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Economic Perspectives on Societal Challenges: Equality of Opportunity, Market Regulation, and Financial Stability - EPoS

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PRESS RELEASE

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China's Rare Earth Restrictions Made EU Manufacturers More Competitive, Study Finds

- **EPoS Economic Research Center analyzed over 30,000 patents improving use of rare earths**
- **After restrictions, companies innovated products and boosted exports**
- **Technological advances increased productivity of EU manufacturers**

Bonn, Mannheim, Germany, 17.12.2025 – **China's restrictions on rare earths have triggered innovation and improved competitiveness of manufacturers in the European Union as they developed new products using less or no rare earths. This enabled them to increase productivity and expand their exports. By contrast, innovation and exports of Chinese manufacturers - who retained full access to rare earths - did not grow to the same extent. These are findings of the EPoS Economic Research Center at the Universities of Bonn and Mannheim. The economists analyzed the effects of the trade conflict around rare earths between 2010 and 2015 and published their results in the discussion paper "Trade and Industrial Policy in Supply Chains: Directed Technological Change in Rare Earths".**

"We analyzed the impact on manufacturers of the rare earths supply shock after China had imposed export restrictions on the rest of the world," says Jan Schymik from the EPoS Economic Research Center. "Our results show, that EU manufacturers were initially hit hard, as global prices for rare earths spiked up to 45-fold. Yet, companies were able to adjust and make innovative changes to their technologies. For example, car manufacturers invented new technologies that reduced the usage of rare earths in permanent magnets or catalysts. These adjustments paid off, as they helped to compensate for the increased input prices and sometimes even led to a subsequent expansion of industries."

Supply shock led to innovation and export growth

Thanks to technological change, manufacturers in the EU that relied intensively on rare earths innovated so much, that their annual export growth was 0.3 percentage points higher compared to manufacturers that were not negatively affected by the supply shock. By contrast, Chinese firms, who retained full access to rare earths, did not boost their exports at the same rate.

To assess the innovation activities, the EPoS team built an input-output table for the use of rare earths and analyzed text descriptions of granted patents that describe key improvements of technologies using rare earths. "We find that companies adapted by using rare earths less intensively or found substitutes - the corresponding patenting activities in the EU rose by more than 7.4 percent," says Schymik. The innovation activities are strongest in industries which had used most rare earth elements before the crisis.

What is more, the European economy as a whole did not experience substantial real GDP losses following the restrictions. "The technological advances mitigated the negative effect of supply shortages almost entirely," says Schymik. "Without these technological advances, GDP losses would have been much more substantial." In his view, the potential losses are comparable in magnitude to the GDP benefits of a large free trade agreement, such as the Mercosur agreement currently under discussion.

PRESS RELEASE

How policymakers can help to build resilience

"Technological advances play a key role in mitigating the negative effects of export restrictions on rare earths," says Schymik. "We conclude that EU companies have become more competitive as a result. Policymakers can help manufacturers to cope with supply bottlenecks in a similar situation by enabling an innovation-friendly environment that builds resilience for the long run."

Rare-earths, a group of 17 elements, are crucial for numerous industrial technologies, such as vehicle electrification, or clean energy. They are difficult to substitute. China controls about 60 percent of the mining and 90 percent of the post-mine processing globally. From 2010 until 2015, China restricted access to the rest of the world. Following a ruling of the World Trade Organization the country lifted restrictions after five years. In April 2025, China reimposed export restrictions on certain rare earth elements.

The presented discussion paper is a publication without peer review of the Collaborative Research Center Transregio 224 EPoS. Access the full discussion paper here: https://www.crctr224.de/research/discussion-papers/archive/dp720

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The Collaborative Research Center (CRC) Transregio 224 EPoS
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