q3

World

Scenarios A3, A2, A1, B1, B2

Real GDP, indexed

Local Currency Units, 2019 Q4=100



1. Seasonally adjusted by Oxford Economics

Source: McKinsey analysis, in partnership with Oxford Economics

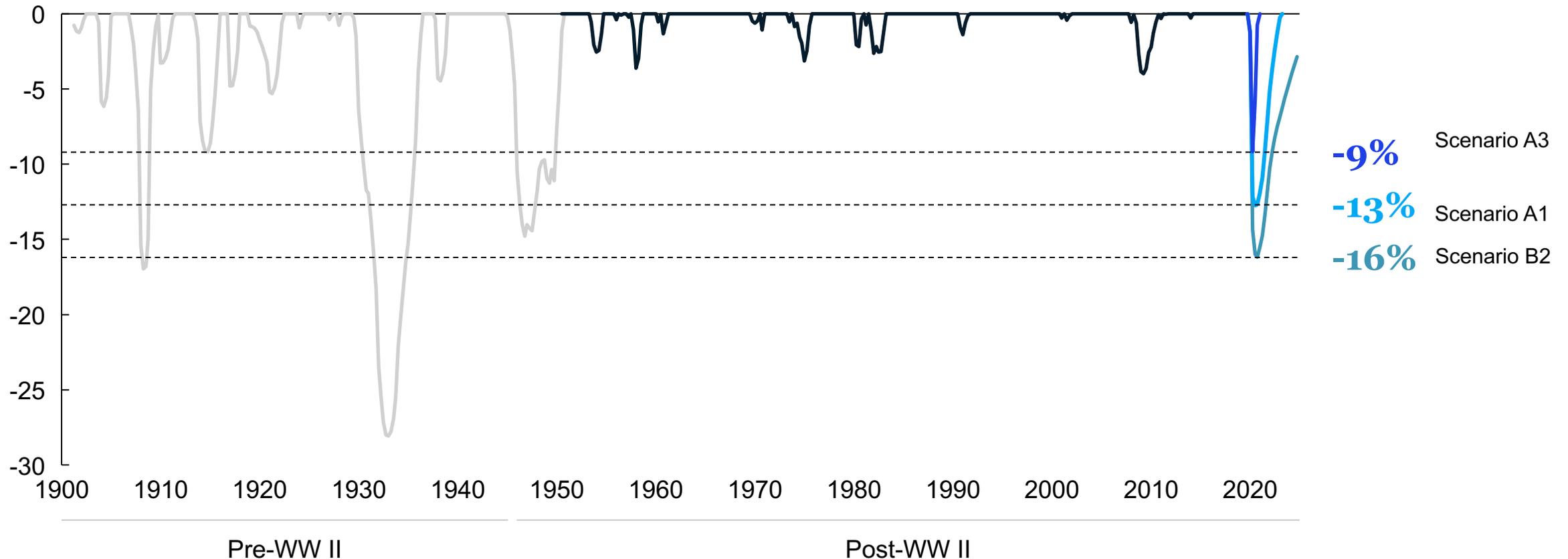
DOCUMENT INTENDED TO PROVIDE INSIGHT BASED ON CURRENTLY AVAILABLE INFORMATION FOR CONSIDERATION AND NOT SPECIFIC ADVICE

	Real GDP Drop 2019Q4-2020Q2 % Change	2020 GDP Growth % Change	Return to Pre- Crisis Level Quarter (+/- 1Q)
A3	-8.9%	-3.5%	2021 Q1
A2	-10.5%	-7.2%	2021 Q4
A1	-11.1%	-8.1%	2022 Q3
B1	-12.6%	-7.4%	2021 Q3
B2	-12.6%	-9.7%	2023 Q3

