The Long Electronics Winter is Ending

Is Spring in the Air … or a Virus?

Dale Ford – Chief Analyst
March 6, 2020
Coronavirus

Status – March 5
The Future Was Bright – Then Coronavirus …
Coronavirus Cases in North America as of March 3

Canada - 30

Mexico - 5

CHINA CORONAVIRUS STATUS (2/27)

- In Treatment: 54.6%
- Recovered: 41.9%
- Deaths: 3.5%

Total = 78,630

CHINA CORONAVIRUS STATUS (3/5)

- In Treatment: 31.3%
- Recovered: 64.9%
- Deaths: 3.7%

Total = 80,565

OUTSIDE CHINA CORONAVIRUS STATUS (2/27)

- In Treatment: 88.9%
- Recovered: 9.6%
- Deaths: 1.6%

Total = 3,664 (46 Countries)

OUTSIDE CHINA CORONAVIRUS STATUS (3/5)

- In Treatment: 88.1%
- Recovered: 10.1%
- Deaths: 1.8%

Total = 14,768 (84 Countries)

Source: WHO

NEW CORONAVIRUS CASES BY COUNTRY OUTSIDE CHINA (DAILY)

Source: WHO
NEW CORONAVIRUS CASES BY COUNTRY OUTSIDE CHINA (DAILY)

Source: WHO
DEATHS BY COUNTRY OUTSIDE CHINA (DAILY)

Source: WHO
# Placing Viruses in Perspective

<table>
<thead>
<tr>
<th>VIRUS</th>
<th>YEAR IDENTIFIED</th>
<th>CASES</th>
<th>DEATHS</th>
<th>FATALITY RATE</th>
<th>NUMBER OF COUNTRIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marberg</td>
<td>1967</td>
<td>466</td>
<td>373</td>
<td>80.0%</td>
<td>11</td>
</tr>
<tr>
<td>Ebola</td>
<td>1976</td>
<td>33,577</td>
<td>13,562</td>
<td>40.4%</td>
<td>9</td>
</tr>
<tr>
<td>Hendra</td>
<td>1994</td>
<td>7</td>
<td>4</td>
<td>57.1%</td>
<td>1</td>
</tr>
<tr>
<td>H5N1 Bird Flu</td>
<td>1997</td>
<td>861</td>
<td>455</td>
<td>52.8%</td>
<td>18</td>
</tr>
<tr>
<td>Nipah</td>
<td>1998</td>
<td>513</td>
<td>398</td>
<td>77.6%</td>
<td>2</td>
</tr>
<tr>
<td>SARS</td>
<td>2002</td>
<td>8,096</td>
<td>774</td>
<td>9.6%</td>
<td>29</td>
</tr>
<tr>
<td>H1N1*</td>
<td>2009</td>
<td>1,632,258</td>
<td>284,500</td>
<td>17.4%</td>
<td>214</td>
</tr>
<tr>
<td>MERS</td>
<td>2012</td>
<td>2,494</td>
<td>858</td>
<td>34.4%</td>
<td>28</td>
</tr>
<tr>
<td>H2N9 Bird Flu</td>
<td>2013</td>
<td>1,568</td>
<td>616</td>
<td>39.3%</td>
<td>3</td>
</tr>
<tr>
<td>Wuhan**</td>
<td>2020</td>
<td>95,333</td>
<td>3,284</td>
<td>3.4%</td>
<td>84</td>
</tr>
</tbody>
</table>

* Between 2009 and 2010; ** As of March 5, 2020

Sources: CDC; UN; World Health Organization; New England Journal of Medicine; Malaysian Journal of Pathology; CGTN; The Lancet

In 2020 alone, so far there have been 18,000 deaths and 32 million infected with the flu in the United States.

*Source: CDC*
Risk Factors

- Location of Treatment
- Age
- Pre-existing Health Conditions
- Weak Immune Systems

**COVID-19 mortality rate by age**

Source: Chinese Center for Disease Control and Prevention

Setting Expectations

"Most of us are going to get this virus. It's undeniable. You won't find a single expert out there who is saying that this is going to be contained."

"And, the more we learn about it, the more we see that the spread is going to be global and, for the most part, that's OK because the data we know from China shows that roughly 98 to 99 percent of us are going to do very, very, well."

