Listen: How 3D Printing May Increase Trade in Hearing Aids

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3D printing has revolutionized the market for customized products. While some experts predict 3D printing will decrease trade, a study from the World Bank finds that 3D printing can increase trade in certain industries such as hearing aids. In light of changes in global manufacturing because of 3D printing, the hearing aid industry has shifted nearly exclusively to additive manufacturing, providing an illustrative example of how 3D printing can impact trade flows.

3D Printing and International Trade

3D printing, a type of additive manufacturing that produces 3D objects by building layers of material upon each other, is being increasingly adopted by industries around the world.[1] During the COVID-19 crisis, a global rise in 3D printing led to the manufacturing of personal protective equipment (P.P.E.) and medical device inputs closer to the end user. Many studies describe the potential for 3D printing to alter global manufacturing by allowing firms to produce parts and components closer to customers, thereby reducing the number of intermediate suppliers and shipments—or "tightening" supply chains. However, a recent study from the World Bank on the global trade in hearing aids provides an example of an industry in which 3D printing increased cross-border trade and expanded the global hearing aid market without disrupting supply chains.

U.S. and Global Advancements in 3D Printed Hearing Aids

Since the early 2000s, hearing aid manufacturers worldwide have increasingly used 3D printing to produce customized products that can be made closer to the end user. Swiss based company Sonova was the first to incorporate 3D printing into their manufacturing process at the start of the millennium. Additionally, Belgium-based Rapid Shell Modeling linked up with Phonak, a Swiss hearing aid manufacturer, to establish a localized process for making hearing aids. Soon after, the U.S. followed suit with a Minnesota-based hearing aid manufacturer; Starkey Hearing Technologies 3D prints 98 percent of their hearing aids in facilities worldwide.[2] Improvements in additive manufacturing allowed for customization of hearing aids, which has contributed to reduced stigma and discomfort for purchasers.

3D Printed Hearing Aids and Trade

One 2019 World Bank paper from Freund, Mulabdic, and Ruta, the first empirical study of the impact of 3D printing on trade, run in direct contrast to the common thought that 3D printing will decrease trade flows.[3] The authors noted that, based on 1995–2016 trade data, trade under the HTS statistical reporting number for hearing aids (9021.40) increased, supporting the view that 3D printing boosted trade in

[1] For more information, see Christine Kobza. "Could 3-D Printing Change Global Trade? The Potential Effects of 3-D Printing on Global Supply Chains."

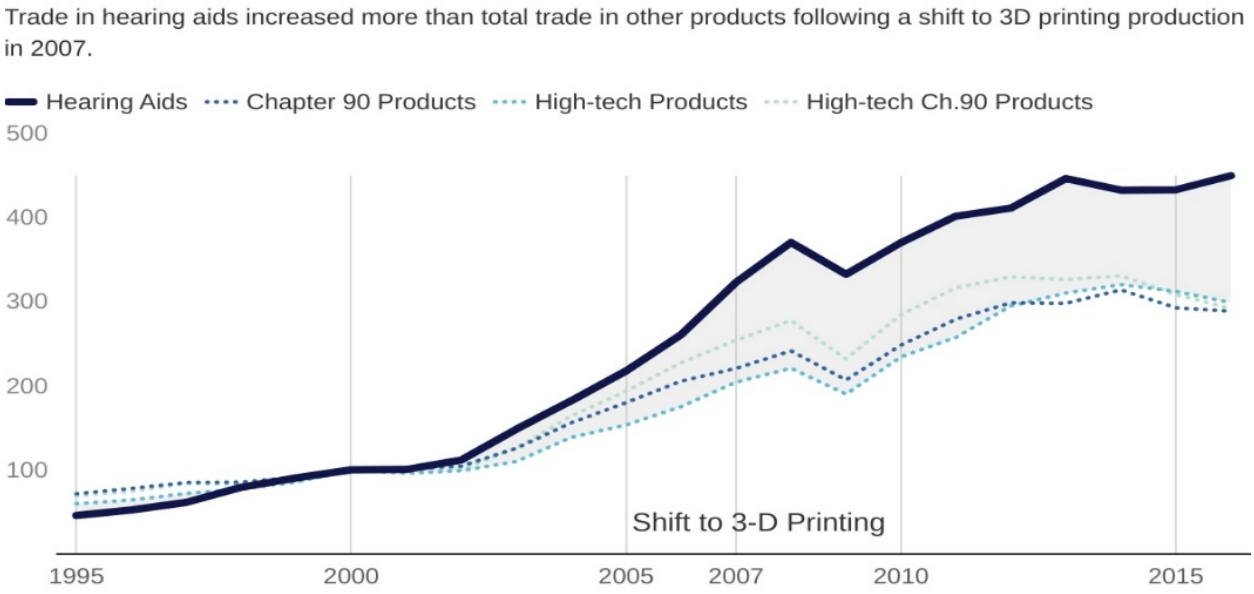
[2] The remaining two percent are not made with 3D printers as a result of complicated form factors and various medical reasons

[3] Freund, Mulabdic, and Ruta, Myth-busting: Why 3-D printing might actually be good for trade, November 18, 2019. In addition to examining country trade data, the authors used a differences-in-differences regression model along with synthetic controls to minimize omitted variables bias, and to determine the impact of 3D printing technology on exports and imports of hearing aids. Findings reported in this article are the authors' estimates using synthetic controls.

hearing aids rather than disrupting international trade flows. Indeed, U.S. exports of hearing aids increased faster than other high-tech products (figure 1). The empirical analysis specifically examined exports and imports of hearing aids before and after 2007—the year 3D printing technology became widely adopted in the industry—while controlling for other determinants of trade. The authors estimated that increased global trade in hearing aids after 2007 is attributable to the use of 3D printing, and that the impact of 3D printing on trade in hearing aids is positive and statistically significant. Exports of hearing aids increased by 56 percent from 2007 to 2016, leading to the finding that 3D printing allowed manufacturers to reduce costs and improve quality, resulting in increased global sales. Moreover, countries that had a comparative advantage in making hearing aids (United States, Germany, France, and the United Kingdom) saw exports almost double during the period. Hearing aid imports increased by 77 percent from 2007 to 2016, driven by an expansion in demand by countries with a relative disadvantage in hearing aids. 3D innovation made hearing aids more available to developing country residents with hearing loss.

Improvements in 3D printing devices likely contributed to the increase in additive manufacturing. The World Bank found that there was no evidence that 3D printing moved manufacturing closer to the end user and disrupted trade. Mass printing hearing aids requires heavy investments and specialized services. Because hearing aids are light products, they are relatively cheap to transport, providing less incentive to manufacture locally. Looking ahead, 3D printing in other medical devices for which the ability to customize would be an asset (such as dental devices and eyeglasses) may also lead to increased trade.

Figure 1: 3D Printing Likely Increased Trade in Hearing Aids, 1995-2017



Source: World Bank

Note: Figure 1 plots normalized values of exports (2000 units = 100 units) on the y-axis. Chapter 90 of the HTS includes optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus, and their parts and accessories.

Sources: Wass, Sanne. *3D printing could wipe out 40% of world trade by 2040.* IBIS*World.* *Hearing Aid Manufacturing in the US Market Size in 2003-2020.* Grayson, Katharine. *Tour Starkey's high-tech hearing aid R&D and manufacturing labs.* Sharma, Rakesh. *The 3D Printing Revolution You Have Not Heard About.* Ruta, Michele, Mulabdic, Alen, Freund, Caroline. *Myth-busting: Why 3-D printing might actually be good for trade.*