Safe Harbor Statement

We will be reviewing a mixture of publicly reported data and forecasts.

Forecasts depend a variety of assumptions and each person should make their own judgements and arrive at their own forecast to inform any of their decisions.

This "safe harbor statement" is a legal notice that you are entirely responsible for the decisions you make. The information and opinions share in this webinar are provided "as is" and without warranty for the intended benefit of providing a point of view so that you can better come to your own judgements.



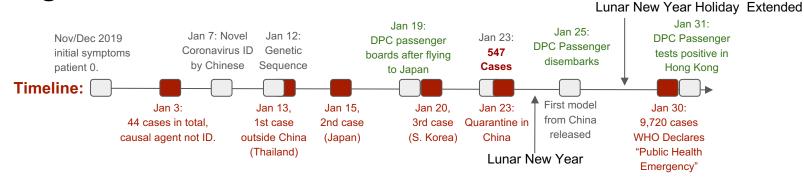
ARF TOWN HALL

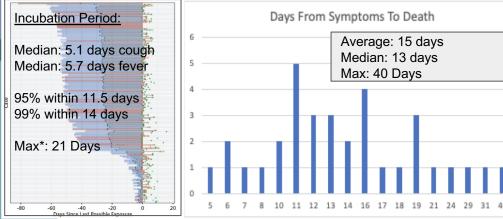
The Coronavirus



- 1. Background Facts
- 2. Forecasts & drivers and alternative scenarios
- 3. Implications to yourself and family
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- 5. Implications to the research industry

Background & Facts





New cases in China have slowed Total confirmed cases of coronavirus in the country 80,879 cases 80,000 Jan 23: 70,000 60,000 Quarantine in China 50,000 40,000 One Month 30,000 20,000 3,139 10.000 deaths

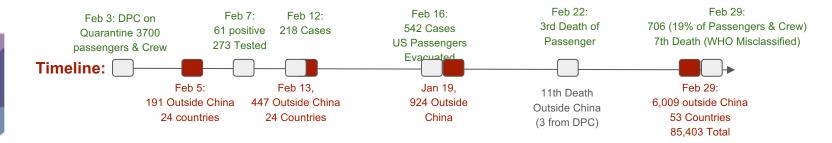
20 Jan 27 Jan 3 Feb 10 Feb 17 Feb 24 Feb 2 Mar 9 Mar

Source: China National Health Commission, WHO, Updated: 10 Mar 06:00 GMT BBG

Source, March 10, Annals Of Internal Medicine.

Source: Briggs Analysis of Hubei Data

Background & Facts



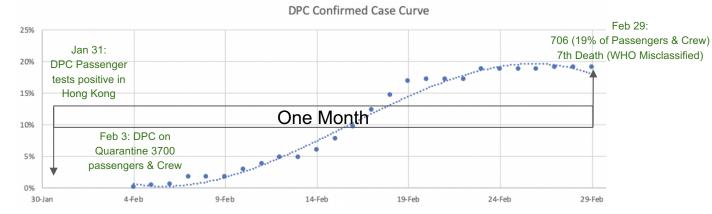
Virus Timelags:

Exposure to symptoms

Median: 5 days (Max 21 days)

Symptoms to death Median: 13 days (Max: 40 Days)

Symptoms to recovery Median: (FILL IN)



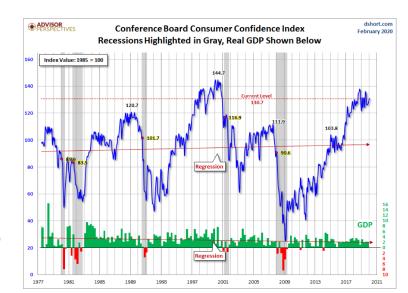
Source: Briggs Analysis of Diamond Princess Cruise. Note: quarantine took about a week to get fully implemented.

