Navigating the Uncertainty

Economic Impact of COVID-19

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AIR

A Verisk Business

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Introduction

On March 11, 2020, the World Health Organization declared the novel coronavirus disease (COVID-19) outbreak a pandemic. The disease was first identified in Wuhan City, Hubei Province, China, in December 2019. Since then, the coronavirus has spread to more than 190 countries and territories globally. As of March 29, more than 693,000 confirmed cases of COVID-19 have been reported, with more than 130,000 recovered from the illness, and over 33,500 reported deaths. Clearly, the humanitarian cost of the outbreak is a bigger concern, and in response to the steep trajectory of its spread, governments across the world have implemented aggressive efforts to slow transmission of the virus. In addition to its human toll, the sizable economic impact of COVID-19 is starting to become apparent. Economists believe the business interruption (BI) caused by COVID-19 could result in a staggering 30%[1] drop in the US's GDP. As the coronavirus spreads worldwide (Figure 1), we are starting to see the ripple effect it has had on global economies and the resulting uncertainty in markets. Investors continue to seek safer assets amid fears that the coronavirus will disrupt global supply chains and tip the economy deeper into recession.

Figure 1. Map of COVID-19 spread as of March 30, 2020. (Source: Johns Hopkins University)

[1] https://fortune.com/2020/03/23/morgan-stanley-goldman-sachs-estimate-coronavirus-economic-pain/

Implications for the Insurance Industry and Other Corporate Sectors

While the economic impact from COVID-19 is going to be significant, the implications of the outbreak for the insurance industry are still unfolding. The general expectation is that for property (re)insurers, COVID-19 may represent a low to moderate loss in terms of (contingent) business interruption (BI) coverage, as most BI policies have a physical damage trigger to qualify as a loss-causing event. However, we are starting to see high exposure from these companies to event cancellation losses. The industry's event cancellation losses stemming from coronavirus are estimated to be USD 5 billion.[2] For life insurers, the economic fallout from COVID-19 represents an impact on their invested assets. Typically, life insurers invest more heavily on longer-term assets as this strategy correlates well with their longer-term liabilities. Depending on the long-term implications of COVID-19 on the procurement patterns of companies, this may cause changes to the exposure footprints of the invested companies and industries.

For most businesses, the expectation is that their BI claims may not be paid as their policies do not cover pandemic disruption (non-property damage BI), such as COVID-19, because of different policy exclusion clauses. This is particularly devastating for small and medium-size enterprises. According to FEMA, nearly 90% of smaller companies fail within a year following a disaster unless they can resume operations within five days. Similarly, businesses can fail without the essential protection that insurance affords. To close the protection gap, in the past, we have seen government regulations being imposed on flood and terrorism insurance cover. With the current COVID-19 crisis expected to cost billions of dollars in lost revenue for businesses, it is reasonable to expect governments to propose similar regulations that would encourage insurers to offer BI/CBI policies with better pricing and coverage terms.

Navigating the Uncertainty

With the continually evolving nature of the COVID-19 outbreak, there is no clear distinction between inherent risk and uncertainty. Figure 2 shows the total confirmed cases per million versus gross domestic product (GDP) per capita for different countries based on data as of March 30, 2020. Interestingly, there is a strong correlation between total confirmed cases per million and GDP per capita. There could be many reasons (e.g., test availability, frequent air travel) for why we see a strong correlation, but one main inference from the data would be that the world's major economies are seeing significant disruption to manufacturing and services. Investment firms, (re)insurers, corporations, and government agencies are looking for guidance on what the potential impacts from BI and CBI may be so that they can build risk mitigation strategies to navigate the current uncertainty.