COVID-19 US impact could exceed anything since the end of WWII

United States Real GDP

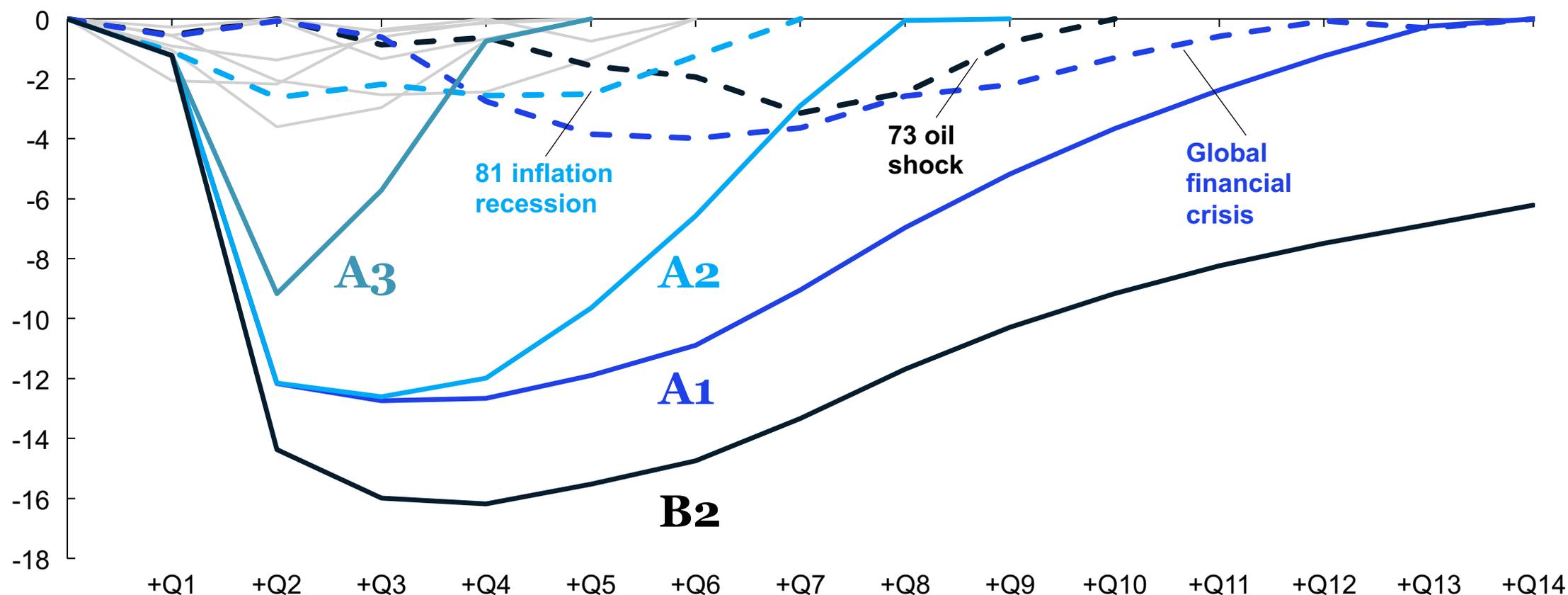
%, total draw-down from previous peak



Pace of decline of economic activity in Q2 2020 is likely to be the steepest since decline since WWII

