Coronavirus: A Black Swan?

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What Is a Black Swan?

- Outlier
- Extreme impact
- Retrospective predictability
What Is Giving Wings to the Black Swan?

• Reproductive Number or $R_0$
  – SARS vs. COVID-19
• Interconnectedness
  – Apple, Armani, and Acetaminophen
• Risks, Responses, Risks of Responses:
  – Hand Hygiene and Respiratory Etiquette
  – Social Distancing
    • Quarantines and lockdowns
    • Cancellations and closures
    • Working remotely
How Do SARS and COVID-19 Compare?
Breaking News: It’s a Pandemic

We have never before seen a pandemic sparked by a coronavirus. This is the first pandemic caused by a coronavirus.

And we have never before seen a pandemic that can be controlled, at the same time.

We cannot say this loudly enough, or clearly enough, or often enough: all countries can still change the course of this pandemic.

If countries detect, test, treat, isolate, trace, and mobilize their people in the response, those with a handful of cases can prevent those cases becoming clusters, and those clusters becoming community transmission.

Even those countries with community transmission or large clusters can turn the tide on this virus.

Several countries have demonstrated that this virus can be suppressed and controlled.

The challenge for many countries who are now dealing with large clusters or community transmission is not whether they can do the same – it’s whether they will.
What Is $R_0$?

**The Atlantic**

**SCIENCE**
The Deceptively Simple Number Sparking Coronavirus Fears

Here's what the oft-cited $R_0$ number tells us about the new outbreak—and what it doesn't.

**ED YONG** JANUARY 30, 2020

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**The New York Times**

**The Coronavirus, by the Numbers**

A mathematician who studies the spread of disease explains some of the figures that keep popping up in coronavirus news.

By James Gorman

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R0 is important because if it’s greater than 1, the infection will probably keep spreading, and if it’s less than 1, the outbreak will likely peter out. So it offers vital information to organizations and nations as they consider how to respond to an outbreak—such as the one the world is currently experiencing.
Apple’s Supply Chain....

• Apple’s Seventh Risk Factor (2019)

The Company depends on component and product manufacturing and logistical services provided by outsourcing partners, many of which are located outside of the U.S.

Substantially all of the Company’s manufacturing is performed in whole or in part by outsourcing partners located primarily in Asia. A significant concentration of this manufacturing is currently performed by a small number of outsourcing partners, often in single locations...The Company relies on single-source outsourcing partners in the U.S., Asia and Europe to supply and manufacture many components, and on outsourcing partners primarily located in Asia, for final assembly of substantially all of the Company’s hardware products. Any failure of these partners to perform can have a negative impact on the Company’s cost or supply of components or finished goods. In addition, manufacturing or logistics in these locations or transit to final destinations can be disrupted for a variety of reasons including, but not limited to...public health or political issues...
Apple’s Supply Chain ....

• Apple’s Second Risk Factor (2003)

War, terrorism or public health issues could disrupt supply, delivery or demand of products which could negatively affect the Company's operations and performance.

...The Company and some of its manufacturing vendors and component suppliers have significant operations in various locations throughout Asia, including locations in mainland China, the Hong Kong Special Administrative Region, and Singapore, all of which were subject to the World Health Organization and Centers for Disease Control and Prevention severe acute respiratory syndrome (SARS) travel advisories at times during the second and third quarters of fiscal 2003...Should the severity of the SARS threat increase or other public health issues arise, the Company could be negatively impacted by the need for more stringent employee travel restrictions, additional limitations in the availability of freight services, governmental actions limiting the movement of products between various regions, delays in production ramps of new products, and disruptions in the operations of the Company's manufacturing vendors and component suppliers.