[2] https://www.theinsurer.com/news/swiss-re-facing-250mn-tokyo-olympics-event-cancellation-exposure/7543.article

Analyzing historical records of similar pandemics can provide context, as each historical pandemic caused immense social and economic losses—regardless of specific event size—but historical analysis alone cannot account for events such as the COVID-19 pandemic, which holds the potential to cause even greater damage as conditions evolve. By accounting for the frequency and severity of disruptions, probabilistic models provide a detailed quantitative assessment of risk that helps organizations properly prepare and assess vulnerabilities in their value chains. Similarly, quantitative models allow businesses to stress-test their supply chain risk by running different edge cases—scenarios that represent both the left and the right tail of the distribution—and assess future risks. Using predictive methods, the AIR Supply Chain Risk Model identifies macro-level causal interdependencies that allow companies to determine potential impacts from disruptions and make data-driven decisions on risk mitigation and risk transfer. The rich set of quantitative analytics from AIR's supply chain model can help businesses better manage uncertainty as the effects of COVID-19 continue to expand around the world.

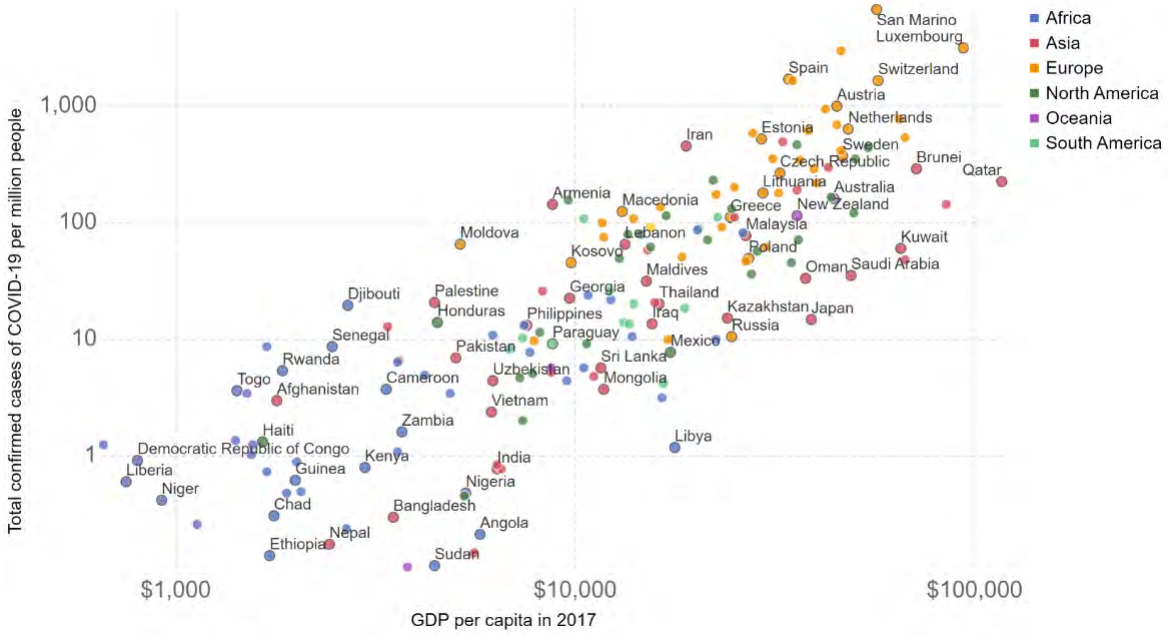

Figure 2: Total confirmed cases per million people vs. GDP per capita. (Source: www.OurWorldInData.org)

Economic Impact: Piecing Together the Puzzle

What is the economic impact of the Coronavirus? There is no easy answer to this question. It's genuinely similar to piecing together a puzzle. Depending on how long businesses are interrupted, the extent of the economic impact will begin to become exponentially worse. To understand the bigger picture, we rely on bringing together large-scale multidimensional data sets and combining them to derive actionable insights. Within the AIR supply chain risk modeling framework, by using different data sets together, we can answer questions that cannot be answered by one data set alone. Understanding the patterns and correlations across many data sets provides a more holistic viewpoint of the complex interdependencies that exists in today's interconnected manufacturing world.