Until Recently, COVID19 Was Not Moving Markets

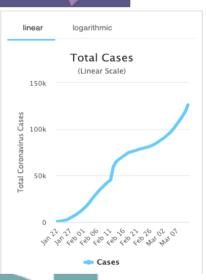


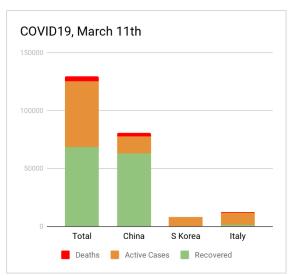


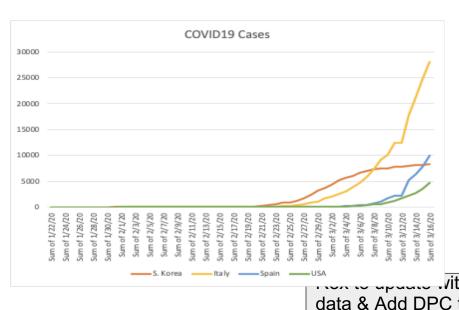
Consumer Confidence measured through Feb 12, and Stock through Feb 10th showed no appreciation for the significance of COVID19.



Facts: Cases Increasing, But China and S. Korea Show It Can Be Contained In Less Than 60 Days.







(pm PT) - ADD TI SCALE of 1 mont

How Bad Could It Get?

Heart Disease in the United States

About 647,000 Americans die from heart disease each year—that's 1 in every 4 deaths. Heart disease costs the United States about \$219 billion each year from 2014 to 2015. Dec 2, 2019



Includes causes of death: Coronary artery disease
Includes Diseases: Coronary artery disease; Stroke
Risk Factors: Tobacco smoking; Hypertension

www.cdc.gov > heartdisease > facts -

Heart Disease Facts | cdc.gov

Forecast 1.0: COVID19

15% of US Infected (49 million people) 780,000 Americans die of COVID19 in 2020. 3,899,000 Critical or Severe Cases

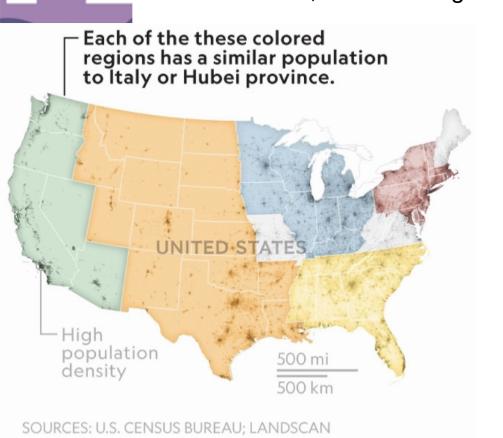
65 and over and pre-existing risk factors are most at risk.

		HUBEI ANALYSIS					CCDC PUBLISHED STUDY			
	% Of Population in China	Number of Deaths	% of Deaths	Index	Number Deat		% of Deaths	Index		
Under 50	67.2%	2	5%	0.1		64	6%	0.1		
50 to 59	7.7%	4	10%	1.3	1	30	13%	1.6		
60 to 69	10.5%	12	31%	2.9	3	09	30%	2.9		
70 to 79	4.9%	9	23%	4.7	3	12	30%	6.2		
80 or older	1.9%	12	31%	16.2	2	80	20%	10.7		

Hypertension, Diabetes, Heart Diseases, Chronic Respiratory and Cancer increase risk

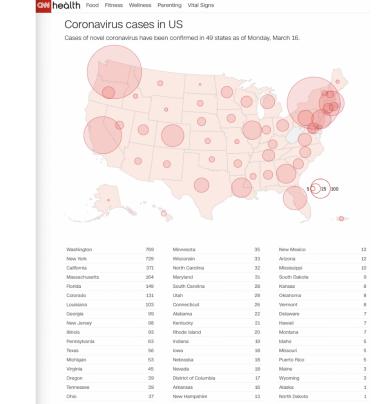
Source: Briggs Analysis of Hubei Case Data

March 16: 1,206 West 1,082 North East 1,275 Other regions



Hubei went into lockdown at 375 cases Source: WHO Situation report#3. (+ 196 for rest of China)

Hubei has 67,794 cases, 3,085 deaths Source: WHO Situation report#55.