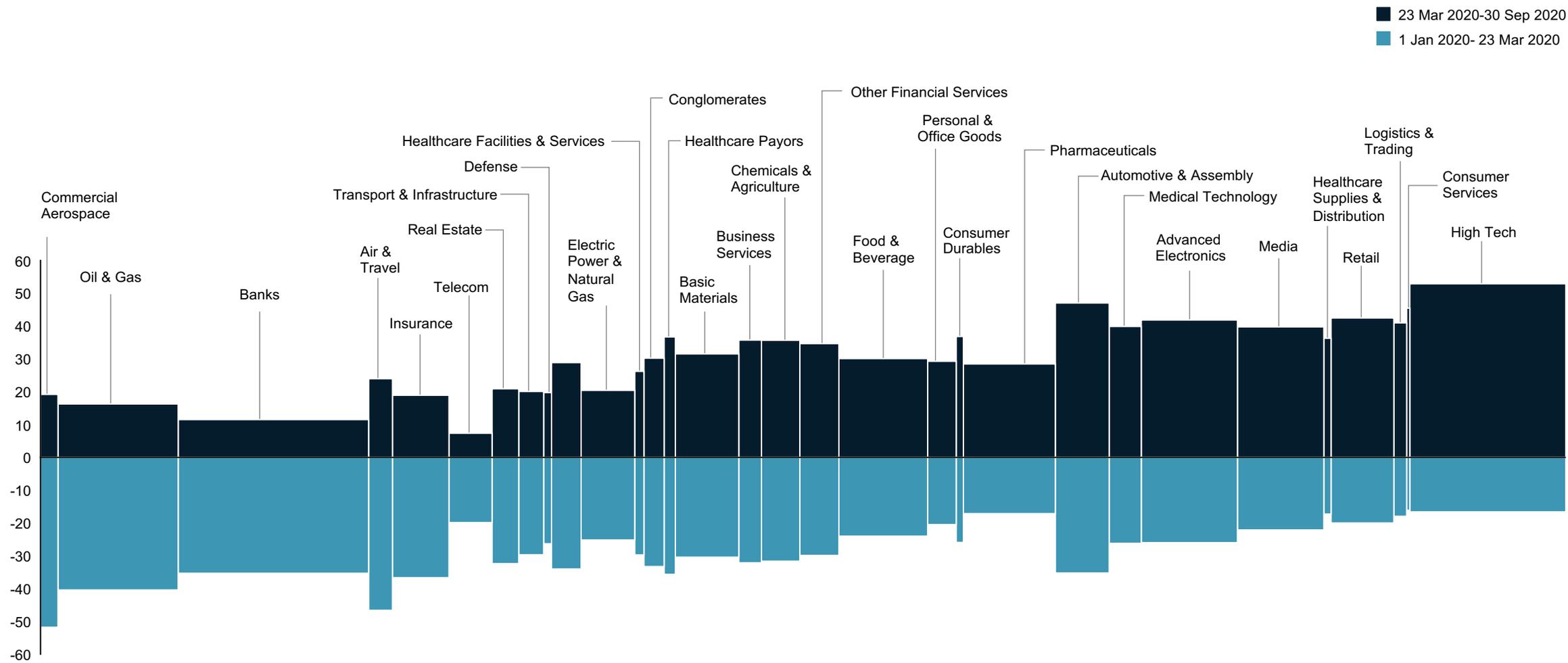
United States, comparison of post-WWII recessions

% real GDP draw-down from previous peak



Many industries have recovered most of their share price drop from recent months, some are up YTD

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



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

Getting ahead of the crisis

What we know for sure

Macro-economic disruption likely greater than the Great Recession

By and large, radical acceleration of existing trends

Discrete events disruption industries and businesses

That will take a long (unknown) time to fully play out and will evolve in stages, there is no one finish line

On the other side of the long tunnel, we come out in a different world

Implications

Can't manage purely as a crisis because this won't go away like a normal crisis...**new operating model**

Your budget is kaput and tough to write a new one: need a **dynamic, contingent response**

Three months is the new year—**4x speeding up** of the corporate calendar

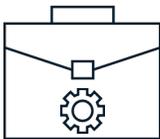
Need a plan ahead team to get ahead and manage across **multiple horizons and scenarios**

You are probably solving for a **different end game** with new threats and new opportunities

The Plan Ahead Team

What it does

- — **Plans for multiple scenarios**
- — Builds a credible view of possible future worlds, each comprised of a unique combination of macro-economic outlooks, shifting trends and discrete events
- —



Defines a portfolio of moves

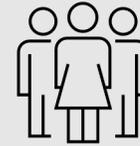
Selects a coherent set of moves that are tuned to the distinct possibility of every possible scenario materialising



Instils dynamic adaption

Structures a dynamic roadmap with clear trigger points which gives you the flexibility to adapt your plan as conditions change

What it looks like



Agents of the CEO

Senior executive leading a small team of your best people with a view across all key business areas. Team members should be fully-dedicated.



Agile and modular

Regular and informal interactions, rapid iterations and collaboration across workstreams. Scalable in line with the magnitude of the crisis and complexity of your business.



Standalone but integrated

Ringfenced team but closely interfaced with other parts of your crisis management nerve centre, e.g., Finance, Ops

The Plan Ahead Team

Builds on best-practice approach to strategic transformations

Financial Lens

What is required to create value in the business?