a) **Potential Supplier Database:** This proprietary database has nearly 3.2 million companies worldwide covering different product groups across multiple industries. Using this data, we can identify exposure concentrations for different product groups and the companies that could potentially be impacted from a disruption.

b) **Product Flow Mapping:** An important step in supply chain modeling is enumerating and associating the physical parts required to construct a final product. AIR has constructed product flow maps for different industries, and Figure 3 shows an abridged version of the product flow map for the Food and Beverage industry. The data allows us to capture product correlations within and across industries, a key component to assessing aggregation risks.

c) **Hazard Layers:** This step represents the different predictive variables that inform us on the frequency and severity of disruption events.

d) **Trade Network:** Supply chain modeling involves understanding trade patterns across regional economies (Figure 4). We have put together a data set that tracks the movement of different product groups across different countries.

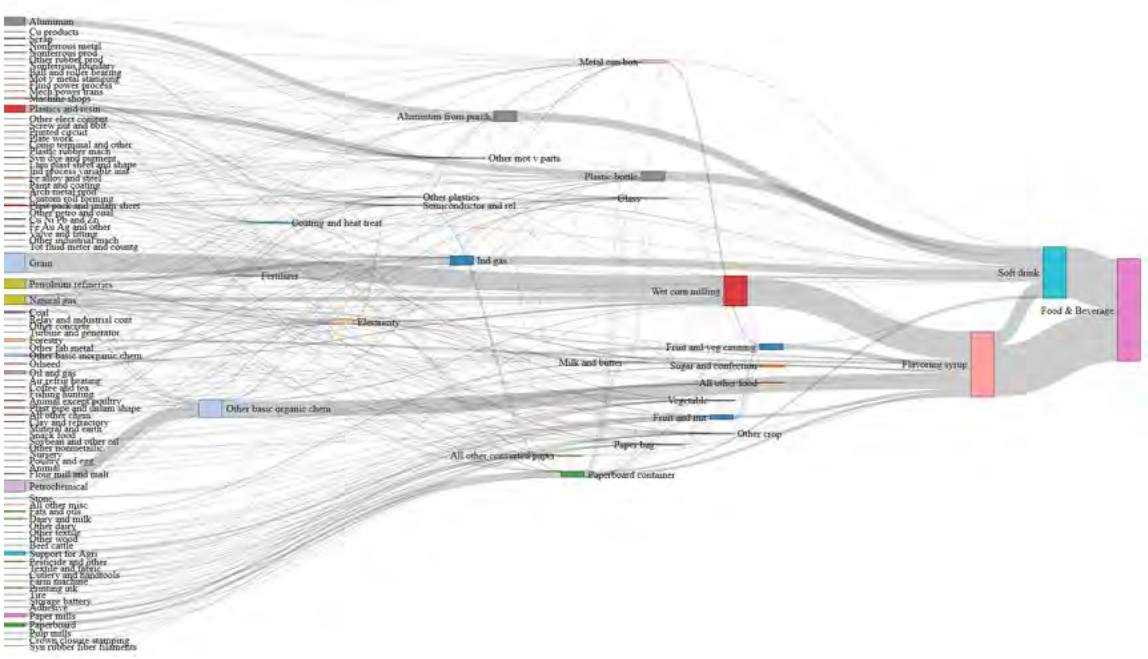

Figure 3. Product flow maps for Food & Beverage industry.