Context: If NYC Was Wuhan...

From Feb 21 Post "Who Is Most At Risk?" (LinkedIn, See Comment section for data link)

January 3rd: 44 cases 0 Deaths February 3rd: 11,177 361

March 3rd: 67,217 2,834

Wuhan is in the Hubei region. Hubei is 4% of China's population. Hubei had about 75% of all cases and 96% of deaths.

NYC and Wuhan are about the same population. If NYC was Wuhan:

- 50% increase in number of deaths. COVID19 #1 killer.
- NYC's death rate would go from 150/day to 230
 - +80 from COVID. Flu is 6.1/day, making COVID 13x worse than a bad flu year.

- Medical capacity would be overwhelmed. Fatality rate increases.
 - 12,000 hospitalizations in the month.

italizations for

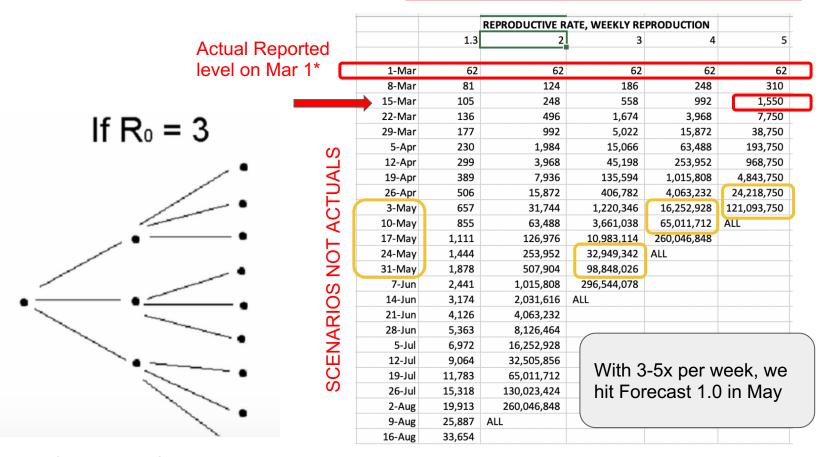


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Could It Get That Bad?

March 15th Actual: 3,563 (source: CNN 3/16 8am PT)



Source: WHO March 1, 2020 https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200301-sitrep-41-covid-19.pdf?sfvrsn=6768306d 2

Scenarios

CAVEAT: I want my forecast to be TOO HIGH. By changing our behavior over the next 30 days, we can come is well below Forecast 1.0.

	COVID-19 Disease Penetration					Harvard's Estimate (Mar 2)	
	0.1%	1%	5%	10%	15%	40%	70%
Infected Rate	331,000	3,310,000	16,550,000	33,100,000	49,019,950	132,400,000	231,700,000
Serious/Critical	26,327	263,267	1,316,336	2,632,672	3,898,896	10,530,688	18,428,704
Mortality Rate (Age Adjusted)	5,265	52,653	263,267	526,534	779,779	2,106,138	3,685,741
No additional Deaths assumed a	410	4 104	20.070	41.041	62.112	167.763	202 505
No additional Deaths scenario	419	4,194	20,970	41,941	62,113	167,763	293,585
3.4% Current Case Fatality Rate	11,254	112,540	562,700	1,125,400	1,666,678	4,501,600	7,877,800

Source Article:

https://www.linkedin. com/pulse/10xworse-than-flu-110th-bad-1918spanish-pandemicrex-briggs/

Updates announced on Twitter: @rexbriggs

Key Assumptions: 1) US will fail to synchronize with a global containment effort. Because local jurisdictions will be left to make their own calls, US will fail to synchronize an effectively national quarantine. 2) Citizen behavior will not change until risk of infection is greater than 1:3,000 (100,000+ cases), but that will be too little too late. Virus will spread to 15% of US pop by end of 2020 without season change in virus infection rate. IFR will be about 1.5% with serious and critical conditions 7% if total infections.