Source: Apple’s Annual Report on Form 10-K
...and Apple’s Consumers (2019)

<table>
<thead>
<tr>
<th></th>
<th>2019</th>
<th>2018</th>
<th>2017</th>
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<td><strong>Net sales (millions):</strong></td>
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<td>U.S.</td>
<td>102,266</td>
<td>98,061</td>
<td>84,339</td>
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<td>China</td>
<td>43,678</td>
<td>51,942</td>
<td>44,764</td>
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<tr>
<td>Other countries</td>
<td>114,230</td>
<td>115,592</td>
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<td><strong>Total net sales</strong></td>
<td>260,174</td>
<td>265,595</td>
<td>229,234</td>
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Source: Apple’s Annual Report on Form 10-K
...and Apple’s Consumers (2003)

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<th>2003</th>
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<td><strong>Net sales (millions):</strong></td>
<td></td>
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<tr>
<td>U.S.</td>
<td>3,627</td>
<td>3,272</td>
<td>2,936</td>
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<tr>
<td>Japan</td>
<td>698</td>
<td>710</td>
<td>713</td>
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<tr>
<td>Other foreign countries</td>
<td>1,882</td>
<td>1,760</td>
<td>1,714</td>
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<tr>
<td><strong>Total net sales</strong></td>
<td>6,207</td>
<td>5,742</td>
<td>5,363</td>
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Source: Apple’s Annual Report on Form 10-K
Luxury Goods, the Tourist...
Luxury Goods, the Tourist...

China is already the world’s largest source of tourists—most to Greater China—but increasingly they are visiting other destinations.

Chinese outbound trips by destination, million trips taken

Excluding Greater China (Hong Kong, Macau, and Taiwan)

% outside Greater China

2011 34
2012 37
2013 45
2014 51

Outbound tourism spending by tourist origin, 2017, $ billion

- China: 265
- United States: 166
- Germany: 89
- United Kingdom: 70
- France: 46
- Canada: 36
- Russia: 34
- Australia: 32
- Italy: 31
- Spain: 29
- South Korea: 29
- Japan: 24
- United Arab Emirates: 23
- Belgium: 23

Source: World Travel and Tourism Council; Hong Kong Census and Statistics; MOTC (tourism bureau), Taiwan; Macao tourism data; McKinsey Global Institute analysis
...and the Supply Chain

- Many Italian and French luxury brands continue to do most of their manufacturing in their home countries
Pharmaceutical Supply Chain: India & China

• Ninety percent of factories making active pharmaceutical ingredients for the U.S. market are located outside U.S. and 60% manufacturing the final product are outside U.S.
• FDA announced in early March that a drug manufacturer alerted the FDA of a drug shortage due to COVID-19
• Since January, FDA has communicated with over 180 drug manufacturers about potential supply disruptions
• India announced last week it would limit exports of 26 drugs or drug ingredients, including several antibiotics and acetaminophen, so it would have a sufficient supply for its domestic population
  • India, which supplies 40% of U.S. generic drugs, relies on China for nearly 70% of its active pharmaceutical ingredients
What Risks, Responses, Risks of Responses?

• Hand Hygiene and Respiratory Etiquette
• Social Distancing
  – Quarantines and lockdowns
    • China, first in city of Wuhan, then all of Hubei province, 60 million
    • Italy—17 million in Milan, Venice, Parma, and other towns first, now the whole country
  – Cancellations and closures
    • Sports (e.g., BNP Paribas Open, Golden State Warriors vs. Brooklyn Net)
    • Festivals, concerts, cultural institutions (e.g., Coachella, South by Southwest, Ultra)
    • Conferences (e.g., Game Developers Conference, Facebook’s F8 Developers Conference)
    • Schools (e.g., Italy, University of Washington, USC, UCLA)
  – Working remotely
    • Amazon, Facebook, Microsoft, Salesforce, Twitter
Will the U.S. Look Like This in April?

Coronavirus from Space
Coronavirus: A Black Swan?

Source of Images on cover page and this slide: WHO image of COVID-19: https://www.who.int/csr/sars/coronavirus/en/; Black swan from cover of Nassim Taleb’s The Black Swan
Sources


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