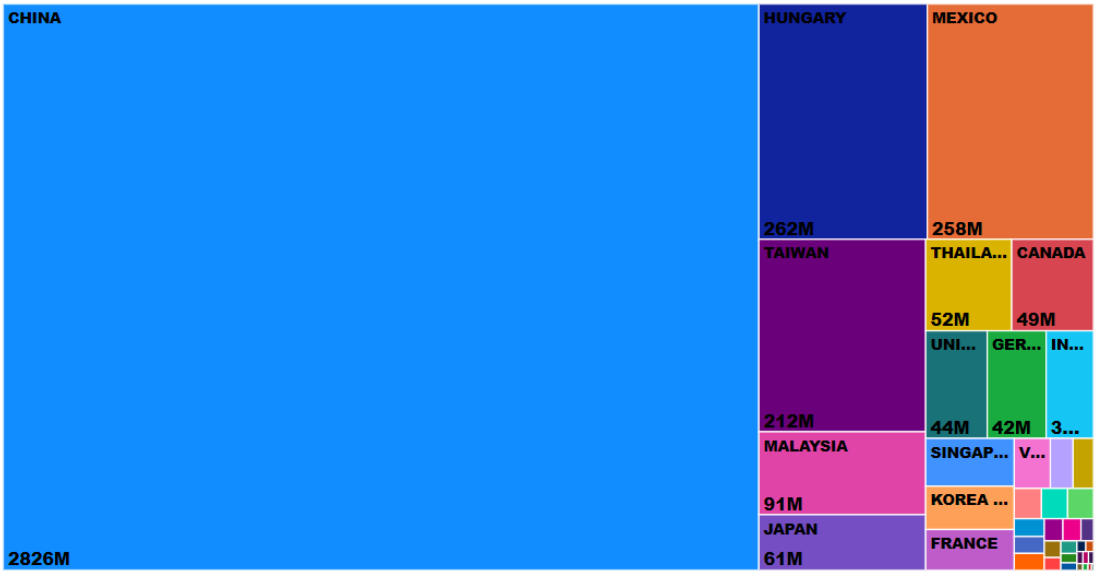

Figure 4. Computers – U.S. Imports (USD) by country.

Integrating these four data sets in a quantitative risk modeling framework allows us to account for a scarcity of information, uncertainty of exposures, and underlying correlations across the value chain. Details on AIR's supply chain risk modeling framework can be found in this report recently published by AIR, in collaboration with Lloyd's of London, on quantitative assessment of supply chain risk.

Estimating the Economic Impact

Each business is unique, so generalizing the size of risk in its supply chain versus its own operation would be an oversimplification of the problem. Nevertheless, we can make these generalizations by different industries based on the complexity of the supply chains, exposure concentrations, and trade flow patterns. For example, U.S. imports from China account for 21% of overall U.S. imports. Any disruption to manufacturing in China, from the outbreak of COVID-19 in Wuhan, would manifest as a loss for businesses in the United States. In particular, the U.S. imports nearly USD 1 billion worth of printed circuits boards from China (Figure 5). Sustained disruptions to printed circuit board manufacturers across China and Vietnam can lead to a shortage of parts for computer and electronic device manufacturers in the U.S. Similarly, with a sustained shutdown of operations of U.S. manufacturers due to COVID-19, the demand for printed circuit boards is expected to drop, and this eventually would lead to business interruption losses for manufacturers in China.