Impact on value from growth and ROIC improvement

Financial benchmarking to peers

Portfolio decomposition

Momentum case vs. investor expectations

Operating Model Lens

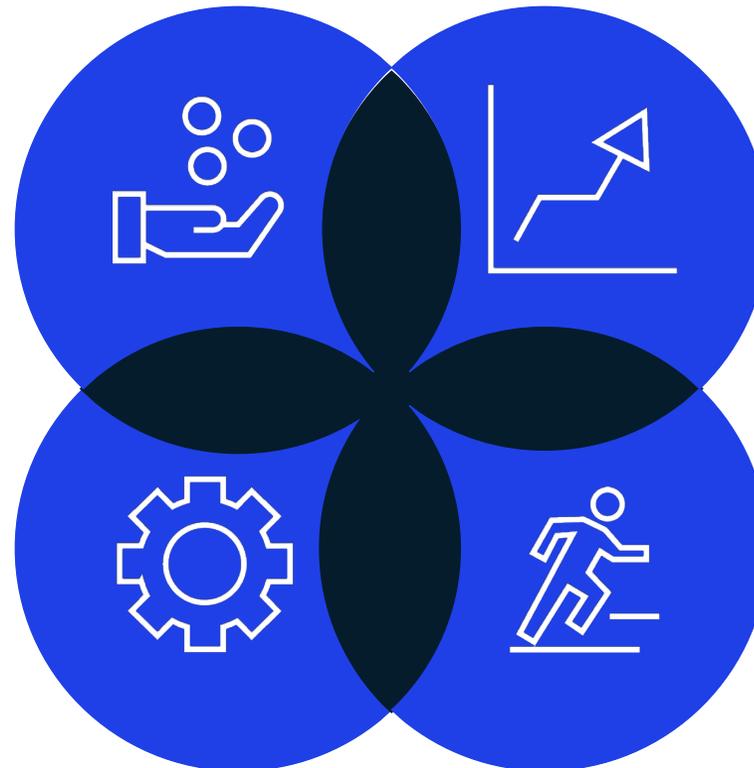
Can the organization deliver?

Strategic execution / resource allocation

Funding sources

Organizational structure & talent

Performance management



Market Lens

Is the company playing in profitable markets that will deliver growth?

Profit pools and growth pockets in current core markets

Growth opportunities in new geographies

Opportunities in adjacent markets

Opportunities in existing or new value chains

Impact of market and customer trends & disruptions

Competitive Advantage Lens

What does it take to succeed in these markets?

