

A decorative graphic on the left side of the page features a curved, grid-like pattern of teal and green squares, transitioning into a series of overlapping circles and lines in the bottom left corner. The background is a dark, high-angle photograph of a city skyline.

COVID-19

BCG Perspectives

Facts, scenarios, and actions for leaders

Future of Cities

October 2020

COVID-19 BCG Perspectives

Objectives of this document

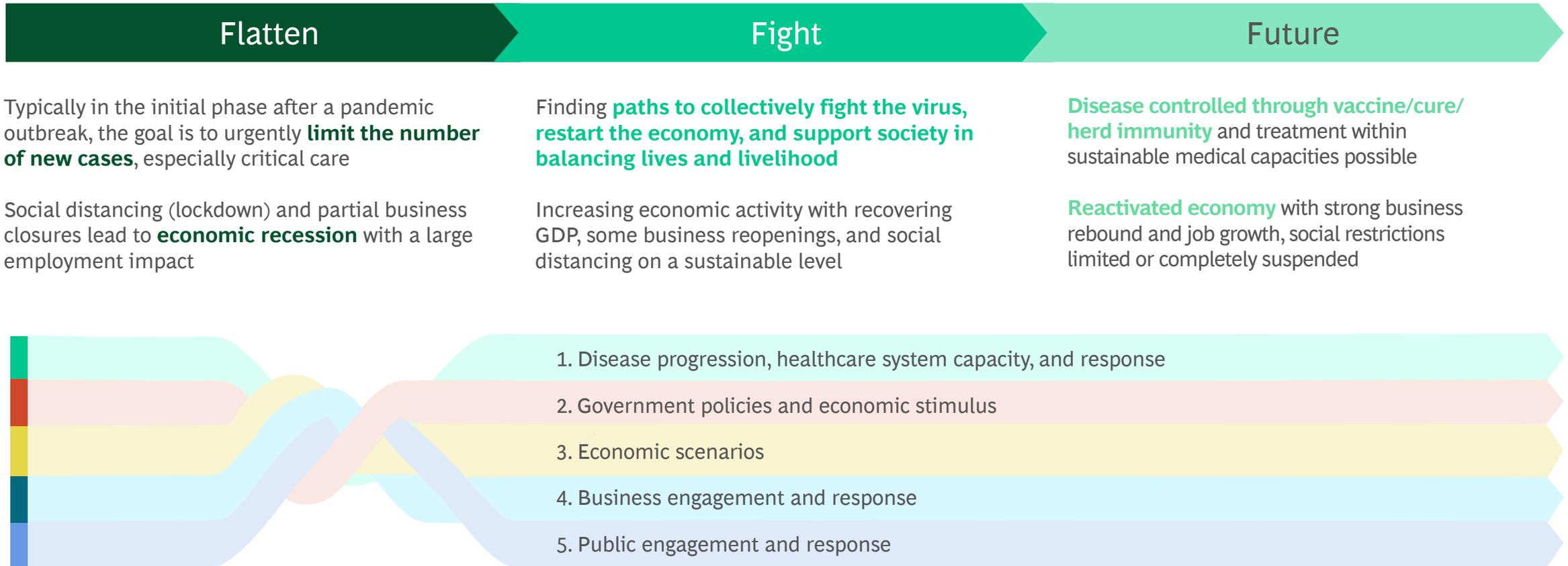
COVID-19 is a global societal crisis

We at BCG believe that the COVID-19 outbreak is first and foremost a societal crisis, threatening lives and the well-being of our global community. Society now, more than ever, needs to collaborate to protect people's lives and health, manage mid-term implications, and search for lasting solutions.

Leaders need to drive an integrated response to navigate the crisis

It is the duty of health, political, societal, and business leaders to navigate through this crisis. A complex interplay of epidemic progression, medical response, government action, sector impact, and company action is playing out. This document intends to help leaders find answers and shape opinions to navigate the crisis in their own environments. It encourages thinking across the multiple time horizons over which we see the crisis manifesting itself.

The COVID-19 recovery will be driven by disease progression, de-averaged economic impact, government policies, and business and public responses



All of the above five factors result in specific economic and social outcomes in each phase

Summary snapshot | Restart progression at a glance

As of 26 Oct 2020

Epidemic Progression

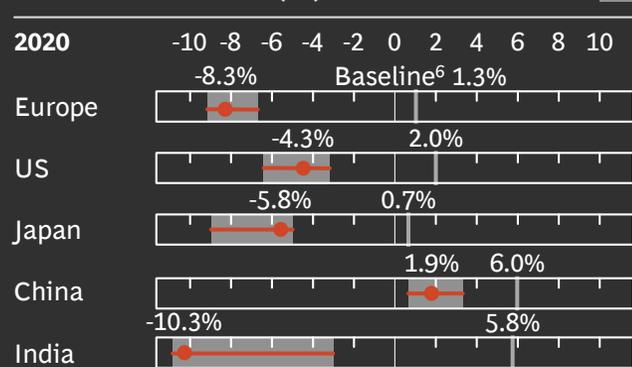
Global epidemic snapshot

43.5M	424K	13.1M	1.2M
# of cases	# of daily cases ¹	# of active cases	# of fatalities

Month-on-month growth of new cases ²		July	Aug	Sep	Oct ⁴
Americas	Americas	1.7x	1.0x	0.8x	1.1x
	Europe	1.0x	1.7x	1.9x	2.8x
	Asia ³	1.7x	1.4x	1.3x	0.9x

Economic Impact

GDP forecasts (%)



Consumer Activity

Mobility

		Jul	Aug	Sep
Mobility ⁷ (month vs. Jan '20)	US	-19%	-19%	-20%
	Europe	-17%	-17%	-14%
	Japan	-13%	-14%	-11%
Domestic air travel tickets booking ⁸ (YoY)	US	-76%	-68%	-64%
	UK	-86%	-86%	-84%
	China	-27%	-8%	-1%

Sales

Retail goods sales ⁹ (excl. auto & fuel, YoY)	US	9%	8%	10%
	UK	3%	4%	
	China	-2%	-1%	2%
Passenger vehicle sales ¹⁰ (YoY)	US	-19%	-27%	-4%
	Europe	0%	-2%	
	China	9%	6%	8%
Hotel occupancy ¹¹ (YoY)	US	-36%	-32%	-28%
	Europe	-66%	-45%	-52%
	China	-19%	-12%	

Business Impact

Stock market performance

Month end vs. 02 Jan '20	Jul	Aug	Sep
S&P500	0%	7%	3%
FTSE100	-22%	-22%	-23%
CHN SSE	7%	10%	4%
Volatility Index (S&P500) ¹²	2.0x	2.1x	2.1x

International trade

Trade value ¹³ (YoY)	US	UK	China
US	-11%	-11%	-8%
UK	-19%	-16%	-8%
China	3%	3%	4%

Industrial production

Purchasing manager's index ¹⁴ (base = 50)	US	51	53	53
	EU	52	52	54
	China	51	51	51
Steel production (YoY) ¹⁵		-3%	0%	3%

To be updated in forthcoming editions

1. Calculated as 7-day rolling average; 2. Calculated as monthly average of daily cases vs. previous month; 3. Includes Middle East and Oceania; 4. As of 26 October 2020; 5. For India, forecast is for financial year; for others, it is for calendar year; YoY forecasts; range from forecasts (where available) of World Bank; International Monetary Fund; JP Morgan Chase; Morgan Stanley; Bank of America; Fitch Solutions; Credit Suisse; Danske Bank; ING Group; HSBC; as of reports dated 08 June 2020 to 16 Oct 2020; for India's GDP forecast, World Bank's 2020 forecast from 08 June provides the upper bound of the forecast range; 6. IMF Jan 2020 forecast; 7. Mobility values are calculated as the average of mean monthly mobilities in workplace, public transit, retail & recreation, and grocery & pharmacy and compared to a baseline from 03 Jan – 06 Feb 2020; Europe mobility values are calculated as the average of Germany, France, UK, Spain, and Italy; 8. Calculated as change in last 14 days rolling average value as compared to same period last year; 9. Retail goods sales include online & offline sales and comprise food & beverages, apparel, cosmetics & personal care, home appliances, general merchandise, building material; do not include auto, fuel & food services; 10. Figures represent passenger vehicle (including sedan, hatchback, SUV, MPV, van and pickup) sales data for 2020 over same month in 2019; Europe value calculated as cumulative sales in Germany, France, UK, Spain, and Italy; 11. Calculated as average occupancy rates compared to same month of previous year; 12. Underlying data is from Chicago Board Options Exchange Volatility Index (VIX); Volatility Index is a real-time market index that represents the market's expectation of 30-day forward-looking volatility and provides a measure of market risk and investors' sentiments; 13. Calculated as sum of imports and exports, measured in USD and compared to previous year period; 14. PMI (Purchasing Manager's Index) is a diffusion index that summarizes whether market conditions, as viewed by purchasing managers, are expanding (>50), staying the same (50), or contracting (<50); 15. Data corresponds to G-20 countries (minus Indonesia). Sources: JHU CSSE; Our World in Data; WHO; World Bank; IMF; Bloomberg; Google Mobility; US Census Bureau; Eurostat; PRC National Bureau of Statistics; ACEA actuals; Marklines; ARC ticketing data; STR; Statista; CBOE; OECD; BEA; GACC (customs) China; ONS; BCG

Executive Summary | COVID-19 BCG Perspectives

Cities hit hard by the COVID-19 pandemic; governments taking action to contain the damage and build a pathway towards a stronger future

- While cities are witnessing higher case numbers and GDP loss than the world at-large, severity varies significantly across cities
- Cities are dealing with multiple challenges arising from the pandemic such as constrained budgets, people exodus, and business closures
- Governments are taking action to support vulnerable communities, small & local businesses as well as large enterprises via incentives & deregulation
- Evidence from past crises highlights that cities transform and emerge stronger; multiple cities have started acting toward a stronger future
- Business leaders should consider six strategic actions now: (i) reimagine workplace & talent footprint; (ii) rethink retail & distribution strategy; (iii) respond to 'new' customer preferences; (iv) enter & grow into adjacencies; (v) participate in building an equitable city; (vi) leverage partnership opportunities
- Public leaders should recraft action agenda: (i) upgrade strategic vision; (ii) rethink citizen's engagement; (iii) review mega projects; (iv) modernize operations

Severe global economic downturn expected to continue for 2020 driven by resurgence in COVID-19 cases across multiple countries

- Several countries (France, Netherlands, Spain, UK, US, Russia, Canada) witnessing resurgence with cases exceeding historic peaks
- Many countries are returning to severe restrictions or even partial lockdowns in the light of latest resurgence of cases
- 10 vaccine candidates already in Phase III; some may get emergency use authorization (EUA) starting in Q4 2020¹; multiple promising therapeutics in trials
- For most leading economies, forecasts indicate a rebound to 2019 GDP levels only by end of 2021
- 5 (out of 24) sectors² are currently above pre-crisis TSR³ levels; 6 sectors have a significant share⁴ of companies with >15% default risk

We believe during this crisis leaders need to think along two dimensions:

Taking an integrated perspective on health/medical progression, governmental responses, societal reactions, and economic implications to understand business/sector impacts

Thinking multi-timescale in a Flatten-Fight-Future logic

1. Initial data observed in the early stages of phase 3 trials may lead to restricted approvals starting in Q4 2020; 2. Semiconductors, Retailing, Household products and Materials; 3. TSR: Total Shareholder Return; 4. Retailing, Materials, Auto, Transport, Hospitality, Real estate and Energy are sectors with > 10% of companies with probability of default > 15%;



Guide for Leaders

COVID-19 impact on cities and current actions

Outlook on future of cities and implications for leaders

Updated Analyses and Impact

Epidemic progression and virus monitoring

Economic and business impact

Questions on business and public leaders' minds about cities

Non-Exhaustive

1 What has been the **impact of COVID-19 on cities?**

- Have all cities been impacted in the same way?
- Is there a correlation between the health and economic impact on cities?
- What actions have cities taken to alleviate the impact of the socio-economic crisis prompted by COVID-19?

2 Will there be a **reversal** of the **urbanization trend?**

- Will COVID-19 lead to degrowth in cities – citizens migrating away?
- How will changes differ around the world? (E.g. emerging vs. developed countries)
- How should leaders think about their workplace and talent footprint given the trends?

3 What will the future city look like & what will the **implications be for business & public leaders?**

- What kind of trends have past pandemics triggered in cities?
- What trends are likely to continue, accelerate and shape the future?
- How should business leaders re-think their operating model and participate in new emerging opportunities?
- How should public leaders now think about livability and its implications?