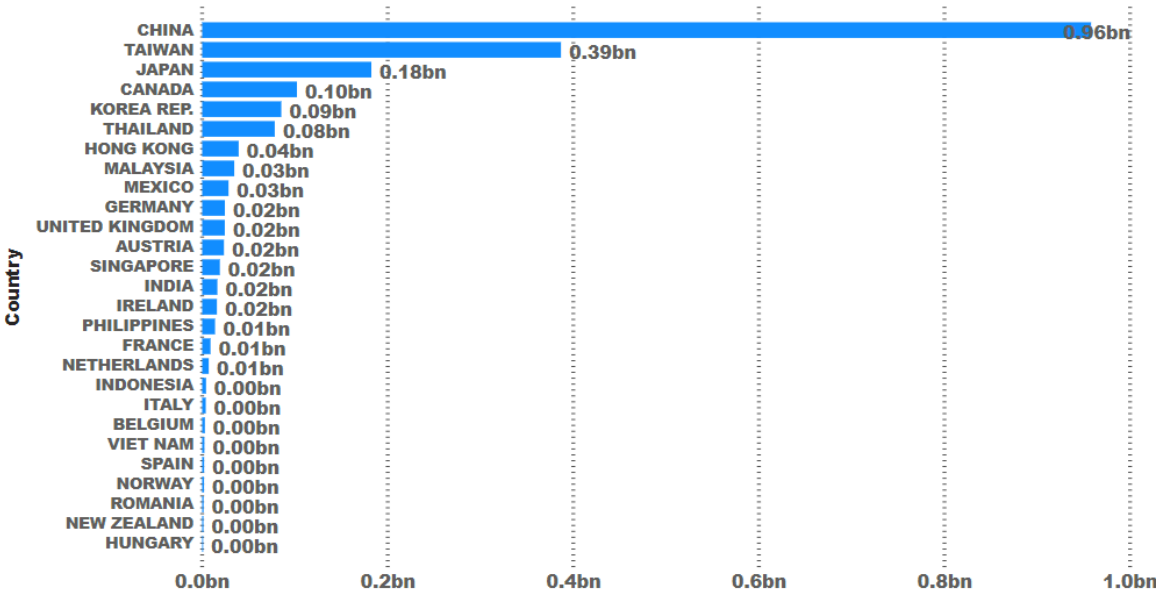

Figure 5. Printed circuit boards, U.S. imports by country.

Given the spread of COVID-19 and the associated uncertainty with the circumstances, to ascertain the economic impact of this pandemic on U.S. manufacturers, we constructed a scenario event where the consumer electronics suppliers in China were shut down for 30 days and estimated the resulting impact of businesses across different product groups in the U.S. with the supply chain risk model. Two additional scenarios were created where businesses in Germany and Taiwan, respectively, were shut down for 30 days due to the COVID-19 outbreak.

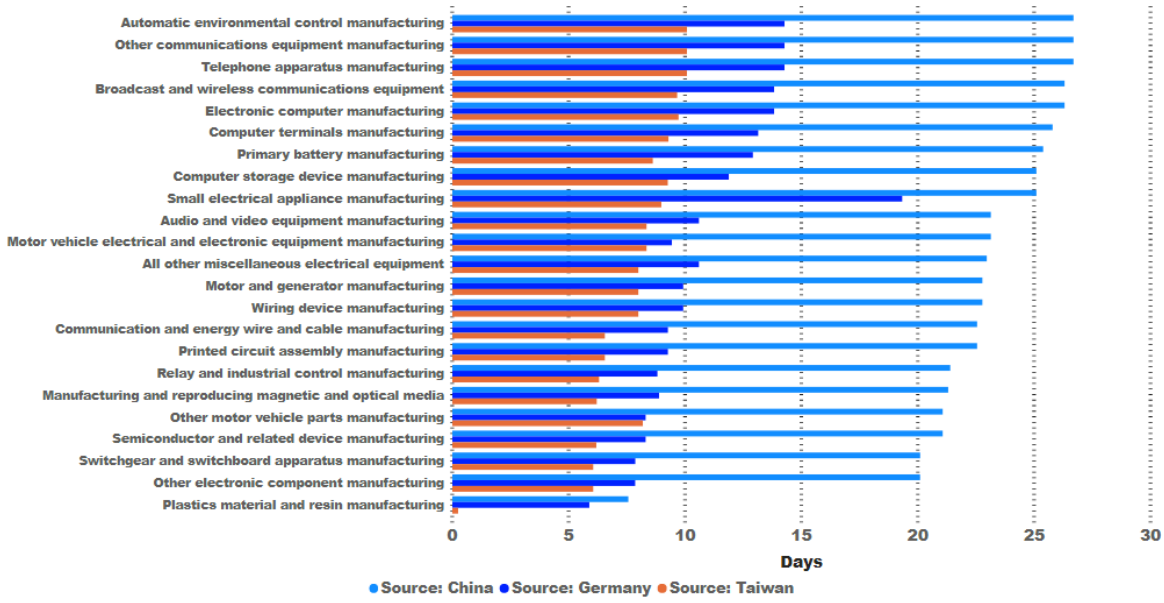

Figure 6. Impact on different U.S. industries from a 30-day disruption to consumer electronics manufacturers in China, Germany and Taiwan, respectively.

