

Systems, Sense and Sensibility

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March 2020

A closer look at network applications with respect to environmental and economic risk highlights how much we do not understand the world in which we live.

For those of us who spend our time in the climate, environmental, technological and financial risk sphere, the importance of understanding the present and historical context with respect to physical, social and economic networks is the foundation of any meaningful analysis if we are to attempt to apply our learnings. How can global economic activity flourish, while also deliver meaningful results towards equitable sustainability commitments? How can economic and environmental objectives be balanced and expanded in the face of increasing global demand for all categories of products, goods and services? How can we shift the risk conversation to one of opportunity? How can the network and geospatial sciences inform risk management activities when large scale supply chain disruptions manifest themselves? What does Environmental, Social and Governance (ESG) really mean as applied to the activities and supply chains supporting multinational corporations? These are only a handful of the many topics that are necessary to think about and prepare for a world anticipating more severe and more frequent risks. Note that the objective here should not be to predict risks - many analysts, consultants or sell-side outfits claim to forecast categories of risks with precision. It is up for debate whether or not predictions of extreme events related to natural disasters, financial crises, or geopolitical activities are actually embedded with any real skill - numerous retrospective analyses have shown that many claims of prediction skill are either purely incorrect, or they were right for the wrong reasons. In either case, the more responsible way to view potential risks associated with extreme events is not to predict, but rather prepare for their occurrence.

The current global economic slowdown related to the COVID-19 outbreak illustrates a timely, albeit extreme, example of what can happen when the commercial and financial sectors, and society at large, are not prepared for unforeseen volatility resulting from global and local business disruption. It is important to note that while the pandemic in this case seems to have served as the catalyst, there are numerous factors which were supporting this house of cards in the months and years preceding the event. Therefore, instead of

taking the commonly held approach of attempting to predict (and subsequently take credit for predicting) the event itself, we are better served by analyzing the contextual factors which may have led to the market/ecosystems reversal, trying to develop a better understanding of the interconnectedness among the parts of the system.

Regarding the current societal and market activity, we are now well past the preparation stage, and into the reaction phase. Once we get past the obvious changes in demand for the products and services that many of us take for granted each day, we have to look closely at the foundation of what makes society work - the access to secure and reliable energy, water, agricultural and material commodities which serves as the fulcrum on which nearly all societal endeavors depend. We can do without movies, sporting events and going out for dinner, but we cannot do without food, water, energy and transportation. As I noted in *Material Movement through the Biosphere*: while the modern economy has seemingly shifted from one built upon brick and mortar businesses delivering goods and services to one of bits, atoms and electrons, a closer look reveals that the cornerstone of global commerce and trade still has at its foundation the extraction, refinement, transformation and distribution of specialty and commodity food, material and energy resources. So rather than taking the long/short approach in trying to look at the various market players through a single-stock lens, attempting to pick individual winners and losers, we should be looking for both the strong and weak links in the system as a whole, and then pushing from a sector perspective to both allocate capital towards the most vulnerable, while at the same time stimulating the opportunities for the sectors that are more robust. By viewing the market ecosystem from this perspective, we see that many assumptions underlying what is believed to be a normally functioning market, contain hidden systemic risks which become exposed when the networks are highlighted.

Data and Decision Sciences can go along way in helping us on the quest to better understand the complex web of relationships which underly the socioeconomic and technological foundation which is the driver of today's interconnected economy. However, we should also not be so bold as to believe that more analysis or better models will always lead to a more enlightened answer; instead, we should get comfortable with ambiguity and the premise that the more we understand, the more we have to learn. And to prepare accordingly.

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