Cities, powerhouses of the world, are most impacted by COVID-19

As of 15 Oct 2020

Cities pivotal to economic activity, with majority of world population

Importance of cities (2020 data)

~55%

Of global population lives in cities

~80%

Of global GDP generated by cities

COVID-19 impact witnessed more severely than world at large

Total impact on capital cities of top 30 countries (by GDP)¹

~2x

Cases per million² in cities vs. world average

~1.5x

Higher % GDP loss³ expected in cities vs. world in 2020

Many facing resurgence, potentially impacting economic activity further

Current resurgence in capital cities of top 30 countries (by GDP)¹

~45%

Cities witnessing resurgence in COVID-19 cases⁴

~40%

Cities re-imposed partial lockdown or tighter restrictions⁵

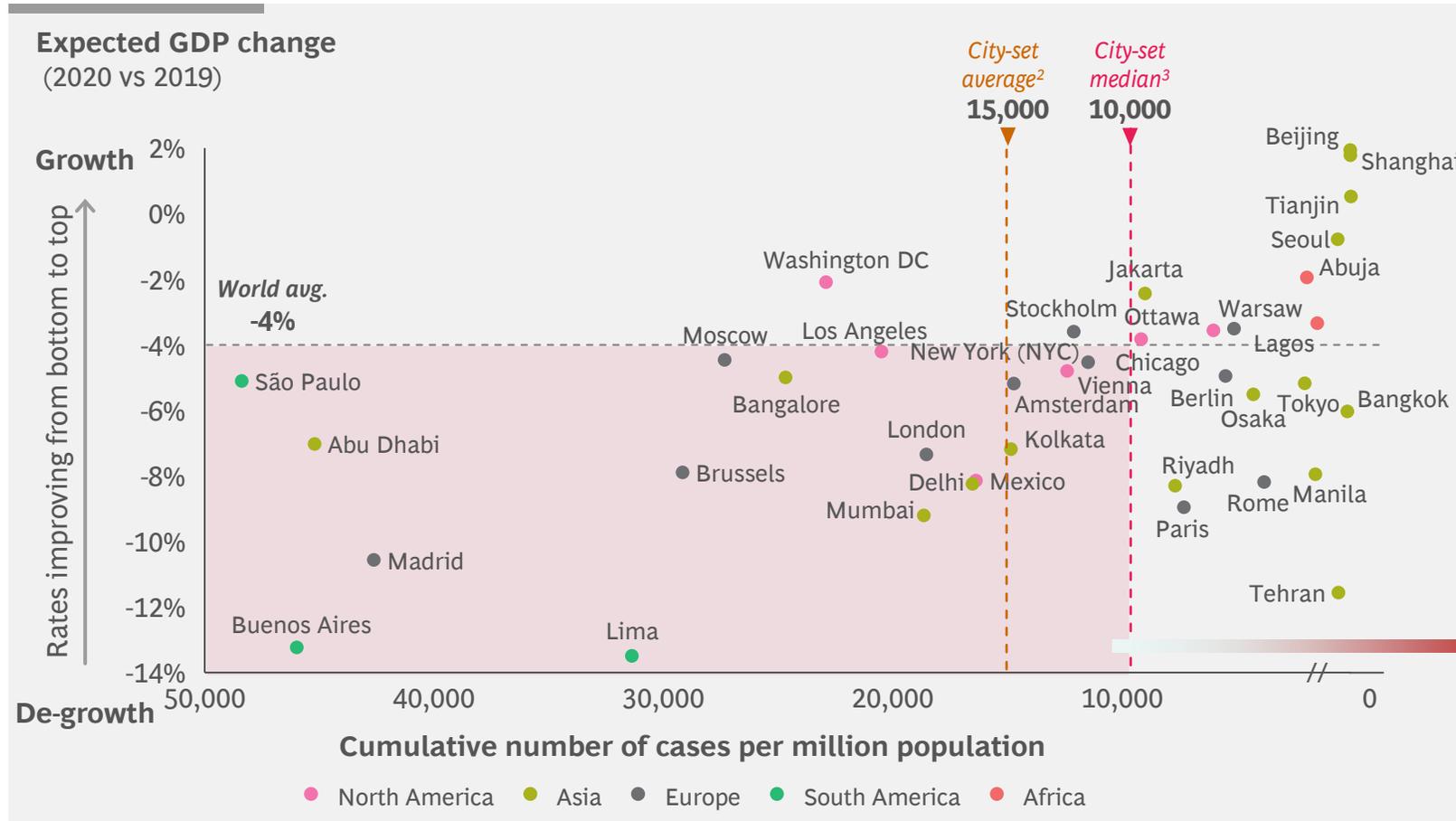
1. Includes: Washington D.C., Beijing, Tokyo, Berlin, Delhi, London, Paris, Rome, Brasilia, Ottawa, Moscow, Seoul, Madrid, Canberra, Mexico, Jakarta, Amsterdam, Riyadh, Ankara, Bern, Warsaw, Taipei, Stockholm, Brussels, Bangkok, Buenos Aires, Abuja, Tehran, Vienna, Abu Dhabi; 2. As of 15th October 2020, cases per million in top 30 capital cities (Data not available for Taipei, Ankara) of ~12,000 vs ~6,000 cases per million world average; 3. Average GDP loss of ~6% in top 30 capital cities vs ~4% in the world expected for 2020; top 30 cities (data not available for Brasilia, Canberra, Bern) expect a fall in GDP of ~\$308 billion while the world expects a fall in GDP of \$3.6 trillion; 4. 13/30 cities facing resurgence - Berlin, Delhi, London, Ottawa, Moscow, Madrid, Amsterdam, Ankara, Bern, Stockholm, Brussels, Tehran, Vienna; 5. 12/30 facing partial lockdown or tighter restrictions - Berlin, London, Paris, Rome, Ottawa, Madrid, Jakarta, Amsterdam, Brussels, Buenos Aires, Tehran, Abu Dhabi; Source: Official regional databases; Oxford Economics; World Bank; BCG

Severity of disease spread and economic impact varies across cities

As of 15 Oct 2020

Non-Exhaustive

Infection spread and economic impact across major¹ cities



Example: Challenges faced by NYC



Constrained city budgets

Budget deficit: NYC facing deficit of approximately \$9 billion



Exodus from big cities

Companies, people fleeing cities: >110K residents moving out of NYC post COVID-19, 5X 2019 level



Small businesses threatened

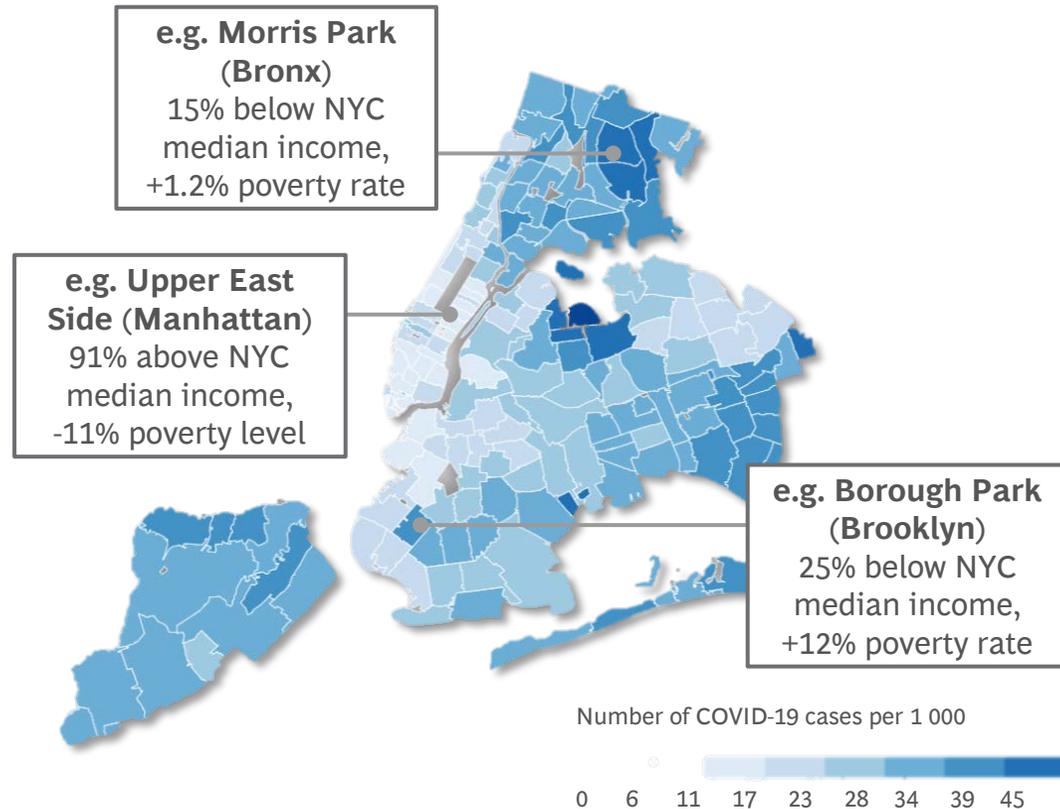
50% of bars & restaurants might have to close for good in NYC alone – 150K jobs threatened

1. Major cities includes a combination of top 30 cities by population and capital cities of top 30 countries by GDP. Data not included for Bern, Brasilia, Canberra, Dhaka, Karachi, Rio de Janeiro, Lahore, Wuhan, Bogota, Ankara, Taipei, Cairo, Istanbul, Kinshasa; 2. Avg. cases/M population (major city average); 3. Median cases/M population (major city median)
Source: Official regional databases; Oxford Economics; BCG

Within cities, inequitable impact correlated with socio-economic disparity

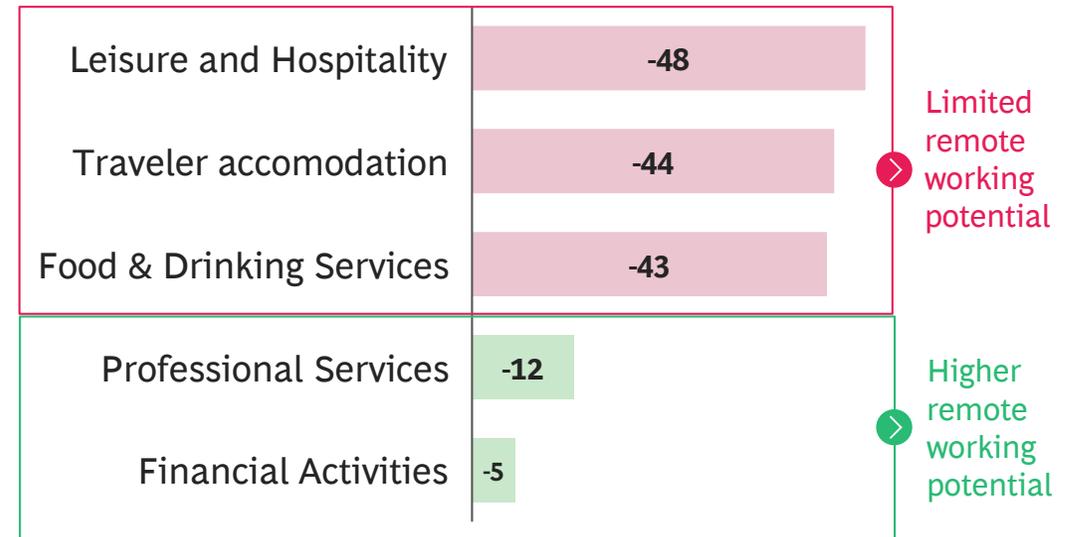
US Example

20 of Top 25 most impacted¹ New York City (NYC) ZIP codes are in low-income communities



Service industries (with low remote potential) impacted severely by COVID-19 facing higher unemployment...

Change in New York City employment in %, Sep'2020 vs. Sep'2019



...aggravating NYC inequality, since more low-income area residents work for these industries

1. Impact = average daily cases per 100,000 people in the past week as of October 2020

Source: Press research; New York City Department of Health and Mental Hygiene; New York Department of Labor; Citizens' Committee for Children of New York; BCG

Governments taking action to manage the immediate fallout

Non-Exhaustive

Multiple interventions rolled out across cities globally...