The model estimates are shown in Figure 6. The X-axis represents the number of days U.S. businesses are expected to be disrupted because of a 30-day shutdown of manufacturers in China, Germany, and Taiwan as separate scenarios. The Y-axis represents the different product groups that could be impacted. For example, “computer terminal manufacturers” in the U.S. are expected to have a possible business interruption of ~26 days because of manufacturers in China being shut down for 30 days. Similarly, the shutdown of German manufacturers on “small electrical appliance manufacturing” in the U.S. is more pronounced. It is also interesting to note that the disruptions to electronics manufacturers in different countries also manifest as disruption downtime for “motor vehicle electric and electronic manufacturers” in the U.S. Electronics comprise nearly 40% of a vehicle’s cost, and the AIR supply chain model can capture these product interdependencies across different industries. The Product Value at Risk (PVAR) for different U.S. industries can then be estimated by applying the number of expected disruption days on the amount of trade flows to the U.S. from the country of pandemic outbreak. For “broadcast and wireless equipment manufacturers” in the U.S., the total estimated PVAR is around USD 4.2 billion (Figure 7) based on a 30-day disruption to consumer electronics manufacturers in China. These numbers represent the upper bound of PVAR as the analysis was performed with a zero-inventory assumption. Clearly, businesses in the U.S. have significant risk exposure to disruptions happening in China, compared to potential pandemic outbreaks in Germany and Taiwan (Figure 7).