Forecast 1.0 Scenario Drivers

Viral Behavior:

- H1N1: Similar infectiousness and 20% of US infected
- 1918 Spanish Flu: 27% estimated infected incidence
- 15% age adjusted infection rate on DPC, with quasi-quarantine (Source: Briggs Analysis)
- Seasonality: Coronavirus may decrease with warmer weather (Some evidence emerging)

Mortality Rate:

Closed Populations Are Key To Accurate Estimate of Attack Rate and IFR (See DPC Article for Analysis to arrive at 1.5% IFR). Known Closed Populations:

- Diamond Princess Cruise Ship
- Kirkland Elder Care Home with 170 staff and Elders
- Princess Cruise (CA)

Other Scenarios:

Harvard 40-70% Infection Rate

It's Not The Flu

The flu kills an average of 50,000 per year (range 20,000 to 80,000). The range is relatively predictable, and there is a vaccine that can significantly lower risk of death.

COVID19 sheds virus **before** symptoms. Flu does so after. (MIT Review)

Half of COVID19 cases are asymptomatic. Means it is more likely to be spread by people that go about their day thinking they aren't harming anyone (DPC, <u>Japanese National Institute of Infectious Disease</u>)

COVID may be 5x more deadly (per DPC analysis we will review later in this session)

"As if contracting coronavirus wasn't bad enough, it leads to about two more secondary infections on average. The flu can sometimes cause a <u>secondary infection</u>, usually pneumonia, but it's rare for a flu patient to get *two* infections after the flu." (MIT Review)

Unlike the seasonal influenza, there is no vaccine expected in 2020.

These facts make COVID19 more dangerous and warrant a different type of response compared to how we handle the "common cold."



It took the <u>Flu 6.5 weeks</u> to get to 1000 cases in New York. <u>COVID got to 1000 in 2.5 weeks</u>. Flu IFR is 0.06% to 0.11% vs. 0.7% -COVID is 6 to 11x worse, (assuming no collapse of medical system).

With a significant response, we can ensure COVID19 does not kill as many as the flu.

- If left unchecked, Briggs Forecast 1.0 projects COVID19 would kill more than 15x this season's flu, making it the leading cause of death in 2020.
 - We need to treat COVID19 as something different than the flu.

How to make this model wrong (my goal):

- 1. Stop the spread. China, DPC and S. Korea seem to have succeeded. It is possible to effectively stop spread (R0 < 1) within 60 days.
- 2. Buy more time by slowing the spread (Weekly Rate: ~1.3). If we can keep it below 3,330,000 cases in 2020 (1% infection rate), less than 50,000 will die, which is as bad. But it we will saved hundreds of thousands of lives.

I'm optimistic US can beat this over the next 60 days (and shift to fighting spot fires with testing and tracing), but not enough evidence to revise my Forecast 1.0 just yet.

Forecast 1.0 Scenario Drivers



Virus Behavior (Seasonality, or lack thereof)

Mortality Rate (IFR) &
Serious / Critical Cases
(Includes Viral Evolution / Mutation)







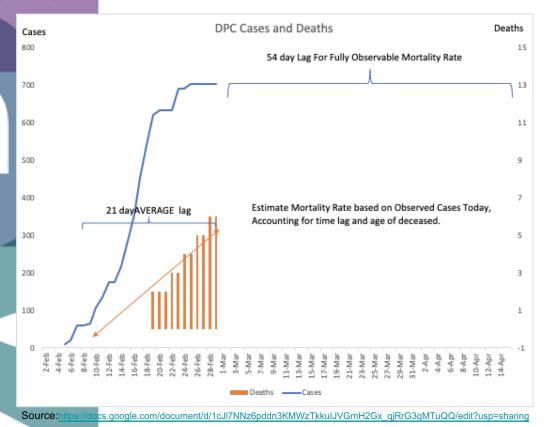
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Flu Infection Rate (source CDC):

36,000,000 to 51,000,000

Fatality Rate (IFR: 0.06% to 0.1%)

Diamond Princess Cruise ship (DPC) Analysis



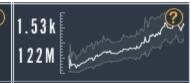
WHO & CDC Lost Ability To Accurately Track at End of February.