Vulnerable & impacted community support

- **Affordable housing** to promote growth, create jobs, and improve living conditions *London*
- Delivery of **food & cleaning supplies** to the disadvantaged *Santiago de Chile*
- **~9-month moratorium** on evictions on residential rental *Seattle*



Small & local business support, especially impacted industries

- **>\$40M relief package** for **food & entertainment** industry *Sydney*
- **Paycheck Protection Program** to enable **small businesses** to guarantee 8 weeks of payroll *New York*



Business incentive & deregulation

- **Rent exemption and tax support** for enterprises *Shanghai*
- **Relaxing zoning** to enable flexible building use *Madrid*

...enabled through federal support and reprofiled city budgets

1 Utilize federal government support (e.g. stimulus packages, loans)

2 Leverage **public debt** (e.g. issue treasury bonds) to improve liquidity

3 Re-prioritize the city's capital expenditure / investment pool

4 Rationalize expenses (e.g. deferred wages) and enhance charges (e.g. additional council taxes¹)

1. Currently under consideration in London
Source: Press research; United Nations; New York Government; London Government; Victorian Government

While the short term is challenging, evidence from past crises suggests that cities transform and emerge stronger

Non-Exhaustive

Example:

Spanish Flu

A pandemic that radically altered cities in the 20th century

~50M

fatalities across three waves (1918-1919)

Changes focused on urban planning and citizen behavior in cities

Institutionalized land use & housing reforms

- Introduced **single-use zoning**¹ and **tenement reforms**² for improved sanitary conditions and ventilation³
- Upgraded and built new **sewage system & water lines**

Re-invigorated open & green spaces

- Construction of **wider, tree-lined boulevards & lush parks** to improve human and environmental health⁴

Accelerated adoption of automobile

- Growing **automobile ownership** (2-4X pre-pandemic level) supported by **social acceptance** established through usage as ambulances during Spanish Flu⁵

Emergence of telecommerce

- Businesses accepted **orders** from quarantined or sick customers **via telephone**⁶; scaled across population steadily

Urban planning

Citizen behavior

Cities in focus: London, Melbourne, Paris, Washington, D.C.

1. Parts of the city became exclusively residential or industrial areas; 2. Reforms for low-income house dwellings; 3. Modernist city planning in Paris sought to build cities and housing full of light and air; 4. Several garden cities constructed after the Spanish Flu, such as St Helier (London) from 1928-36 & Garden City in Victoria, Melbourne from 1926-48; 5. Private-owned automobiles used as motorized ambulances & taxis for healthcare personnel in many U.S. cities (1918/19), U.S. yearly automobile registrations grew ~2X from 1918 to 1922 & ~4x from 1918 to 1928; 6. In Washington, D.C., sick customers phoned in grocery orders during the Spanish Flu
Source: Press search; BBC; FHWA; NCBI; UC Davis; BCG

Cities will learn and adapt; multiple pre-existing trends and new considerations will shape the future city

Urban Sustainability:

- **Green mobility** & public transport
- Open **green** spaces & vertical farms
- **Low-carbon** ecosystem

Inclusive City:

- Increased affordable housing
- Equitable access to key services

Resilient Infra & Operations:

- **Real-time data tracking** & surveillance of city operations
- **Climate-smart** infra: resilient to extreme weather changes

15-Minute Neighborhood:

- **Hyperlocal** concept using mixed-use real estate & agile infrastructure¹
- Basic needs within a 15-min radius via **walking or micro-mobility**

Digital Public Services:

- City services **online**, with enhanced cybersecurity
- City uses real-time data for **transparent** decision-making

Increased Outdoor Orientation:

- **Outdoor & leisure spaces** as new city centers; work & other activities organized around them

Connected Suburban Cities:

- **Stronger digital connection** between suburb and main city
- **Burgeoning local economy**, with availability of key services

Changes in cities will vary depending on their starting point (including extent of municipal services, type of economic opportunities), COVID-19 impact & response, and city leadership priorities

1. Infrastructure that can be easily re-configured for different uses

Many cities have already started to act toward a stronger future

As of 26 Oct 2020



Paris to create a **15-minute city**: 'Hyper proximity' with less cars and easy access to **essentials by foot & micro mobility**



London to turn **50% of its urban environment green** by 2050, supported by Mayor's £12 million Greener City Fund



First Australian city aims to go **carbon-neutral** in 20 years using renewable energy, shared transport, e-vehicles



Singapore investing heavily in **high-tech farming** to become more **self-sufficient** and increase food security



Real-time monitoring of environmental health implemented in Sydney suburb



Singapore to enable citizens to access government agencies, banking services, etc. with **quick face scan verification**



Lisbon has started leasing empty rental apartments and sub-letting as **subsidized housing** post COVID-19



London releases 2025 vision that mulls **outdoor gyms, skateboarding parks, pop-up art galleries**, etc.

Business leaders should craft their action agenda keeping in mind trends shaping the future of cities

A Re-think & Innovate Operating Models

- 1 Re-imagine workplace & talent footprint**
Re-design workplace, rethink talent strategy, find right balance of “type,” location, and size of workplaces
- 2 Re-think retail & distribution strategy**
Refine customer experience via prioritized store and delivery footprint, size, and digital integration
- 3 Respond to “new” customer preferences**
Refine current product, pricing, promotion, and assortment in reaction to pivots in lifestyle and habits

B Capitalize on Emerging Opportunities

- 1 Enter and grow into adjacencies**
Tap into new “city” opportunities in mobility, digitization, climate-smart infrastructure, urban food systems, etc.
- 2 Participate in building an equitable city**
Take action on city focus areas, such as affordable housing, quality healthcare, digital literacy, etc.

C Leverage Partnership Opportunities

- 1 Optimize outcomes via strategic partners**
Operating model innovation & opportunities enabled through partnership models, including PPP¹

1. Public-Private Partnership
Source: BCG

A.1

Re-imagine workplace and talent footprint

How does the need for physical space change with more remote work?

With increasing migration out of cities, should offices shift to sub-urban locations?

Re-design workplace, rethink talent strategy, find right balance of “type,” location, and size of workplaces

Focus of upcoming edition

Employee-centered future hybrid workplace model

- Access wider & **diverse talent pool**, not constrained by location
- Define future workforce personas per team needs & employee preferences to create **future hybrid workplace scenarios**

Optimal space allocation and streamlined real estate portfolio

- Optimize space required by **reducing assigned workspaces & creating activity-based space** allocation¹
- Select **right “type”** of workplaces across **formats** (owned, leased, flex space, etc.) & **locations** (e.g. suburban satellite offices)

Example | US-based financial institution optimized real estate footprint by considering employee preferences and expected future realities



1. Reduces ties to assigned workspaces; Provides purpose-built zones for collaboration, focus, wellness, and affiliation to support productivity
Source: CBRE Analysis; BCG

A.2

Re-think retail and distribution strategy

How should cities reassess store network per preference for local stores?

What is the role of a retail store & omni-channel strategy in best serving future customers?

Refine customer experience via prioritized footprint, size and digital integration

1

Re-imagine the purpose of the retail store of the future to reflect new reality

2

Re-assess appropriate size for store portfolio, balancing physical and digital presence

3

Accelerate omnichannel integration, using data to provide a personalized experience, across channels

Example | Multinational sports footwear & apparel company's two-pronged strategy to provide localized & hyper-personalized experiences

Direct to consumer via neighborhood stores

Plans to open 150-200 smaller footprint stores in US and EMEA



- Shift closer to end-user with local retail assistant familiar to community
- Direct to home shipment post selection in store

Omni-channel strategy

Launched a digitally enabled experiential store in China



- Digitally push personalized offers to customers, as they explore store
- Latest in-store technologies (foot scan to find shoe size, scan to try)

Source: Press search; BCG

A.3

Respond to “new” customer preferences

How do companies refine their portfolio to better meet buying preferences?

What is the right pricing strategy given increased focus on value?

Refine current product, pricing, promotion, and assortment based on pivots in lifestyle and habits of city residents

Build a demand lighthouse

Observe real-time changes in city residents’ lifestyle, habits and behaviors

Enable targeted reactions to changing customer preferences

Assortment

Optimize product & assortment mix per new emerging trends in cities

Packaging

Adapt product size, design, materials to cater to new city consumer needs

Pricing

Introduce new pricing models; push for “new affordability”

Example | Select instances of companies re-adjusting portfolio offering based on changing preferences of city dwellers



American coffee subscription company launched new 5-pound pack for value-conscious home customers; pack typically sold to wholesalers



Luxury couture brand over-indexed on loungewear & home décor, anticipating sustained demand for home-living categories

Source: Press search; BCG

B.1

Enter and grow into adjacencies

Which city trends will create new opportunities and adjacencies?

How should companies leverage investments and capabilities to capture value in city growth vectors?

Identify trends emerging in cities

(Non-Exhaustive)

Climate-smart infrastructure for resilience

E-commerce and digital retail

Sustainable urban food systems

E2E digitization for a connected IoT city



Capitalize on opportunities opened up by new “city” opportunities

(Non-Exhaustive)

Invest in **alternate energy** as climate concerns rise

Devise localized **last-mile offering**

Innovate to make **urban farming** scalable

Use real-time data to **enhance resident experience**

Example | Leading companies orient toward future value in city growth vectors

Asian auto player setting up 100 dealerships with EV charging infrastructure across key cities



Manufacturer investing in **brand-agnostic swappable battery & charging stations** for two-wheelers, anticipating energy transition in cities

European tech startup to manage end-to-end last-mile delivery for retailers



Offer enabled by 50+ carrier networks (from local bike couriers to large express operators) & pooling **increased last-mile demand across retailers**

Source: Press search; BCG

B.2

Participate in building an equitable city

Which initiatives can business leaders implement to help build an equitable city?

How can companies integrate both business and social priorities?

Example | Affordable housing, key agenda of cities for equity and inclusivity

Cities launching multiple schemes

New ownership model:

UK city to deliver 100+ homes with **mixed ownership models** with housing association

Ease in regulation:

Indian city relaxes policy on land purchase and building **approval process**

Companies already engaging on city agenda



Norwegian startup to use local **recycled plastic waste** to build **quick, low-cost & dignified houses**



US real estate player **digitized modular design**, for **reduced housing delivery costs**

Key city priorities to reduce urban inequity

(Non-Exhaustive)

Affordable housing

Literacy and digital awareness

Accessible **quality healthcare**

Participate in building equitable and inclusive communities

(Non-Exhaustive)

Innovate in real estate to build **budget homes**

Launch **online learning solutions** at low prices

Establish low-cost **digital healthcare facilities**

Source: Press search; BCG

C.1

Optimize outcomes via strategic partners

Which city priorities benefit from a collaboration model, creating synergies at large?

What innovative partnership models can be leveraged to create win-win partnerships?

Operating model innovation & new opportunities enabled through partnership models, including PPP¹

Non-Exhaustive

Private-Private

Leverage **complementary capabilities and shared networks** to gain access to markets

Public-Private

Combine private sector **capabilities** with public sector **scale & resources** to deliver city-centric objectives

Community as Partner

Seek **active partnership** with **citizens** to ensure buy-in and mitigate roadblocks

Example | Innovative partnerships to optimize city and business outcomes

FMCG achieves direct to home delivery

Asian FMCG joins hands with ride-hailing app to ensure access to essentials for city consumers



- App created **alternative use case** for delivery, given reduced rideshare demand
- **FMCG captured increased demand**, gaining 10% YoY growth vs. industry decline²

Preparing for the future of work

North American CEO council partners with city to meet need for skilled labor & create employment



- Scaled **proven skilling model**, using shared resources
- **Plug labor shortfall** via upskilling to **hire 100,000** city residents by 2030

1. Public-private partnership; 2. Non-cigarette FMCG business sees 10.3% YoY growth vs. industrywide slump of 17.1% in April-June 2020
Source: Press search; BCG

Public leaders should re-craft their action agenda to transform cities

A	Upgrade strategic vision	B	Rethink citizen engagement	C	Review mega projects	D	Modernize operations
01	Make economic recovery a priority including contingency planning	01	Lead the dialogue on “digital rights”	01	Consider extended city to address potential de-urbanization	01	Apply “ war rooms ” and agile teams beyond COVID-19
02	Include emerging trends (e.g. hybrid work footprint) into development plans	02	Support R2R (resident to resident) cooperation & networks	02	Evaluate projects in light of future scenarios (incl. mobility)	02	Be “ digital by default ” in public services & operations
03	De-average , assess impact, and act based on areas and segments	03	Facilitate participation through digital platforms	03	Review zoning rules to enable multi-purpose infrastructure	03	Access to wider talent pool enabled via remote working

"COVID-19 has laid bare the systemic inequities too often found at the heart of our communities – and as we start to emerge from this crisis, we must rebuild an economy that truly works for everyone."