- Dr. James Philips; George Washington University School of Medicine

• More testing kits and increased availability of tests will identify a growing number of infected individuals

• How will markets, government officials and company leaders respond? – Perception is Reality
Coronavirus

Economic Impact
Record Setting Market Correction
Starting Feb 24

- The definition of FUD
- “Known Knowns, Known Unknowns, Unknown Unknowns”
- Reasonable?
- “Keep Calm and Carry On”
Record Setting Market Correction – Feb 24, 2020

Fastest 10% declines in the S&P 500 from an all-time high since 1980

<table>
<thead>
<tr>
<th>Date</th>
<th>Days</th>
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</thead>
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<tr>
<td>Thursday</td>
<td>3</td>
</tr>
<tr>
<td>Feb. 1, 2018</td>
<td>13</td>
</tr>
<tr>
<td>Oct. 27, 1997</td>
<td>18</td>
</tr>
<tr>
<td>Apr. 14, 2000</td>
<td>26</td>
</tr>
<tr>
<td>Aug. 14, 1998</td>
<td>30</td>
</tr>
<tr>
<td>Aug. 17, 1990</td>
<td>31</td>
</tr>
<tr>
<td>Nov. 26, 2007</td>
<td>31</td>
</tr>
<tr>
<td>Oct. 15, 1987</td>
<td>32</td>
</tr>
<tr>
<td>Nov. 23, 2018</td>
<td>34</td>
</tr>
<tr>
<td>Sep. 29, 1999</td>
<td>52</td>
</tr>
</tbody>
</table>

Source: Dow Jones Market Data
The S&P 500's cumulative decline from its Feb. 19 peak through Feb. 27 compared to each of the six corrections that have occurred in the current bull market.
Then Up! Dow Industrials Rally 5.1% on Stimulus Hopes

Record setting nearly 1,300 point rally

Source: FactSet
Global Stock Performance Following Epidemics

Notes: Global stocks refer to the MSCI World Index. Charles Schwab determined when each epidemic began for its analysis. Data as of Jan. 21. Source: Charles Schwab analysis of FactSet data and news reports.
Coronavirus

Electronic Supply Chain Impact
The Scope of Electronics Component Manufacturing Impact in China

| Electronic Component Mfr Sites in China Impacted | 5,057 |
| Electronic Component Mfr Sites Completely Shutdown | 43 |
| Electronic Component Suppliers Impacted | 3,855 |

* According to X2Data, these are the statistics of companies which have been effected due to the virus (as of Feb 18)

- Many impacted sites only operating at 50% to 60% manned capacity
  - Many suppliers only operating on 1 to 2 months cash
  - No banking access – financially viable?
- Supply AND Demand are both impacted
- High volume manufacturers production declines for different reasons
  - Xiaomi, Huawei, etc – Collapse of China demand
  - Apple, Microsoft, etc – Supply limitations
- China production resuming with government support
  - Due to diminishing concerns about health crisis?
  - Or due to government concerns about economy?
- China deployed AI and Big Data to combat virus spread?
Shipping & Logistics Challenges

• February Air Cargo Down 9% Compared to Year Ago

• Chinese Trucking Still Crippled by Coronavirus; Trucking in China Moves 73% of Its Freight
  • Citywide lockdowns/quarantines are keeping half of China’s truck drivers off the roads
  • Trucking in the south is closer to pre-virus levels of activity, operating at 60% 

• Chinese Ports Resume Normal Activity
  • Workers moving cargo that was set to be shipped after the Lunar New Year
  • Could be idled again if there are continued supply chain disruptions or reduced demand
  • Canceled containership sailings are also down

• U.S. Ports Expect Activity to Drop
  • Expecting a 20% drop in cargo
  • Expecting recovery after several weeks
  • Over 100 transpacific ships to North America have been canceled between February and April

Source: Thomasnet.com
Shipping & Logistics Challenges

Slump in international shipping volume
Percentage decrease in small parcel volume post Coronavirus outbreak across FedEx, UPS and DHL

- FedEx: 41.5%
- UPS: 65.5%
- DHL: 23.9%

Increase in international delivery delays
Percentage increase in late deliveries due to Coronavirus outbreak across FedEx, UPS and DHL

- FedEx: 4.32%
- UPS: 7.40%
- DHL: 6.94%

Retail industries impacted the most due to Coronavirus
- Auto Parts
- Aviation Parts
- Electronic goods
- Apparel
- Healthcare
- Hardware

Source: AuditShipment.com

What is the impact level of the Coronavirus on your company’s ability to supply your customers on time? - CATEGORY AVERAGE

- Electro-Mechanical Average (2/21/20)
- Electro-Mechanical Average (2/7/20)
- Passives Average (2/21/20)
- Passives Average (2/7/20)
- Semiconductors Average (2/21/20)
- Semiconductors Average (2/7/20)