- Eight deaths as of March 6th.
- Feb 29th death in Australia from repatriated passenger not counted by WHO*
- IFR between 0.7% and 2.0 (average 1.3%)
- Lack of confidence in follow-on reporting of DPC passengers who have been repatriated hampers further analysis.
- Unclear if Princess Cruise will include complete testing and follow-on reporting.
- Lack of testing in Kirkland for 170 staff and patients is undermines need for accurate IFR for policy planning.

Source: https://www.bloomberg.com/news/articles/2020-03-01/man-dies-in-first-australia-coronavirus-fatality-channel-9-says

NOTE: WHO misclassifies this death as "Australia" rather than "Other" because patient was transferred to Australia.





Open closes Jun 30, 2020

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Join A prediction market:

https://www.metaculus.com/questions/

Or, Maybe ARF can create one?



- 1. Quarantines (China, DPC, S. Korea, Italy) or significant social distancing (Singapore).
 - a. Handwashing
 - b. Disinfectants
 - c. Masks?

2. Testing & Reporting

- a. World's supply of thermal cameras is currently zero -- all inventory being deployed
- Testing Rate by Country: S. Korea Leads: 4000 / million
- c. US Lags: 26 / million (just ahead of Vietnam, 24/million)
- d. Singapore is gold standard in open and daily reporting.
 US lags. HIPAA is being used as an excuse. Revisit EDRS and adopt reporting standards.



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- 1. Implications to yourself and family
 - a. Risk by age, and based on cases and modeled cases (reverse engineering deaths to make a projection of likely cases)
 - b. Washing hands, social distancing, masks (debatable)
 - c. Supply chain, medications, pantry load. (I bought ahead for 60 days).
 - d. Parents, pre-existing conditions (show age chart).
 - e. Financial/Savings

We can beat this in less than 60 days. A teachable moment about our responsibility to one-another?

Please Edit, add your POV

Should we include pressing our political leaders around testing, reporting and cancelling events? Can you believe how many are still doing in-person press conferences?



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Business Implications



















READING TIME: 6 MINS

Last Month, February 10th, I wrote about the economic implications of the Coronavirus.

Even though the stock market wasn't showing it at the time, my forecast was projecting the Coronavirus was about to have significant financial impacts. China's factory closing would affect supply chains and pricing. Commodity based economies like Australia would be hurt. Oil producing countries such as Iran, Saudia Arabia and Russia would be put under increased pressure as their revenues fell, and this could potentially have geopolitical implications. The US and other service-based economies would see significant declines in the first half of 2020. I noted that China's decrease in travel would affect many tourist economies. I argued that we should expect major European economies like Germany, who were already on the brink of recession, to slide into recession in 2020.

COVID19 (the disease caused by the novel Coronavirus) is now making its presence felt across the globe. My





earn more

Scenario Planning:

- 1. V-shape recovery
- 2. Fall recovery (Mild to no recession)
- 3. Recession lasting into 2021 + "Fortress Home"