C40¹ Chair and Los Angeles Mayor - Eric Garcetti

1. C40 Cities connects 97 of the world's greatest cities to take bold climate action, leading the way toward a healthier and more sustainable future



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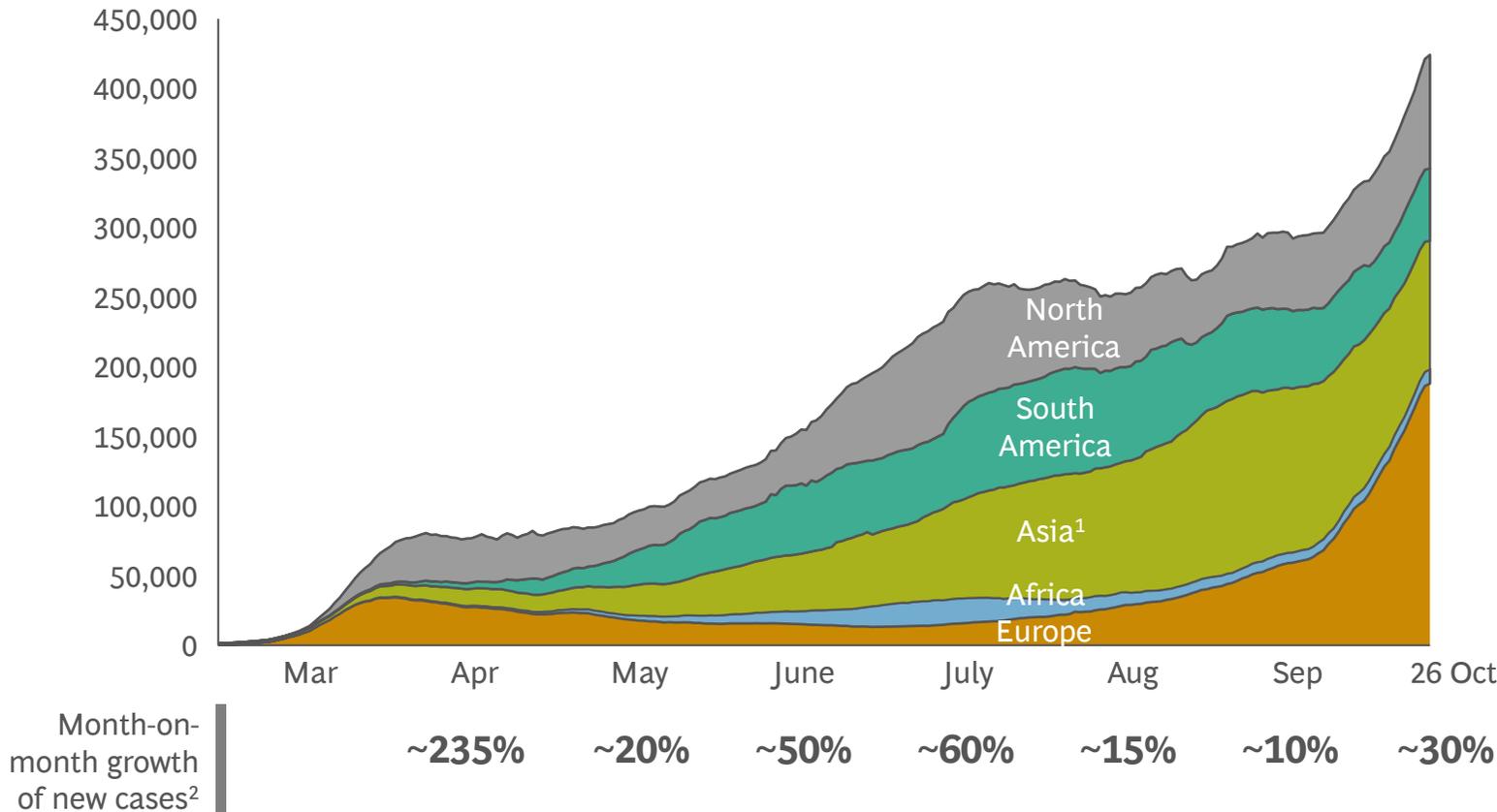
Epidemic progression and virus monitoring

Economic and business impact

Epidemic progression | Daily case growth increasing rapidly, led primarily by resurgence in Europe

As of 26 Oct 2020

Daily new cases (7-day rolling average)



Key observations

43.5M

of confirmed cases

13.1M (30%)

of active cases
(% of confirmed cases)

1.2M

of fatalities

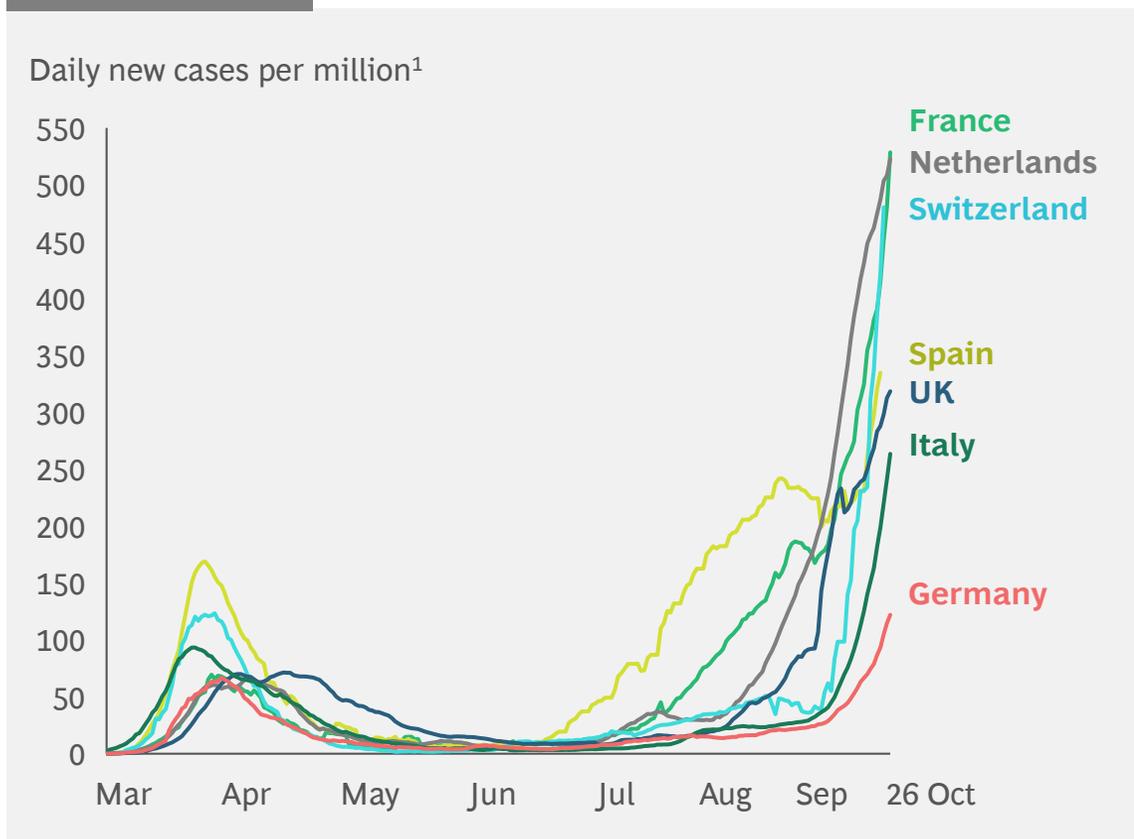
1. Includes Oceania (Australia, New Zealand, Papua New Guinea and surrounding island nations of the Pacific ocean); 2. Calculated as growth in monthly average of daily cases as compared to previous month; Source: Johns Hopkins CSSE; Our World in Data; BCG

De-averaged view | Several countries across the world witnessing resurgence

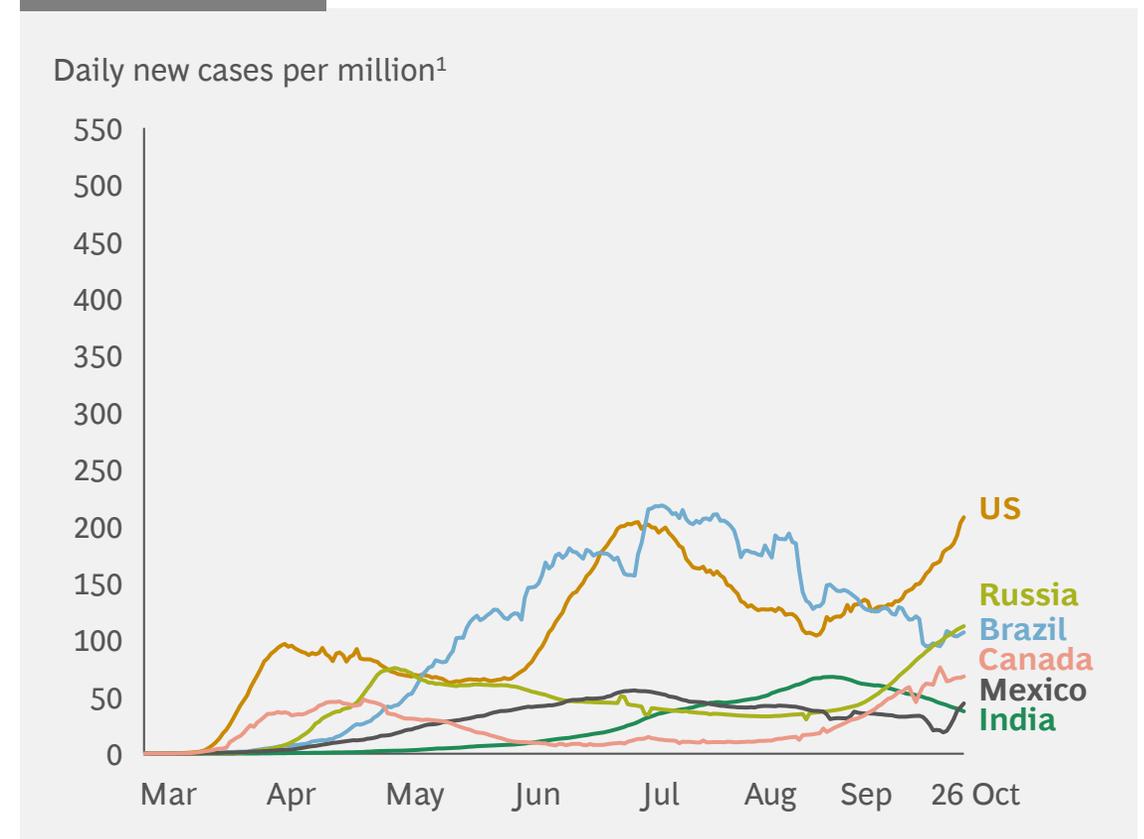
As of 26 Oct 2020

Data shown only for top 20 countries (by GDP) with >30 daily new cases per million¹

Europe: Most countries witnessing resurgence, with cases exceeding previous peaks



US, Russia and Canada facing resurgence; Brazil and India showing decline compared to peak case levels



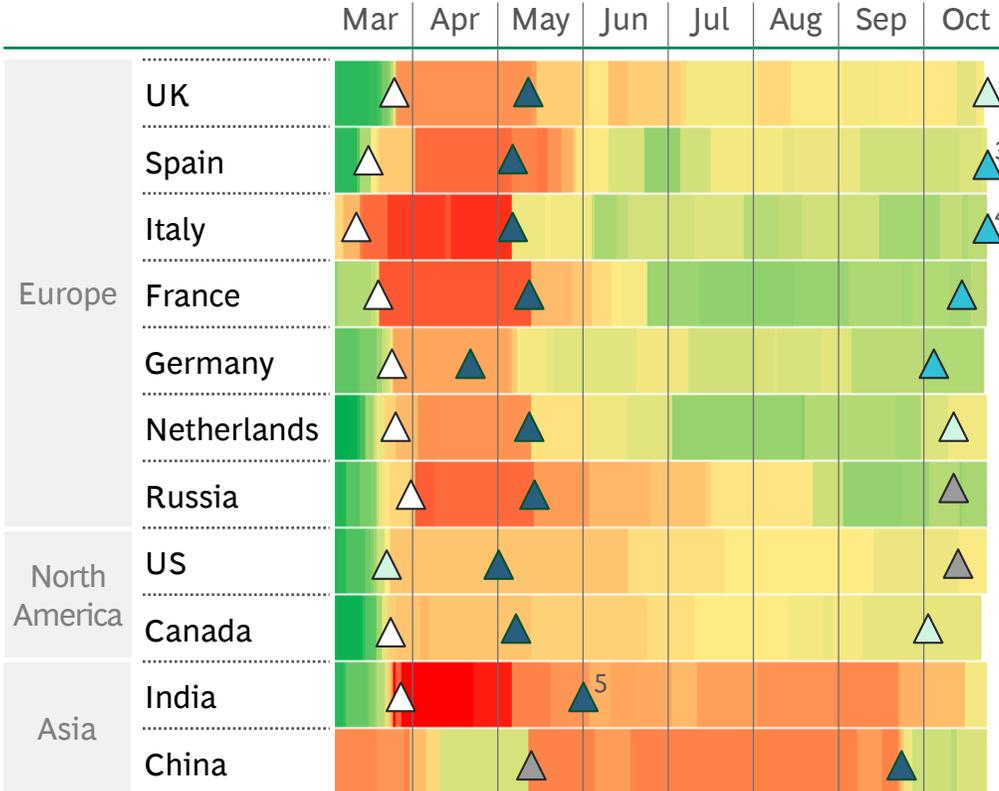
Note: Page shows de-averaged view of top 20 countries (by GDP), of which 13 have daily cases/M >30; other 7 countries have <30 daily cases/M (Turkey (24), Indonesia (15), Saudi Arabia (11), Japan (4), South Korea (2), Australia (1), China (0)); 1. Calculated as a 7-day rolling average; Source: Our World in Data; BCG