Legend:
- Severe
- Serious
- Moderate
- Minimal
- None
- Do Not Know
How much will the loss of supply in your markets due to Coronavirus increase overall lead times (not just for your company)? - CATEGORY AVERAGE

Electro-Mechanical Average (2/21/20)

Electro-Mechanical Average (2/7/20)

Passives Average (2/21/20)

Passives Average (2/7/20)

Semiconductors Average (2/21/20)

Semiconductors Average (2/7/20)

Legend:
- None
- Less than 1 Week
- More than 1 Week; Less than 2 Weeks
- More than 2 Weeks
- No Visibility
The latest ECIA survey on the Coronavirus impact on the electronic components supply chain ends today

Please Support This Survey!!
Have you seen a negative impact to component demand and/or production due to the Coronavirus?

Survey Date: February 11-15  Respondents: ~6000  Location: Worldwide/China focus (~85% China)  Who: Active Electronics Industry Professionals

Source: TPC
What % do you think this will impact C1Q’s electronics production vs. previous plans?

Survey Date: February 11-15  Respondents: ~6000  Location: Worldwide/China focus (~85% China)  Who: Active Electronics Industry Professionals

Source: TPC
Do you think this production delta will be recovered in C2Q?

Survey Date: February 11-15  Respondents: ~6000  Location: Worldwide/China focus (~85% China)  Who: Active Electronics Industry Professionals

Source: TPC
If production delta will not be recovered in C2Q, why? (multiple answers OK)

Survey Date: February 11-15  Respondents: ~6000  Location: Worldwide/China focus (~85% China)  Who: Active Electronics Industry Professionals

- Not enough workers to complete builds: 70%
- Not enough components to complete builds: 60%
- Virus still will not be contained enough: 50%
- Demand destruction: 20%

Source: TPC
Inventory Status

(Using a scale of 1 to 5 with 1 being extremely low inventory, 3 being the normal amount, and 5 being extremely high; how do you view inventory levels for the following products?)

Source: TPC

Seeing most products now at or BELOW normal inventory levels
North America Sentiment Survey Trends Turning Down

Market Outlook for coming month compared to current month

Source: ECIA Electronic Component Sales Trends Survey
The Annualized Semiconductor Growth Cycle
40 Years of History

Source – WSTS
June 2016 – Start of the tenth semiconductor cycle
Most cycles last roughly four years

Source – WSTS
Semiconductor Revenue Growth Cycle

- Strong annual market downturn started 26 months ago
- Quarter-over-Quarter trend solid indicator of recovery
- Positive Q-over-Q growth trending toward Q1 2020
- But then Coronavirus hits

Source – WSTS

Overall Semiconductor Growth Cycle Aligned

- Memory ICs pull out of their steep dive
- Other Semiconductors break into positive growth by end of 2019
- Likely dip/pause in Q1 with potential to resume growth by summer

Source – WSTS

• Current Cycle – Continues 20-year pattern of alignment with GDP
• Technology/Market forces aligning to support growth in 2020+

Source: IHSM Global Insight and Informa Tech

Electronic Equipment OEM Factory Revenue
Semiconductor Revenue
WW Real GDP

Semiconductor Market Outlook
Semiconductor / Electronics Components Market Outlook – Near-Term

Multiple potential scenarios:

- “Containment” of virus by March / April
  - Market dip through H1
  - Market snapback in H2 that could drive revenue growth up to 3% to 5%

- Large, regionally focused outbreaks extend into Q3
  - Market will not recover in 2020 and potential for revenue collapse by 20%

- Global pandemic continues into Q4
  - Global economic decline could suppress semiconductor market for multiple years
  - Potential for multiple company failures and market consolidation
Market Outlook – Long Term Future Still Bright!
The Developing Technology Triumverate

Perfect Storm 2020 / 2022
Cloud 5G Waves of Amplified Growth
“5G mobile technology will, like electricity or the automobile, benefit entire economies and benefit entire societies. This is because the global 5G standard (5G New Radio) will advance mobile from largely a set of technologies connecting people-to-people and people-to-information to a unified connectivity fabric connecting people to everything.”
Opportunities Go Beyond 5G

MIT Technology Review

Annual list of technological advances that we believe will make a real difference in solving important problems. How do we pick? We avoid the one-off tricks, the overhyped new gadgets. Instead we look for those breakthroughs that will truly change how we live and work.

1. Unhackable Internet
2. Hyper-personalized medicine
3. Digital Money
4. Anti-aging Drugs
5. AI-discovered Molecules
6. Satellite Mega-Constellations
7. Quantum Supremacy
8. Tiny AI
9. Differential Privacy
10. Climate Change Attribution
Thank you!