

MACRO STRATEGY

Still Chained: N95 Masks and Supply Chains Lessons During COVID-19

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Supply chains have become a much-maligned component of the international trade system. We examine the N95 mask shortage during the COVID-19 pandemic and argue that it demonstrates the difficulties of unraveling supply chains.

N95 Masks: Deceptively Simple yet Vital

We start by looking at the N95 production process. The U.S. International Trade Commission published a report in December 2020 about the supply chain problems for COVID related goods, including N95 masks.¹ Although it appears simple, masks are quite carefully engineered to provide the medical and environmental grade level of protection. Constructing the mask requires specialized equipment. Inputs include principally the meltblown fabric from which the main part of the mask is made, which is itself made from polypropylene resin using specialized equipment. During the pandemic, each of the steps faced supply constraints.

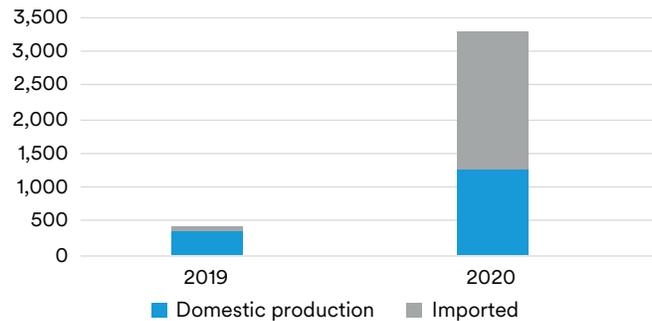
The U.S. Market for N95 Masks

Before the pandemic, the U.S. market was mostly (about 80%) supplied by domestic production. It did not appear particularly vulnerable to global supply chains. The main vulnerability was that most of the imported masks were imported from one country, China.

At the start of the pandemic, U.S. mask demand skyrocketed. Mask imports from China fell as the Chinese government prioritized its own response to the pandemic. U.S. firms retooled production lines to the extent that they could toward N95 masks and meltblown fabric production. Domestic mask production rose six-fold, but still couldn't meet demand. Relatively few domestic firms invested in new production lines, with lead times to setting up new production lines nearly a year long, and representing a considerable investment. Moreover, with long run demand quite uncertain, few firms decided the investment was worth the risk. There were a few firms that did take the risk. Most struggled to attract buyers: their production costs were high, and they were largely shut out of the market as medical goods distributors stuck with their supplier relationships.²

Much of the slack was eventually taken up by supply from abroad, mostly China. Beginning in June, Chinese suppliers began export again. In the summer months of 2020, imports of N95 masks rose 60-fold. By December 2020, the domestic/imported split was partly reversed with 62 percent of supply coming from abroad. The supply remains far from sufficient as evidenced by higher mask prices, from about \$1 per mask pre-pandemic to as much as \$6 during parts of 2020.³

Monthly N95 Masks Production (millions)



Source: USITC.gov, MIM

Supply Chains Aren't Dead Yet

Although this episode is an extreme example of fluctuating supply and demand, it can provide some lessons on supply chains and self-sufficiency.

1. International supply chains remain an important source of production flexibility, reducing the need for each country to expand investment for shifts in demand.
2. China remains uniquely able to flexibly scale up production to meet consumer demand.
3. Market forces may not yield sufficient investment in a needed good, especially when the demand is expected to be short-lived or volatile. For critical goods, government intervention – or accepting a period of shortages – may be required.

Supply chains are not dead. The U.S.-China trade war failed to kill them, a global pandemic failed to kill them. While adjustments around the margins – reductions in foreign dependence of the most critical technologies – are likely possible, true “freedom” from supply chains is a much more difficult and expensive proposition.

Endnotes

- 1 The figures and production details in this article are taken from the U.S. International Trade Commission report. USITC, “COVID-19 Related Goods: The U.S. Industry, Market, Trade, and Supply Chain Challenges,” Pub No. 5145, December 2020.
- 2 Jacobs, Andrew, “Can’t Find an N95 Mask? This Company Has 30 Million That It Can’t Sell.” New York Times, February 10, 2021.
- 3 Dataweb.USITC.gov

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