Decision Rule Dashboard

Acceleration of tech trends, including labor/cost saving automation

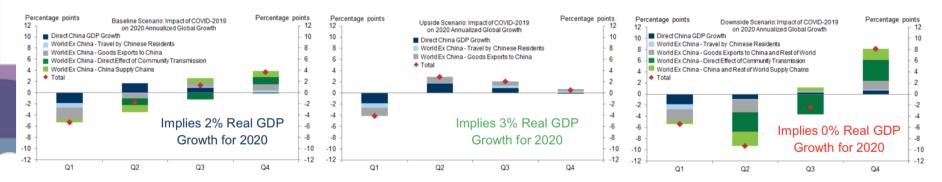
Three POVs

- 1. Goldman Sachs Global Investment Research
- 2. McKinsey & Co
- 3. Our POV

GIR's <u>Baseline Scenario</u>: Virus Impact on Global Real GDP Growth

2. GIR's <u>Upside Scenario</u>: Virus Impact on Global Real GDP Growth

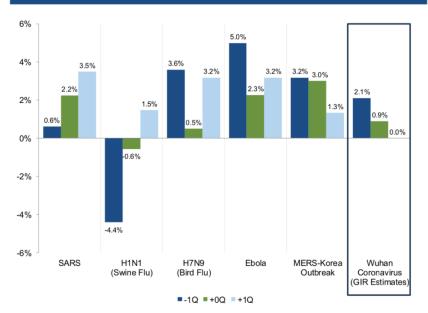
3. GIR's <u>Downside Scenario</u>: Virus Impact on Global Real GDP Growth

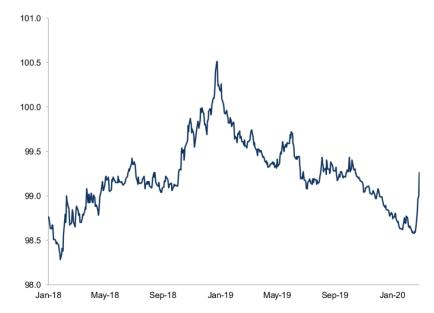


- GIR estimate the impact on global growth based on five different effects:
 - 1. Direct China impact
 - 2. Spillovers from China via reduced goods imports
 - 3. Spillovers from China via reduced spending by Chinese tourists
 - 4. Damage to supply chains outside of China
 - 5. Disruptions to domestic economic activity in virus-hit countries other than China



2. Goldman Sachs US Financial Conditions Index





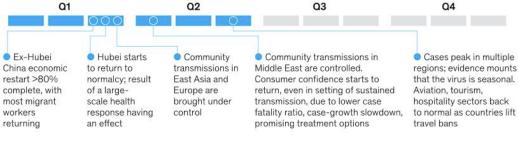
- Goldman Sachs GIR revised its 2020 US real GDP growth estimate to 1.3% from 2.1%. When the year began, GIR estimated that growth would be 2.3% this year.
 - GIR expects real GDP growth to slow from 0.9% in Q1 to 0.0% in Q2 before accelerating to 1.0% in Q3 and 2.25% in Q4.
- GIR expects the Federal Reserve to cut its policy rate by a cumulative 100 bps between now and the end of June, beginning with a 50-bp cut this month.

McKinsey & Company

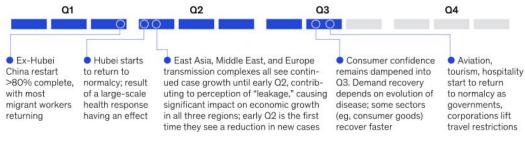
March 9th, 2020

Businesses should consider three scenarios as part of their contingency planning.

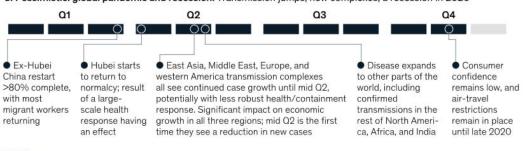
1. Quick recovery (least likely): Intracomplex transmission contained; economic impact mostly restricted to Q1



2. Base case: global slowdown. Sustained intracomplex transmission; global slowdown in 2020



3. Pessimistic: global pandemic and recession. Transmission jumps, new complexes; a recession in 2020



McKinsey & Company

Three scenarios for how COVID-19 could evolve

Potential scenarios as of March 9, 2020

Quick recovery

What you have to believe

- Public health response similarly effective as with China
- Virus is seasonal
- Fatality ratio similar to that of the flu (or an existing therapy proves effective)
- Socioeconomic reaction is localized
- Strong public reaction, initial drop in demand, but peak comes quickly
- Working populations change some daily habits but resume ec. activity