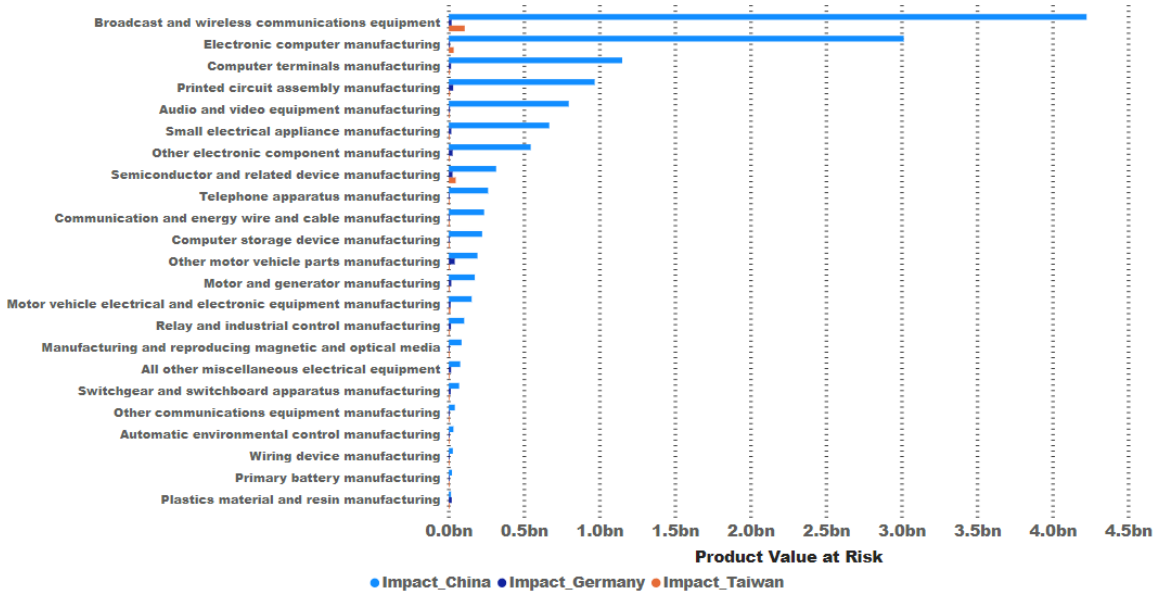

Figure 7. Product Value at Risk (PVaR) across different U.S. industries based on a 30-day disruption to consumer electronics manufacturers in China, Germany, and Taiwan, respectively.

A similar set of scenarios were analyzed to study the impact on France's different industries from a 30-day disruption to consumer electronics manufacturers in China, Germany and Taiwan, respectively. Results from the analyses are shown in Figure 8. The impact from China is not as pronounced on France when compared to the previous impact on the U.S., but we see a bigger influence from German manufacturing on France's companies. Countries within the Eurozone trade extensively with each other, and Germany is one of France's main trading partners. Like the U.S., the PVAR for most industries in France are driven by their dependencies on manufacturing in China; however, motor vehicle parts manufacturing in France is more dependent on German consumer electronics manufacturers (Figure 9). Understanding these macro-level interdependencies helps insurance and investment firms understand their risk exposure across their portfolios as COVID-19 shuts down businesses across the world.

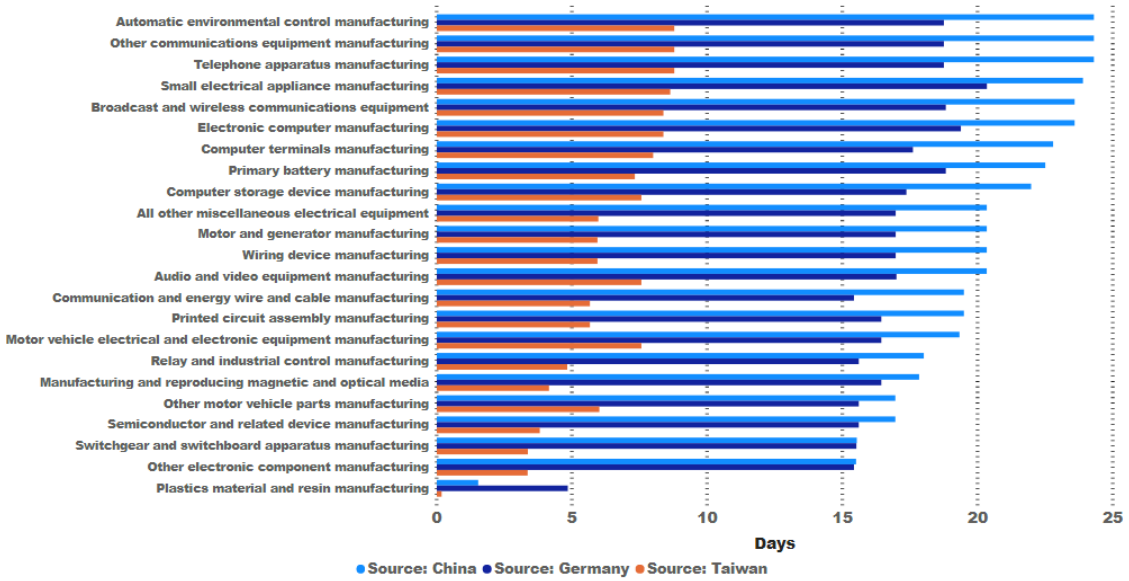

Figure 8. Impact on France's different industries from a 30-day disruption to consumer electronics manufacturers in China, Germany and Taiwan, respectively.