Several countries are returning to stricter restrictions or even partial lockdowns driven by resurgence

As of 26 October 2020

Non-Exhaustive

Change in lockdown restrictions basis stringency index¹



Total cases² (K)

Current status of measures implemented by governments

898	Alert system depending of # of cases; for "very high," pubs & bars must close, private meetings only within households; lockdown in Wales from 23 rd October to 9 th Nov
1,098	Declared national state of emergency on 26 th October incl. night-time curfew from 11:00 p.m. to 6:00 a.m., private meetings of max. 6 people
543	New measures from 26 th October; all leisure establishments (incl. restaurants, gyms, theaters, cinemas) to close from 6 p.m., online classes for 75% of high school students
1,210	Curfew (from 9:00 p.m.) since mid-October; due to >50,000 daily cases lately, currently reviewing additional measures incl. potential second lockdown
456	In regions with >50 cases per 100K inhabitants: Curfews, re-enforced restrictions on private meetings, strict mask obligation; if not successful, local lockdowns
308	Partial lockdown from 14 th Oct, incl. closure of all bars & restaurants, private meetings of 4 people maximum, closure of retail stores from 8:00 p.m.
1,537	New measures incl. stricter mask obligation, remote schooling & 30% obligatory rem. working; considering closure of bars & restaurants, reluctant toward second lockdown
8,705	Measures varying across states; after having reopened, 8 states now re-introducing stricter measures; Trump's government admitted it's not going to control pandemic
223	Partial lockdowns in highly affected Quebec; stronger restrictions on private meetings (household members + 6)
7,946	In the phase of reopening (still restrictions e.g. online schooling where possible); few local lockdowns depending on # of cases
91	After very strict lockdown & controls, cases are low now and measures strongly reduced; however, recent resurgence in Xinjiang might cause reversal

△ Lockdown ▲ Restrictions without lockdown ▲ Ease of restrictions △ Partial lockdown ▲ Night curfew with additional restrictions

Index Min restrictions Max restrictions

1. Stringency index is calculated using 8 govt. policy indicators (School closing, workplace closing, public events cancellation, gatherings restriction, public transport closure, stay at home requirements, internal movement restrictions, international travel controls) and public information campaigns; represented for selected countries; Data range provided from 01 March 2020 until 22 October 2020, stringency index not yet available for most recent dates for individual countries; Stringency Index for Spain until 12 October only with color for 13-22 October indicating current restrictions; 2. As of 26 October 2020; 3. Nationwide curfew with Canary islands as only exemption; 4. Curfews in individual regions (e.g., Campania region). Note: Lockdown is defined as "stay at home" orders from govt. People are allowed to go out only for essential activities like medical, grocery shopping, etc. following certain restrictions. Lockdown measures can differ across countries; 5. Ease of restrictions in 4 phases; currently in re-opening phase until 31st October; Source: Oxford covid-19 Government response tracker; Our world in Data; News articles

Best-case timelines as of 19 Oct 2020

Vaccines

44

candidates currently in clinical trials

10

candidates currently in Phase III;
in race for EUA^{1,2} starting Q4'20,
contingent on safety and efficacy profiles

Q2'21

expected start of broader distribution
(beyond targeted population segments)³
in the best-case scenario⁴

Therapeutics

257

candidates currently in clinical trials

4

key candidates currently under EUA^{1,5} in select
countries; ensuring broad clinical trials, safety,
and efficacy key for further approvals

Q4'20

expected broader availability⁶

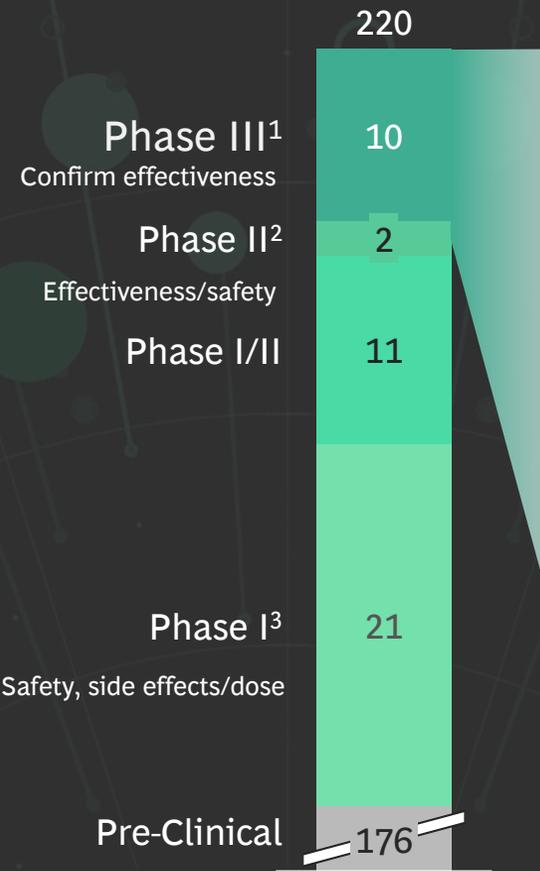
1. Emergency Use Authorization; nomenclature may differ across geographies; 2. Estimated timelines for grant of EUA: BioNTec h/Pfizer, Moderna, Sinopharm/BIPB and Sinopharm/WIPB by Q4 '20, Oxford University/AstraZeneca between Q4 '20 & Q1 '21; Janssen (J&J), Novavax, Sinovac and CanSino by Q1 '21; Gamaleya Research Institute to be ascertained; 3. Healthy adults (beyond initial target population segments) able to access vaccine; 4. Estimated for the US; will be subject to a set of preconditions including phase 3 results, manufacturing & distribution setup and scale-up, etc.; 5. EUA for Remdesivir in the US, Japan, Australia (non-exhaustive), Convalescent plasma therapy in the US (non-exhaustive); Dexamethasone in UK, Japan (non-exhaustive); Favipiravir in India, Russia, China (non-exhaustive); 6. First few million doses; Gilead to ramp up availability of Remdesivir to 2M by Dec 2020; the US has secured 500k already and pre-booked 90% of the September 2020 capacity; Additionally, availability basis prescription has started in select geographies like India, Japan, European Union, etc; Gilead has also signed non-exclusive voluntary licensing agreements with generic pharmaceutical manufacturers based in Egypt, India and Pakistan; Dexamethasone widely available but used generally in severe patients requiring supplemental oxygen support; Source: FDA; WHO; Milken Institute; Biocentury; Company websites; BCG

Further reading

[Vaccines & Therapeutic Outlook Part I: Timelines and Success Factors](#)

Vaccine fast movers | 10 vaccine candidates already in Phase III

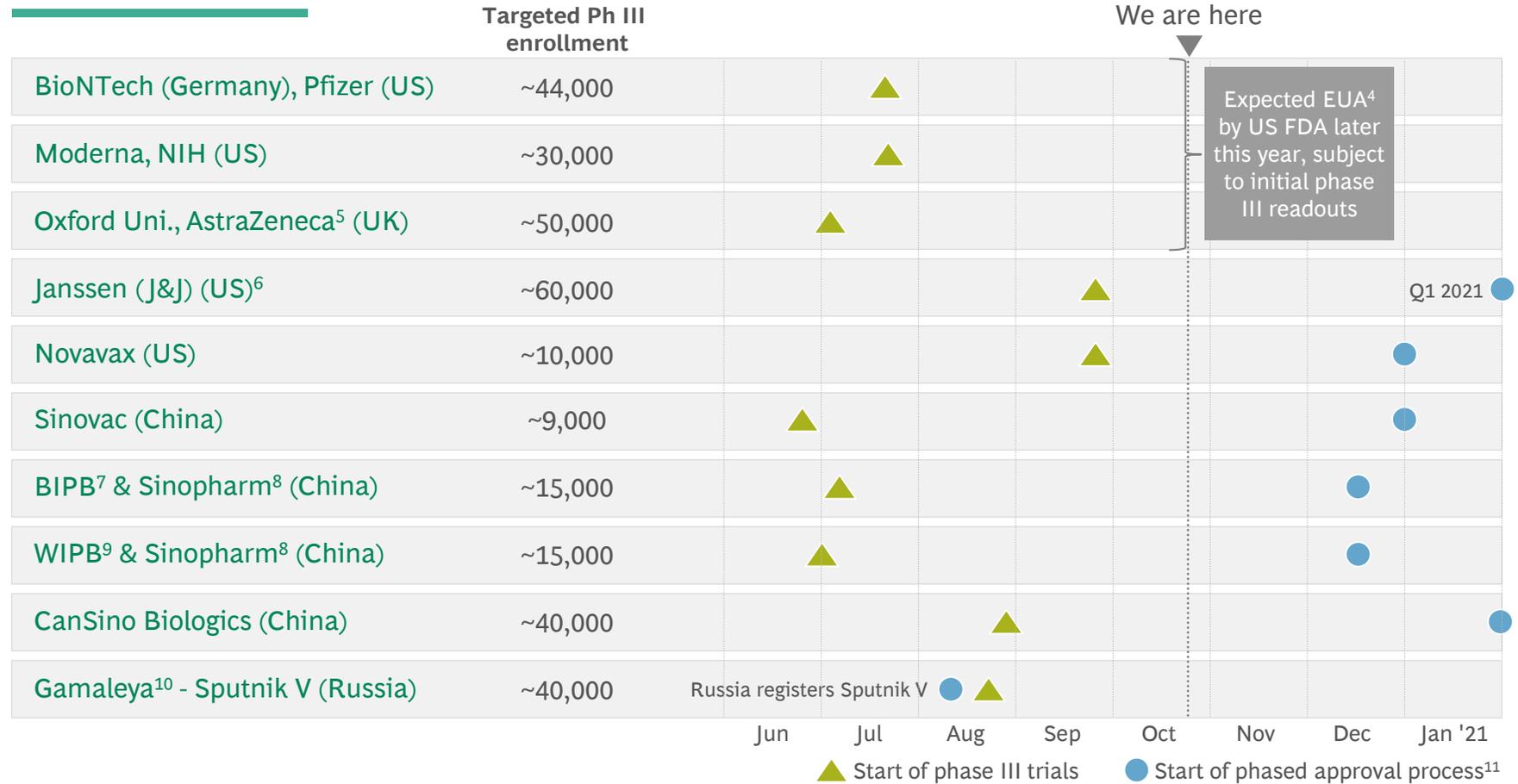
Vaccine candidates across development phases