How the scenario could evolve

- China recovery is largely complete, inc. Hubei by early Q2
- Relatively fast rebound after initial acute drop in consumer demand
- US, Europe economic slowdown until the end of Q1
- Varied impact in other economies (Middle East, rest of Asia, Africa, LatAm) – slowdown in Middle East until Q2; some disruption in Africa, LatAm

Global slowdown

- Less effective public-health response than China
- Virus is seasonal
- Fatality ratio is higher than or near that of the flu, dependent on public health response
- Impact largely localized in Europe and US; some spread in other transmission complexes in Africa, India, with more generalized reactions
- Greater shift in daily behaviors
- China recovery is largely complete, incl. Hubei by early Q2
- US, Europe sees economic slowdown until mid-Q2; other regions see varied impact (rest of Asia, Middle East more impacted; LatAm, Africa more insulated)
- Certain sectors (e.g., aviation, hospitality) deeply hit – missing the summer season
- Other sectors (e.g., CPG) experience acute initial drop, recover at end-Q2

Global pandemic and recession

- Less effective public-health response than China
- Virus is not seasonal so transmissibility does not decline with northern hemisphere spring
- Fatality ratio is higher than that of the flu, because of disease characteristics or insufficient health system response
- Continued case growth count through Q2 and Q3
- · Reaction is generalized
- China recovery drives new transmissions; complete by Q3
- · US, Europe see generalized reaction
- Global recession economic slowdown across all regions
- Consumer confidence does not recover until end Q3 or beyond

All sectors are impacted, with several seeing severe consequences

Preliminary views based on base case – Subject to change as the COVID-19 outbreak evolves



Tourism and hospitality



Aviation / airlines



Oil and gas



Automotive



Consumer products



Consumer electronics. semi-conductors

Longest

Estimated global restart (Global slowdown scenario)

Estimated

degree of

of duration

impact, in terms

Severe ripple effects (e.g., closures in Paris, tourism down 50% in Vietnam, despite lack of local transmission)

Q4

Delayed recovery until winter season, when disease might surge again

Potential of more localized impact. containing negative demand hit

Late Q3 / early Q4

Sustained headwinds, with global travel acutely impacted: summer season missed forward bookings for Mar-April down significantly; reports of over 40% in certain airlines

Pace of recovery faster for domestic travel (~2 quarters): slower pace of recovery for long-haul and/or international travel

(up to ~3-4 quarters)

Oil price decline driven by both longer-term demand impact and short-term supply overhang Rebound expected

Q3

with resumption of consumer demand. but **long-term** impact likely if situation persists and depresses prices beyond a

year

Late Q2 / Q3

Existing vulnerabilities (e.g., trade tensions. declining sales) amplified by acute decline in Chinese demand, continued supply chain and production disruption (in China, rest of Asia, now EU)

Headwinds to persist into Q3 given tight inventories (<6 weeks), supply chain complexity (therefore, minimal ability to shift)

Overall moderate decline in private consumption and exports of services Demand for certain

product seaments (e.g., food, produce) resilient; significant online growth (though hampered by labor shortage)

Potential of localized impact, containing negative demand hit

Market structure shifts accelerated (e.g., strategic moves to diversify supply chain)

Downstream impact due to supply chain challenges in China. rest of Asia (esp. South Korea), causing delays in 5G, product development

Pace of recovery to differ by sub-sector (e.g., semiconductor likely faster)

Panel POV

Briggs Forecast 1.0: Recession & Change In Consumer Psychology

The "Fortress Home" Scenario

ADD YOUR SLIDES HERE, OR WE CAN DO AS A DISCUSSION

"how we work, how we serve consumers, and consumer demand trends"



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Implications To Research Industry

- 1. Value of speed in analytics
- 2. Problems of 3 year averaged mix models
- 3. Need to have models that can quickly incorporate exogenous factors
- 4. Issues with Face-to-Face (Qual, etc.)
- 5. Cancelling of Events, how we migrate to video & webinars