Competitive positioning

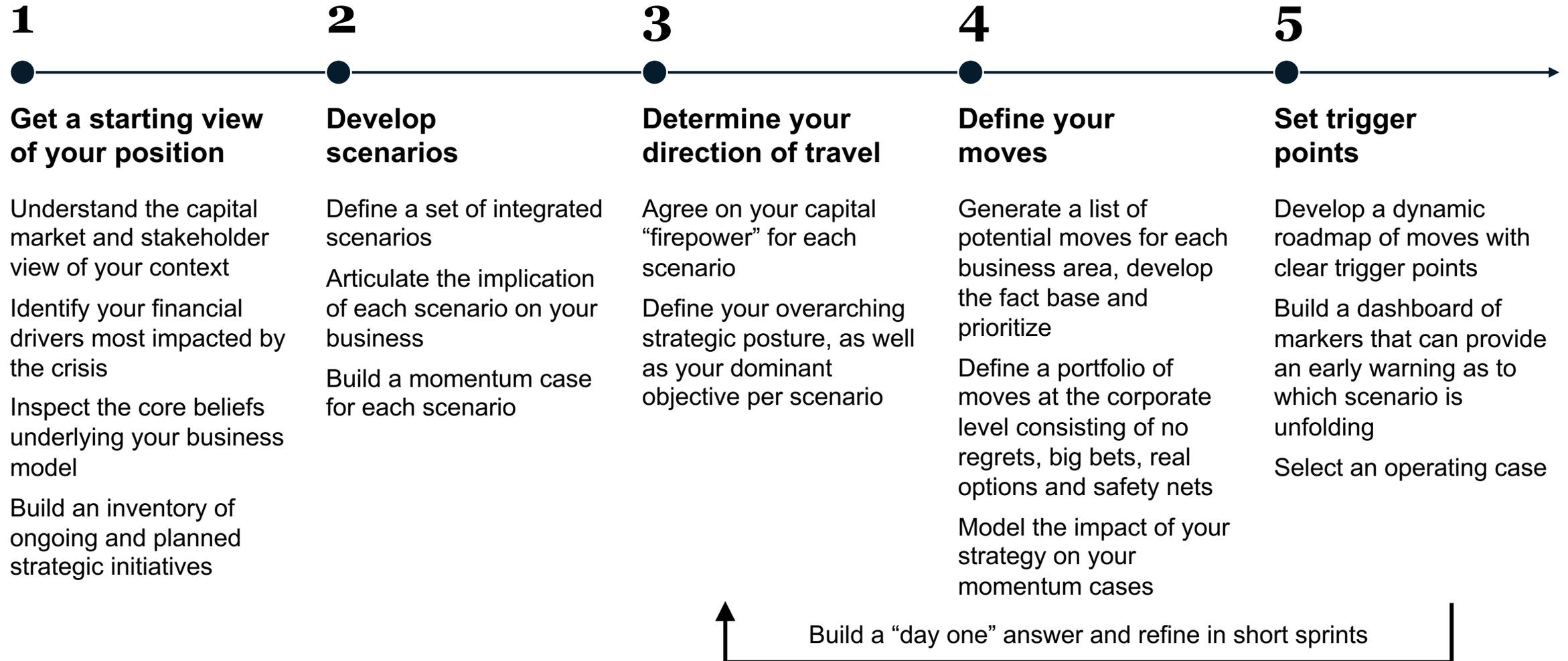
Requirements to shape industry conduct

Ownership advantages in the portfolio

Ability to compete in adjacent markets

A playbook for your Plan Ahead Team

5 Frames to build and execute your COVID-19 plan-ahead strategy



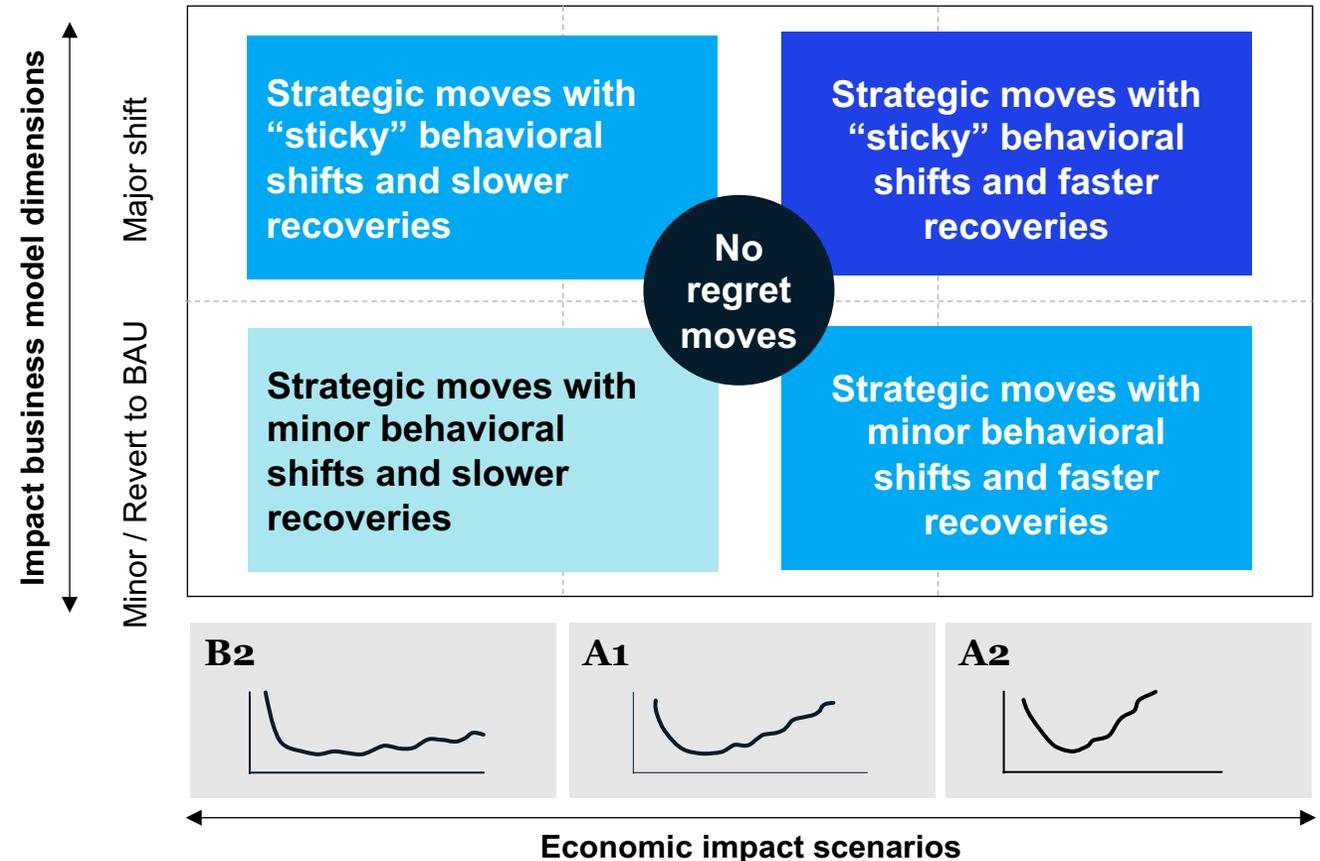
Identifying no-regret moves across behavioural and economic shifts