As of 19 Oct 2020

Potential timelines for candidates currently in Phase III

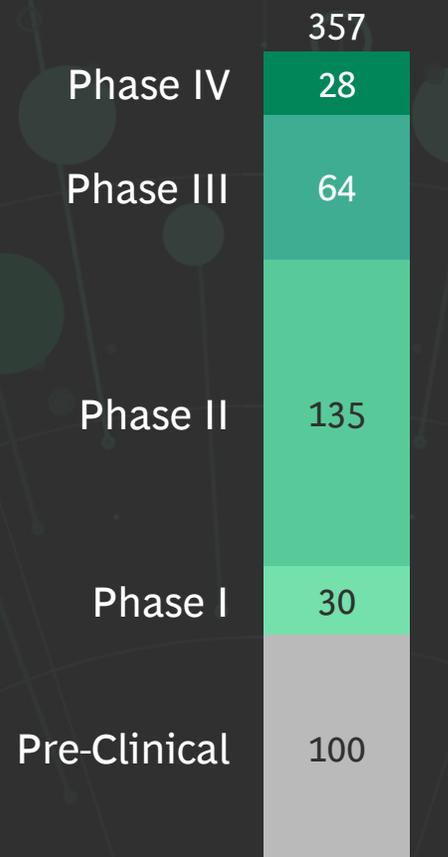
WHO Phase III classification



Note: The timeline represented is highly dependent on Phase III vaccine results including safety and efficacy data and, hence, is subject to change; 1. Ph III trials involve large number of volunteers (e.g., 10s of 1000s) to test efficacy & safety of vaccine; 2. Phase II studies involve small number of volunteers (e.g., 100-1000) & intended to provide preliminary information about vaccine's ability to produce desired effect; 3. Phase I clinical studies involve initial testing in very small number of volunteers (e.g., 20-100) to test safety profile; 4. Emergency Use Authorization; 5. Oxford University/AstraZeneca voluntarily paused Ph. III trials to review safety event on a UK patient; trials resumed in UK, India but suspended in other countries, including US; 6. J&J paused trials due to an unexplained illness in a study participant; 7. Beijing Institute of Biological Products; 8. EUA granted for high-risk groups in China & UAE, conditional regulatory approval for general public use expected by end of year; 9. Wuhan Institute of Biological Products; 10. Gamaleya Research Institute; 11. Trials expected to continue until 2021 & 2022 for different candidates, per WHO, clinicaltrials.gov. Companies expected to start approval applications with initial phase III results. Source: Guggenheim; Wells Fargo; Bloomberg; FT; Cowen; NYT; Milken Institute; Morgan Stanley; NIH; clinicaltrials.gov; WHO; Press Search; BCG

Therapeutics | Multiple therapeutic candidates at various stages of clinical trials

Globally 300+ treatments undergoing trials



As of 15 Oct 2020

US Example

3 therapeutic candidates currently approved¹ in the US for potential COVID-19 treatment

	Remdesivir <i>(antivirals)</i>	Dexamethasone <i>(corticosteroid)</i>	Plasma Therapy <i>(convalescent plasma)</i>
Interim report view	~30% drop in recovery time >50% patients discharged in 2 weeks	Mortality risk reduction in <u>severe patients</u> ² Reduced 28-day mortality rate by 17%	8.7% mortality rate ³ for patients transfused within 3 days of diagnosis versus 11.9% in patients transfused after 3 days
Authorization status	Broader EUA ^{4,5} granted allowing treatment of suspected or confirmed COVID-19 patients	<u>Widely available</u> as anti-inflammatory drug	EUA ⁴ granted ⁶ ; rigorous randomized trials underway

Example candidates in Phase III clinical trials

Non-Exhaustive

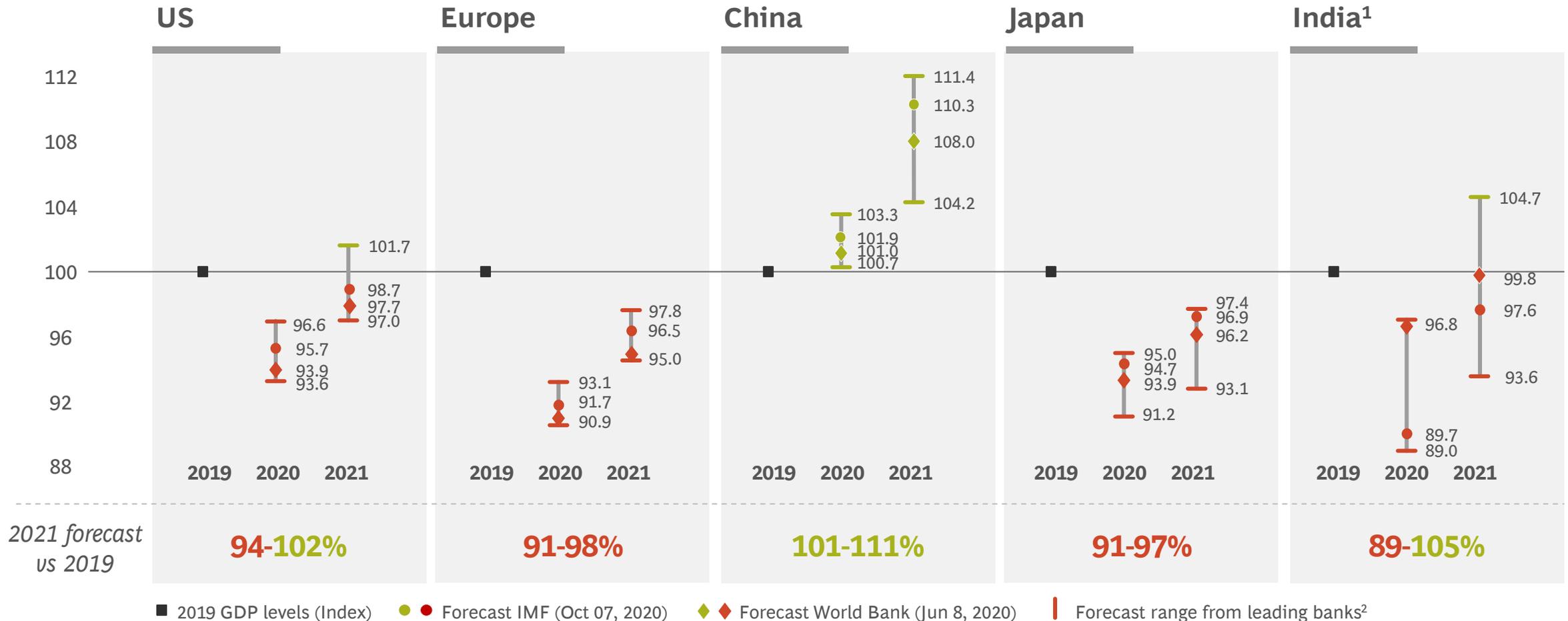
	LY-CoV555 (Eli Lilly⁷) <i>(monoclonal antibodies)</i>	Actemra (Roche) <i>(monoclonal antibodies)</i>	REGN-COV2 (Regeneron) <i>(antibody cocktail)</i>
Trial phase & authorization status	Phase III ⁸ Submitted initial request for EUA ⁴ in US	Phase III	Phase III Submitted initial request for EUA ⁴ in US
Interim report view	72% reduction in hospitalization for patients who received antibody vs. those who received a placebo	Patients were 44% less likely to progress to mechanical ventilation or death	Reduced viral load by 50-90% and time to alleviate symptoms by 5-7 days vs. those who received a placebo

1. Remdesivir and plasma therapy granted Emergency Use Authorization; US Health and Human Services included dexamethasone in COVID-19 treatment guideline; 2. Patients requiring supplemental oxygen support; 3. 7-day mortality rate; 4. Emergency Use Authorization; 5. Initial EUA restricted use to patients with severe conditions (e.g., patients requiring supplemental oxygen support); 6. EUA granted despite no to limited randomized clinical trial involving a placebo group to estimate actual impact of the plasma treatment; 7. Initial request for EUA for LY-CoV016 submitted; 8. Eli Lilly paused one Phase III trial of LY-CoV555 citing undisclosed safety concern

Economic forecasts point toward a continued downturn in 2020; most countries expected to rebound to 2019 GDP only by end of 2021

As of 16 Oct 2020

GDP forecast levels indexed to 2019 value (Base: 100)



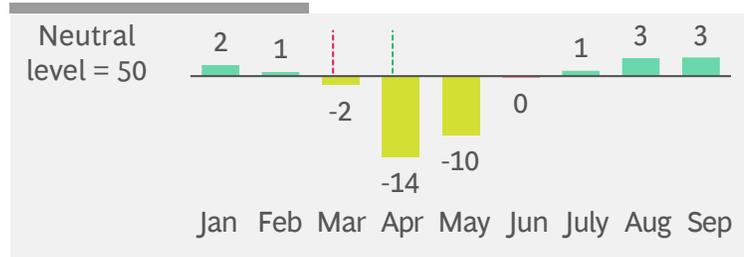
Note: As of reports dated 08 June 2020 to 16 Oct 2020, YoY forecasts; 1. For India, forecast is for financial year; for other countries, the forecast is for calendar year; 2. Range from forecasts (where available) of JPMorgan Chase; Morgan Stanley; Bank of America; Fitch Solutions; Credit Suisse; Danske Bank; ING Group; HSBC; Source: Bloomberg; World Bank; IMF; BCG

Manufacturing PMI recovery globally indicates positive momentum

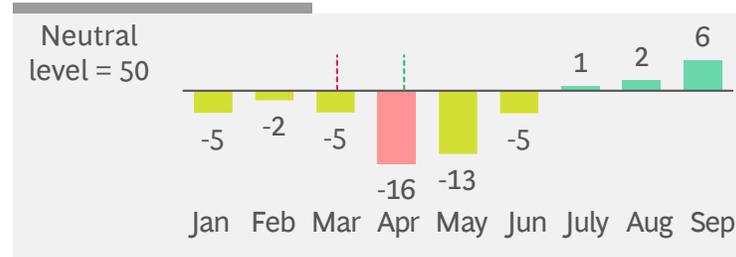
As of 26 Oct 2020

Manufacturing PMI before, during, and after the crisis

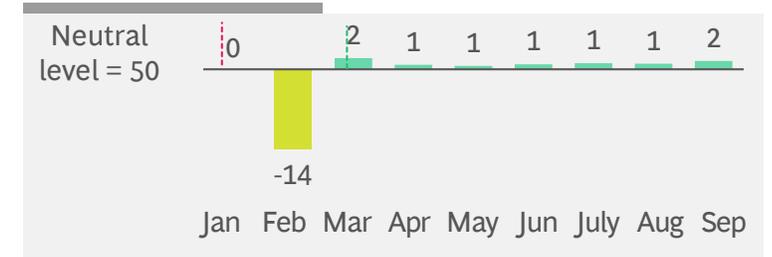
US



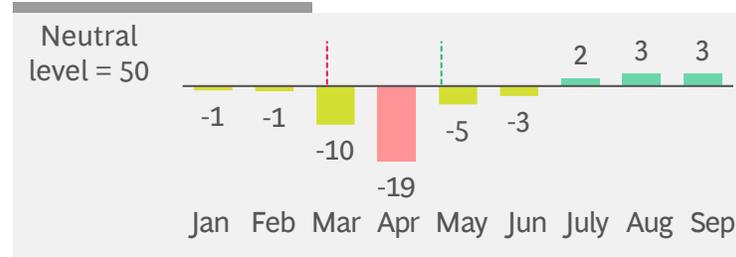
Germany



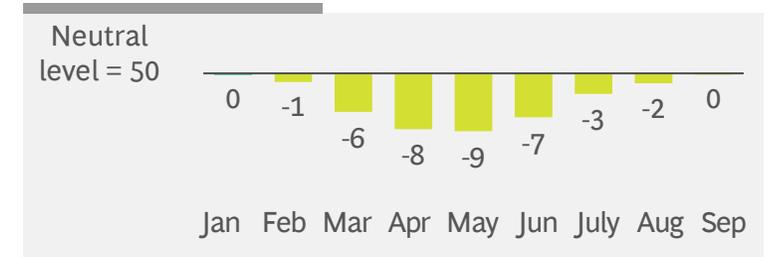
China¹



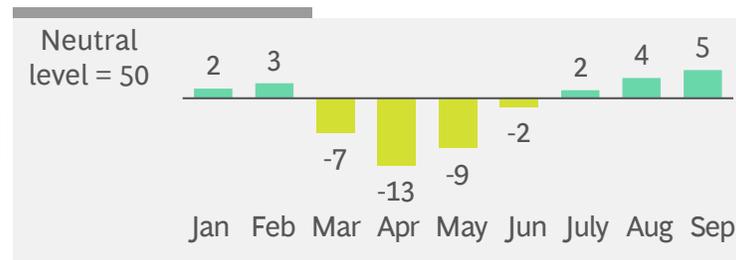
Italy



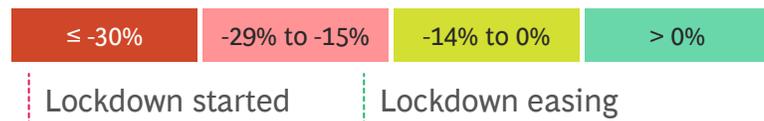
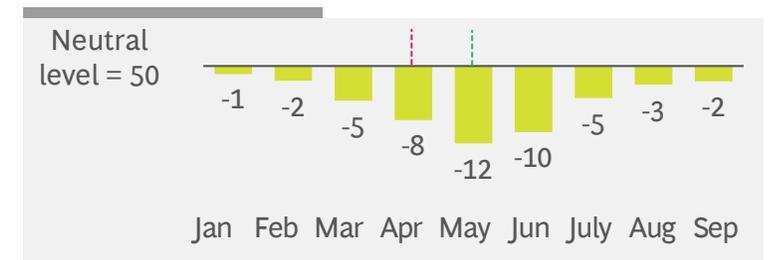
South Korea