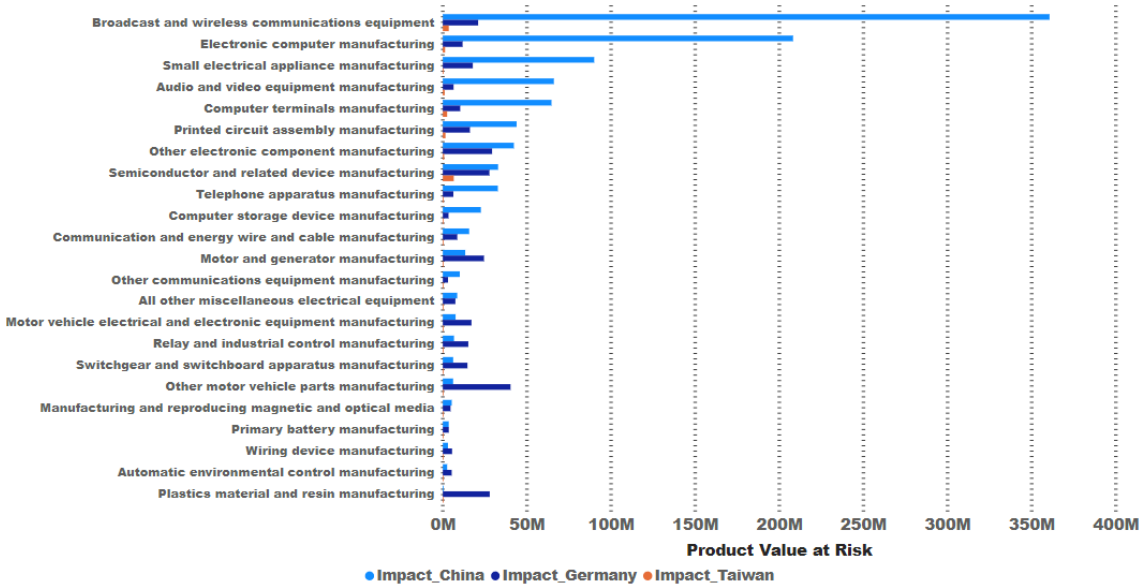

Figure 9. Product Value at Risk across different France's industries based on a 30-day disruption to consumer electronics manufacturers in China, Germany, and Taiwan, respectively.

Supply Chain Modeling to Build Resilience, Close the Protection Gap

Supply chains come in different shapes and sizes, and in today's interconnected world there are myriad vulnerabilities that companies are exposed to. The work presented in this report gives a preview of AIR's modeling capabilities in understanding the economic impacts of supply chain disruptions. Similar economic loss estimates can be derived for other industries and for a specific company of interest. While the consensus is that the large majority of the economic losses from the outbreak will not be covered, there is growing concern in the insurance market on other related liabilities and the possibility of a "silent pandemic," where ambiguous language in the insurance contract can be construed to make physical damage claims that could subsequently trigger significant business interruption losses. The economic ramifications from the COVID-19 pandemic is a stark reminder of the need to understand the complex vulnerabilities in today's interconnected world, and that we can expect the demand for BI/CBI cover to increase. For the (re)insurance community, this presents an opportunity for market growth. With better data and analytics to identify and measure interconnected risks, we, as a community, can find ways to close the protection gap and build resiliency against future risks, including pandemics.

About AIR Worldwide

AIR Worldwide (AIR) provides risk modeling solutions that make individuals, businesses, and society more resilient to extreme events. In 1987, AIR Worldwide founded the catastrophe modeling industry and today models the risk from natural catastrophes, terrorism, pandemics, casualty catastrophes, and cyber incidents. Insurance, reinsurance, financial, corporate, and government clients rely on AIR's advanced science, software, and consulting services for catastrophe risk management, insurance-linked securities, longevity modeling, site-specific engineering analyses, and agricultural risk management. AIR Worldwide, a Verisk (Nasdaq:VRSK) business, is headquartered in Boston, with additional offices in North America, Europe, and Asia. For more information, please visit www.air-worldwide.com.