Frames 1 & 2: developing a “momentum case” and strategic implications for each economic scenario

Examples

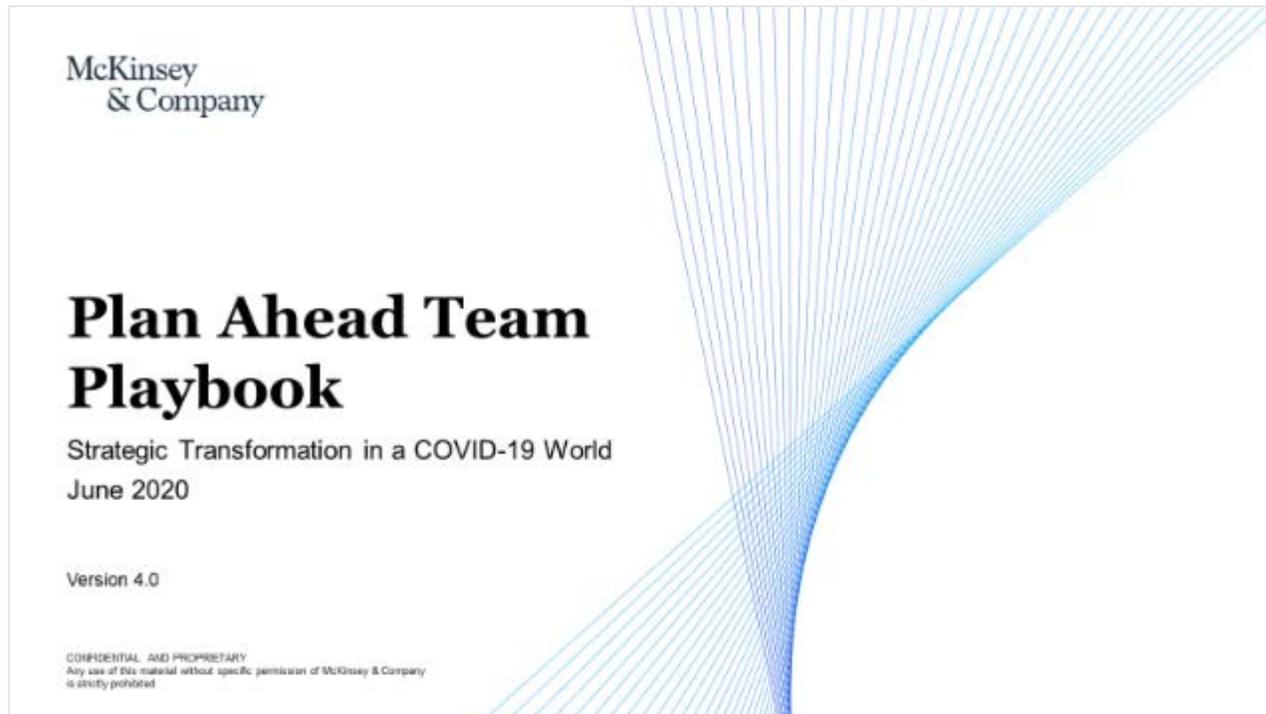
Business model dimensions to be stress-tested with scenarios

Value proposition	What problems are you trying to solve/unmet needs are you trying to fulfill?
Economic model	How do you monetize your offerings and sustain them economically over time?
Production model	How is your organization configured to produce its offerings?
Delivery model	How are offerings brought to market and what are other customer and user touchpoints?
Assets and capabilities	What are the resources, skills, and systems that drive your business model?



The Plan Ahead Team

The playbook to guide your strategic transformation



McKinsey
& Company