Sweden



Japan



Note: PMI (Purchasing Manager's Index) is a diffusion index that summarizes whether market conditions, as viewed by purchasing managers, are expanding, staying the same, or contracting. 50 is neutral, >50 is considered to be positive sentiment and <50 is considered to be negative sentiment. 1. Lockdown dates are only pertaining to Hubei province; Source: Markit South Korea Manufacturing PMI SA; Jibun Bank Japan Manufacturing PMI SA; China Manufacturing PMI SA; Swedbank Sweden PMI SA; Markit/BME Germany Manufacturing PMI SA; Markit Italy Manufacturing PMI SA; Markit US Manufacturing PMI SA; Bloomberg

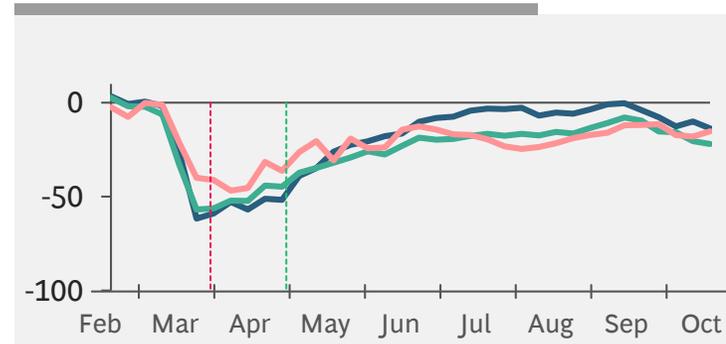
Retail & recreation mobility declining after attaining baseline levels for select countries; continued lower recovery of workplace mobility

As of 20 Oct 2020

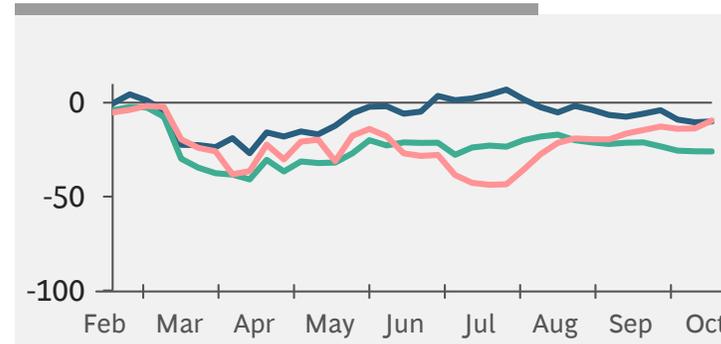
Non-Exhaustive

Workplace¹, public transit,² and retail & recreation³ mobility compared to baseline of January to mid-February 2020

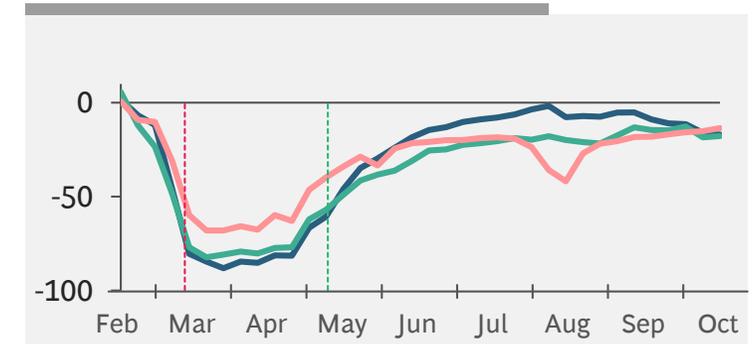
Germany



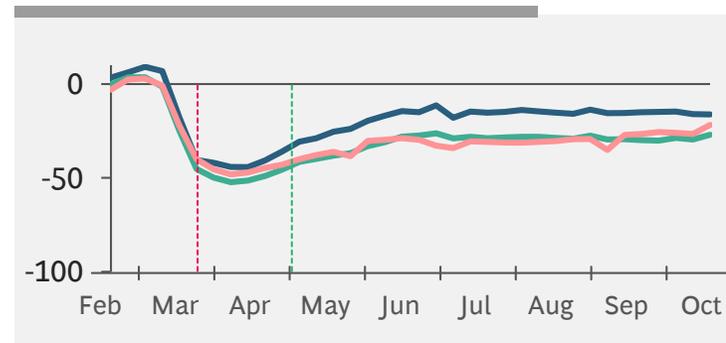
Sweden



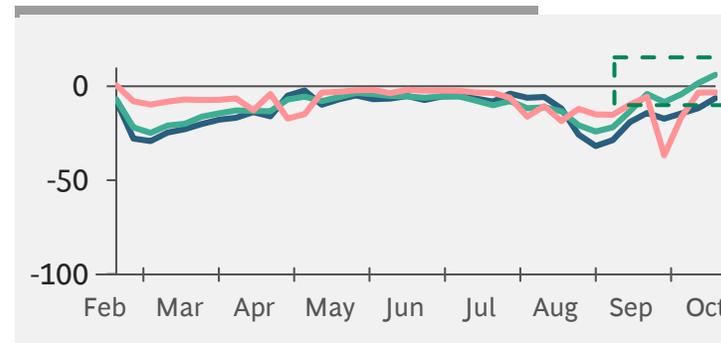
Italy



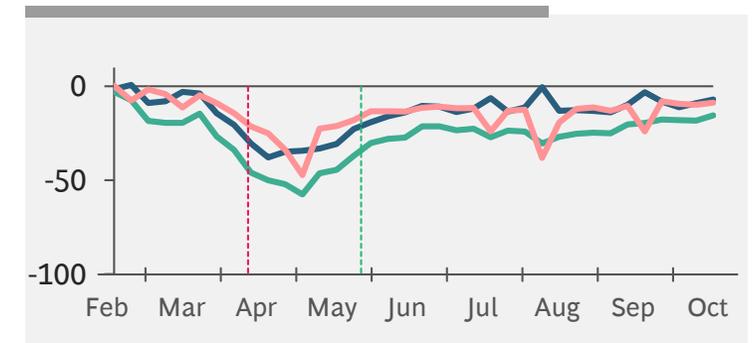
US



South Korea



Japan



--- Lockdown started⁴
--- Lockdown easing⁴
— Workplace mobility
 — Public transit mobility
 — Retail & recreation
 Mobility rebounded to baseline levels

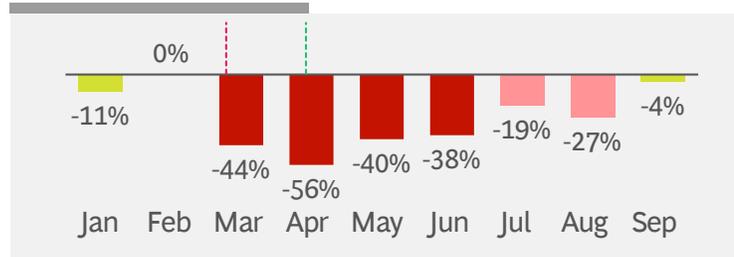
Note: Data taken as weekly average compared with baseline (average of all daily values of respective weeks during Feb 15–Oct 20, 2020); 1. Tracked as changes in visits to workplaces; 2. Tracked as changes in visits to public transport hubs, such as underground, bus and train stations; 3. Tracked as changes for restaurants, cafés, shopping centers, theme parks, museums, libraries and cinemas; 4. Refers to average lockdown start and easing dates; Source: Google LLC "Google COVID-19 Community Mobility Reports". <https://www.google.com/covid19/mobility/> Accessed: 26 Oct 2020; Press search; BCG

Passenger vehicle sales see limited rebound, except in Japan

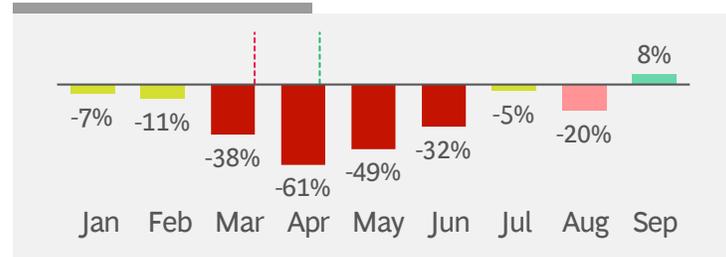
As of 20 Oct 2020

Monthly passenger vehicle¹ sales, YOY % change vs 2019

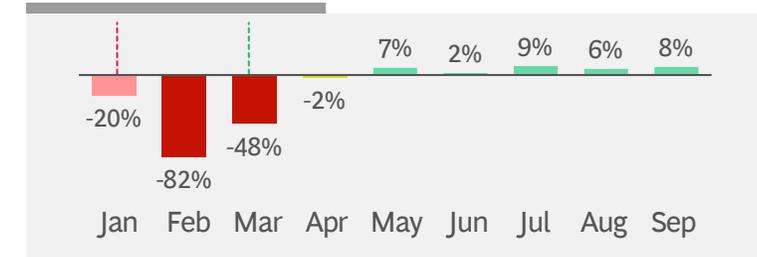
US¹



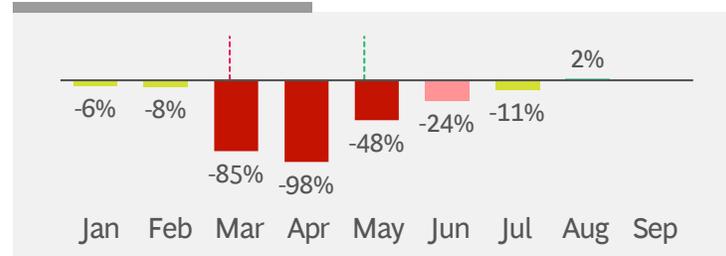
Germany



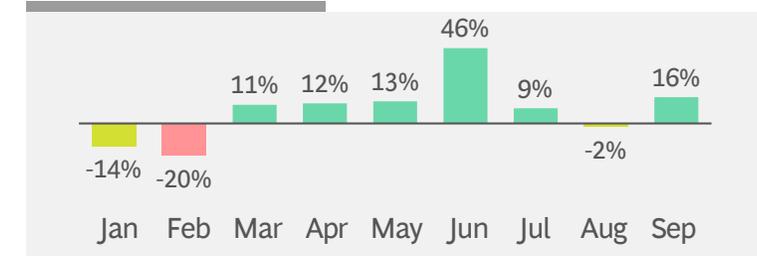
China²



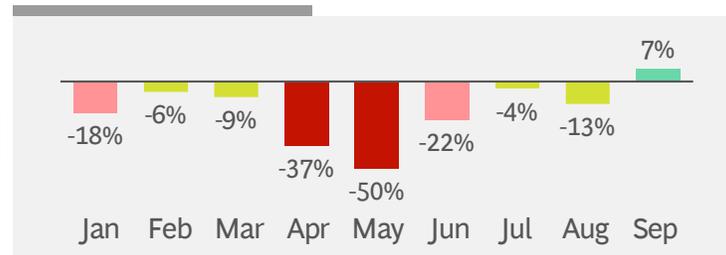
Italy



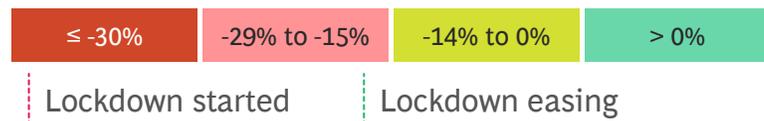
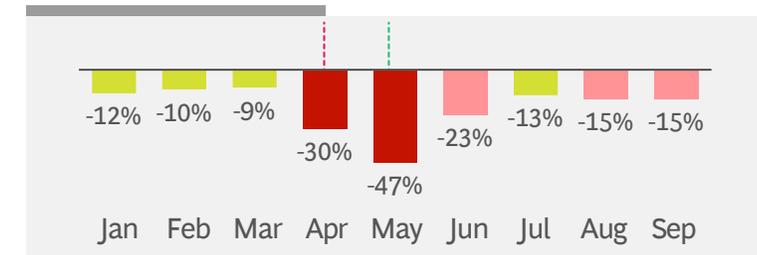
South Korea³



