



Uncertainty Affects All: How Supply Chains Change with COVID

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The COVID-19 pandemic is an unprecedented uncertainty shock. This paper uses the rise of uncertainty in the financial sector to evaluate how global value chains (GVCs) will evolve with the pandemic. It then asks whether governments need to step in to help firms to navigate the crisis.

With the fall of the Soviet Union in 1989 and the entry of the People's Republic of China into the World Trade Organization in 2001, major markets with low labor costs entered the world economy. Firms in high-income countries started to utilize GVCs by relocating parts of production to these regions to save on labor costs. At the same time, a revolution in the transport sector—containerization—lowered transport costs, making offshoring very profitable. As a result, GVCs exploded in the hyper-globalization period from 1990 to 2008. According to estimates, GVCs accounted for 60 percent of world trade, but since the financial crisis of 2008, GVCs have stopped growing.

Why have GVCs stopped growing? The financial crisis changed the relative costs of GVCs and robots. The increase in uncertainty from the financial crisis made GVCs more costly, with the increased risk of a non-delivery of an input good. Over the course of the Euro debt crisis from 2008 to 2012, uncertainty rose by over 200 percent as indicated by the World Uncertainty Index (WUI).¹

At the same time, the cost of financing a robot relative to hourly wages changed by more than 100 percent, favoring the adoption of robots. As a result, firms in high-income

countries reshored production back to the home market and invested in robots. After the financial crisis, GVCs and robots became substitutes. The more robot-intensive a sector is, the less it engages in GVCs.²

The COVID pandemic has accelerated this trend and is likely to lead to deglobalization. COVID will likely lower GVCs by 35 percent and increase robot adoption by 76 percent. This calculation assumes that, in the COVID pandemic, the WUI increased by 300 percent (the first SARS1 epidemic increased the WUI index by 70 percent) and lowered the ratio of interest rates to hourly wages by 30 percent. The robot adoption number is on the high end, since it does not take into account that uncertainty also reduces investment and robot adoption.

Rising transport costs are likely to accelerate the shift away from GVCs. During the pandemic, the cost of containers used to ship goods from Asia to Europe and the United States rose nearly tenfold, and transport workers, facing increasingly harsh working conditions, have been leaving their jobs. It remains to be seen whether the turmoil in the transport sector, which has led to supply-chain bottlenecks, is transitory or persists in the long term.

This vulnerability helps to explain why the European Union has earmarked part of its €750 billion NextGenerationEU recovery fund to establish a semiconductor and battery cell sector in Europe, to make Europe less dependent on Asian suppliers. US policymakers have similar concerns.

The Biden administration has presented an assessment of America's supply chain vulnerabilities to strengthen domestic production networks.

Some might argue that high-income country governmental efforts to strengthen domestic and regional production networks reflect a new form of economic nationalism, driven by fear of China. But the crucial question is whether companies really need state help to protect themselves from supply chain turbulence.

There are three ways that advanced-economy firms can make their input supplies more resilient, and only one of them requires government involvement. One option is to take control and reshore production from developing countries. A second way to insure against supply chain shocks is to build inventories and to switch from "just-in-time" production to a "just-in-case" model. Third, companies can dual-source or triple-source inputs, relying on suppliers from different continents in order to hedge the risk of natural disasters and other regional disruptions.

But this diversification strategy has its limits. For example, a highly specialized supplier that invests in research and development to provide a specific input is not easily replaceable, and sourcing others can be costly. Heavy regional concentration of suppliers also makes diversification difficult. Most producers of chips, battery cells, rare earth materials such as cobalt and lithium, and pharmaceutical ingredients are based in Asia. Geographic clustering of input suppliers can generate upheavals in the rest of the world, as the current global semiconductor shortage illustrates. In a 2012 paper, MIT's Daron Acemoglu and his co-authors showed that disruptions to an asymmetric supply chain

network—in which one or a few suppliers deliver inputs to many producers—can spread throughout the world economy and potentially lead to a global recession. That supply chain disruptions can have global economic effects has been recently shown in empirical studies of the 2011 Great East Japan Earthquake³ and of three decades of major natural disasters in the United States.⁴

In such cases, governments can play a useful role by helping to provide firms with more potential alternative suppliers. Governments in the United States and European Union can ensure that a sufficient number of suppliers are available in both Europe and North America to hedge against the risk of disruption.

Endnotes

1. WUI developed by Ahir et al (2018) counts the frequency of the word uncertain or variants in EIU country reports.
2. Faber, M. Kilic, K. Marin, D. (2022), Uncertainty, Robots, and Supply Chains, Technical University of Munich, Mimeo.
3. Carvalho, V.M. et al. (2021), Supply Chains Disruptions: Evidence from the Great East Japan Earthquake, *Quarterly Journal of Economics*, 136(2), p 1255-1321.
4. Barrot, J.N. and Sauvagnat, J. (2016), Input Specificity and the Propagation of Idiosyncratic Shocks in Production Networks, *Quarterly Journal of Economics*, 131(3), p 1543-1592.