Sweden



Japan



1. Passenger vehicle sales includes data on, where available, hatchback, MPV, pickup, sedan, SUV, and vans; 2. Stimulus policies: Launched subsidies for car purchases in 10 cities, lessened purchase restriction in high tier cities and extended NEV subsidies; 3. South Korea's growth in auto sales from Mar through June 2020 is supported by recent tax cuts for individual consumption goods (e.g., cars), several carmakers (e.g. Audi, VW) launching new models and the increased appreciation by the Koreans of cars as a safe mode of transport and as a travel alternative for camping during COVID-19, supported by recently passed legislation to allow a variety of different cars to be modified into 'camping cars'. Source: Marklines; BCG

Retail goods sales (excl. auto and fuel) have rebounded to pre-COVID-19 levels across most of the countries

As of 21 Oct 2020

Growth of total retail goods sales (excl. auto & fuel)¹, YOY % change vs 2019

Retail goods sales include online & offline sales and comprise food & beverages, apparel, cosmetics & personal care, home appliances, general merchandise, building material; do not include auto, fuel & food services

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep
China ²	-16%		-12%	-6%	-1%	2%	-2%	-1%	2%
Japan	0%	2%	1%	-6%	-1%	10%	7%	7%	
US	3%	4%	7%	-6%	3%	8%	9%	8%	10%
UK	1%	0%	-4%	-19%	-11%	1%	3%	4%	
Italy	1%	2%	-18%	-27%	-11%	-1%	-11%	1%	
Sweden	3%	5%	2%	-3%	2%	3%	3%	3%	
Belgium	2%	2%	-7%	-14%	2%	7%	1%	9%	

Retail goods sales have currently **rebounded** to pre-COVID-19 levels, with US, UK and Belgium showing higher growth than Jan levels

In **Italy**, retail goods sales **rebounded in Aug** to Jan levels

Sweden hasn't shown a significant impact of COVID-19 on retail goods sales



Further reading
Reigniting Retail Demand

1. Retail goods sales categorization may be different across countries; seasonally adjusted values taken; 2. For China, combined value of Jan & Feb is available; Source: US Census Bureau; PRC National Bureau of Statistics; Eurostat; Ministry of Economy Japan

De-averaged view | Retail store sales in China have rebounded across categories; apparel sales continue to be impacted in other countries

As of 21 Oct 2020

Retail store sales' breakdown by category, YoY % change vs 2019

Food & beverage stores

	Apr	May	June	Jul	Aug	Sep
China ¹	18%	11%	11%	7%	2%	5%
Japan	0%	2%	3%	1%	2%	
US	12%	15%	12%	11%	10%	10%
UK	5%	6%	6%	3%	3%	
Italy	0%	1%	-1%	-2%	1%	
Sweden	-2%	0%	1%	0%	3%	
Belgium	11%	11%	7%	6%	6%	

Personal care & cosmetics stores

	Apr	May	June	Jul	Aug	Sep
China ¹	4%	13%	21%	9%	22%	16%
Japan	3%	-3%	3%	1%	2%	
US	-10%	-8%	-1%	4%	4%	5%
UK	-37%	-30%	-6%	-3%	0%	
Italy	-13%	-13%	-9%	-5%	-1%	
Sweden	-3%	-5%	3%	1%	3%	
Belgium	-6%	-8%	-1%	-2%	5%	

Apparel stores²

	Apr	May	June	Jul	Aug	Sep
China ¹	-19%	-1%	0%	-3%	2%	6%
Japan	-54%	-35%	-6%	-19%	-18%	
US	-86%	-62%	-24%	-23%	-21%	-12%
UK	-68%	-60%	-33%	-25%	-16%	
Italy	-88%	-43%	-18%	-41%	1%	
Sweden	-38%	-30%	-22%	-20%	-16%	
Belgium	-87%	-33%	-13%	-29%	21%	

Home appliance stores³

	Apr	May	June	Jul	Aug	Sep
China ¹	-9%	4%	10%	-2%	4%	-3%
Japan	-9%	9%	26%	12%	10%	
US	-53%	-42%	-20%	-6%	-4%	-6%
UK	-50%	-31%	0%	9%	10%	
Italy	-55%	-14%	1%	-1%	1%	
Sweden	8%	15%	15%	17%	9%	
Belgium	-46%	5%	13%	3%	28%	

China's sales (except Home Appliances) **have almost rebounded to year-ago run rates**

Retail store sales recovery driven by **F&B** across all countries

Personal care & cosmetics category sales have rebounded to last year levels except in Italy

Apparel category saw the largest decline; far from recovery across countries except China, Italy & Belgium

Home appliances sales showing signs of rebound; strong sales growth in Belgium



Note: For US, share in retail store sales in Q4 2019: F&B ~25%, personal care & cosmetics ~12%, apparel ~6%, home appliances ~3%, general merchandising ~25% and building material & gardening equipment ~13%. Sector classification & mix may be different across countries; 1. For China, Feb data includes both Jan & Feb, Food & beverages category only includes food & grains; 2. Includes clothing accessories, shoes, etc.; 3. Includes audio video & home appliances stores; Source: US Census Bureau; PRC National Bureau of Statistics; Eurostat; Ministry of Economy Japan

5 sectors currently above pre-crisis TSR levels; 6 sectors with significant share¹ of companies with >15% default risk

As of 23 Oct 2020

Based on top S&P Global 1200 companies

Categories based on TSR and net debt/enterprise value²

		TSR performance ³			Companies with probability of default >15% ⁴		
		21 Feb 2020 - 20 Mar 2020	21 Feb 2020 - 23 Oct 2020	09 Oct 2020 - 23 Oct 2020	21 Feb 2020	23 Oct 2020	09 Oct 2020 - 23 Oct 2020
Healthier sectors	Semiconductors	-30%	20%	→	0%	0%	→
	Retailing	-40%	11%	→	0%	35%	→
	Materials	-32%	7%	→	5%	9%	↗
	Household Products	-16%	3%	→	0%	0%	→
	Health Equipment	-31%	0%	↗	0%	0%	→
Pressured sectors	Tech Hardware	-26%	-1%	→	0%	0%	→
	Capital Goods	-35%	-1%	→	2%	5%	→
	Pharma	-20%	-1%	↘	0%	0%	→
	Media	-36%	-2%	→	0%	0%	→
	Software	-30%	-3%	↘	9%	0%	→
	Food/staples Retail	-10%	-3%	→	0%	0%	→
	Durable Goods	-39%	-3%	→	0%	0%	→
	Prof. Services	-30%	-5%	→	0%	0%	→
	Auto	-41%	-7%	→	0%	14%	→
	Utilities	-30%	-9%	→	0%	0%	→
Vulnerable sectors	Financials	-35%	-9%	→	0%	0%	→
	Food & Beverage	-23%	-11%	↘	0%	0%	→
	Telecom	-17%	-16%	↘	0%	8%	→
	Transport	-34%	-18%	→	0%	28%	→
	Hospitality	-44%	-19%	→	8%	31%	↘
	Insurance	-39%	-21%	→	0%	0%	→
	Banks	-39%	-23%	↗	0%	4%	→
	Real Estate	-39%	-28%	↘	0%	13%	→
	Energy	-52%	-42%	↘	0%	21%	↘

Note: Based on top S&P Global 1200 companies; Sectors are based on GICS definitions; 1. Retailing, Auto, Transport, Hospitality, Real estate and Energy are sectors with > 10% of companies with a probability of default > 15%; 2. Net debt & enterprise value from latest available balance sheet; categories defined based on comparison with S&P Global 1200 median: healthy = TSR & debt/EV > median, pressured = TSR or debt/EV < median, vulnerable = TSR & debt/EV < median; 3. Performance is tracked for two periods, first from 21 February 2020 (before international acceleration of outbreak) to 20 March 2020 (trough of the market) and from 21 February 2020 through 23 Oct 2020 based on median; 4. Implied by 5-year credit default swap based on median; Source: S&P Capital IQ; BCG ValueScience Center; BCG

↗ Pos. trend ≥ 2%
→ No sig. change
↘ Neg. trend ≥ 2%

Additional perspectives on COVID-19



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[Advantage in Adversity](#)



Edition #16
[Vaccines & Therapeutics Outlook Part II: Scenarios and Implications](#)



Edition #15
[Vaccine & Therapeutics Outlook - Part I: Timelines and Success Factors](#)



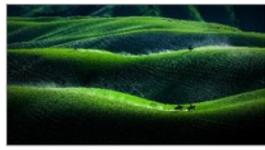
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[US: Current Dynamics and How to Win the Fight](#)



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[Global Restart: Key Dynamics](#)



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[Emerging Stronger from the Crisis](#)

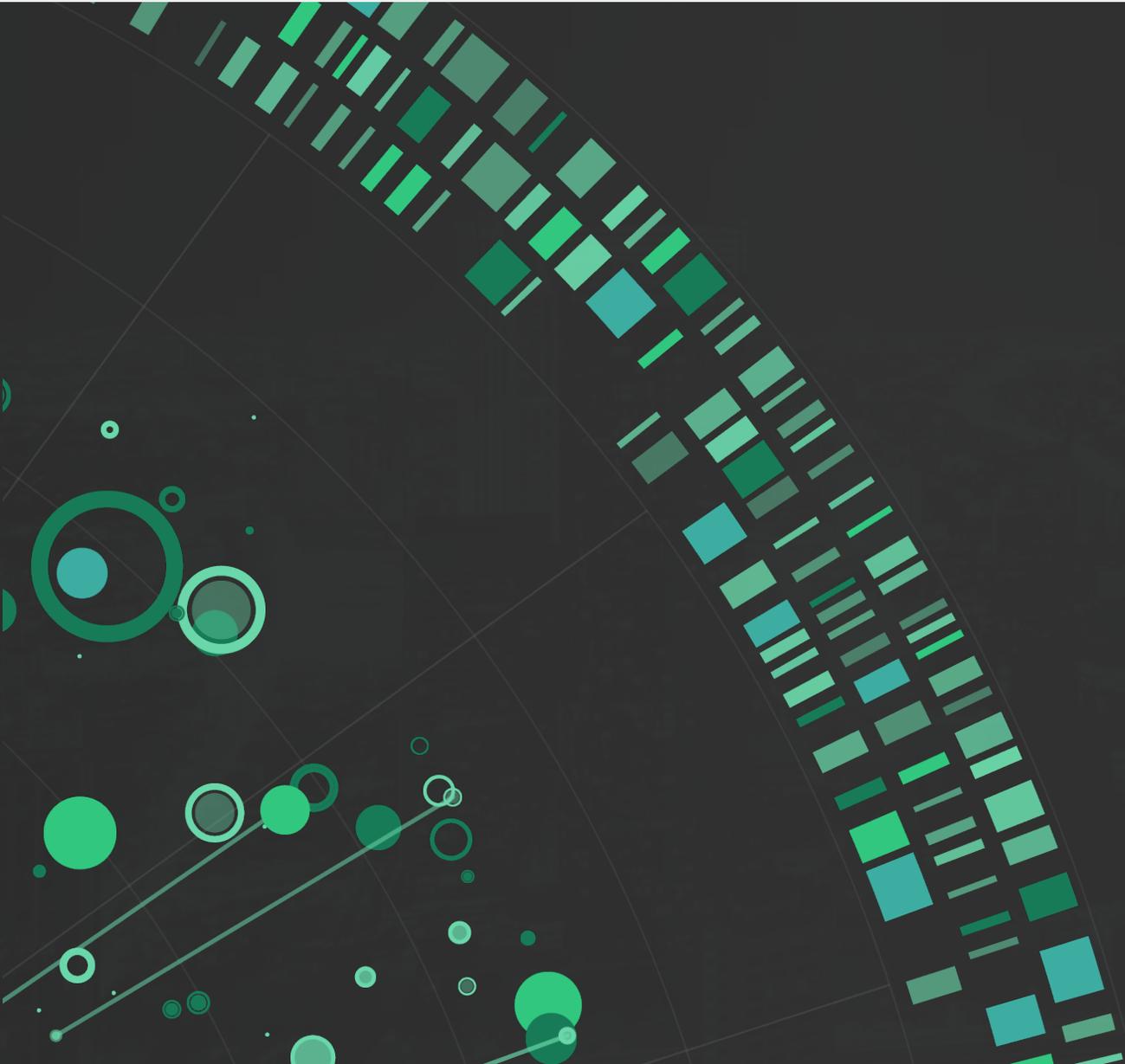
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