



Szkoła Główna Handlowa
w Warszawie 1906–2026

Nature-Related Copper Supply Shocks:

Global Production Networks, Recycling, and Macroeconomic Vulnerabilities

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- The literature provides extensive evidence on commodity market and macroeconomic shocks, yet considerably **less is known about shocks originating from nature-related physical events.**
- In particular, **little empirical evidence exists on the transmission mechanisms of shocks originating from documented nature-related physical events, or on whether market-based adaptation mechanisms,** such as secondary copper recovery, mitigate temporary disruptions to primary supply.



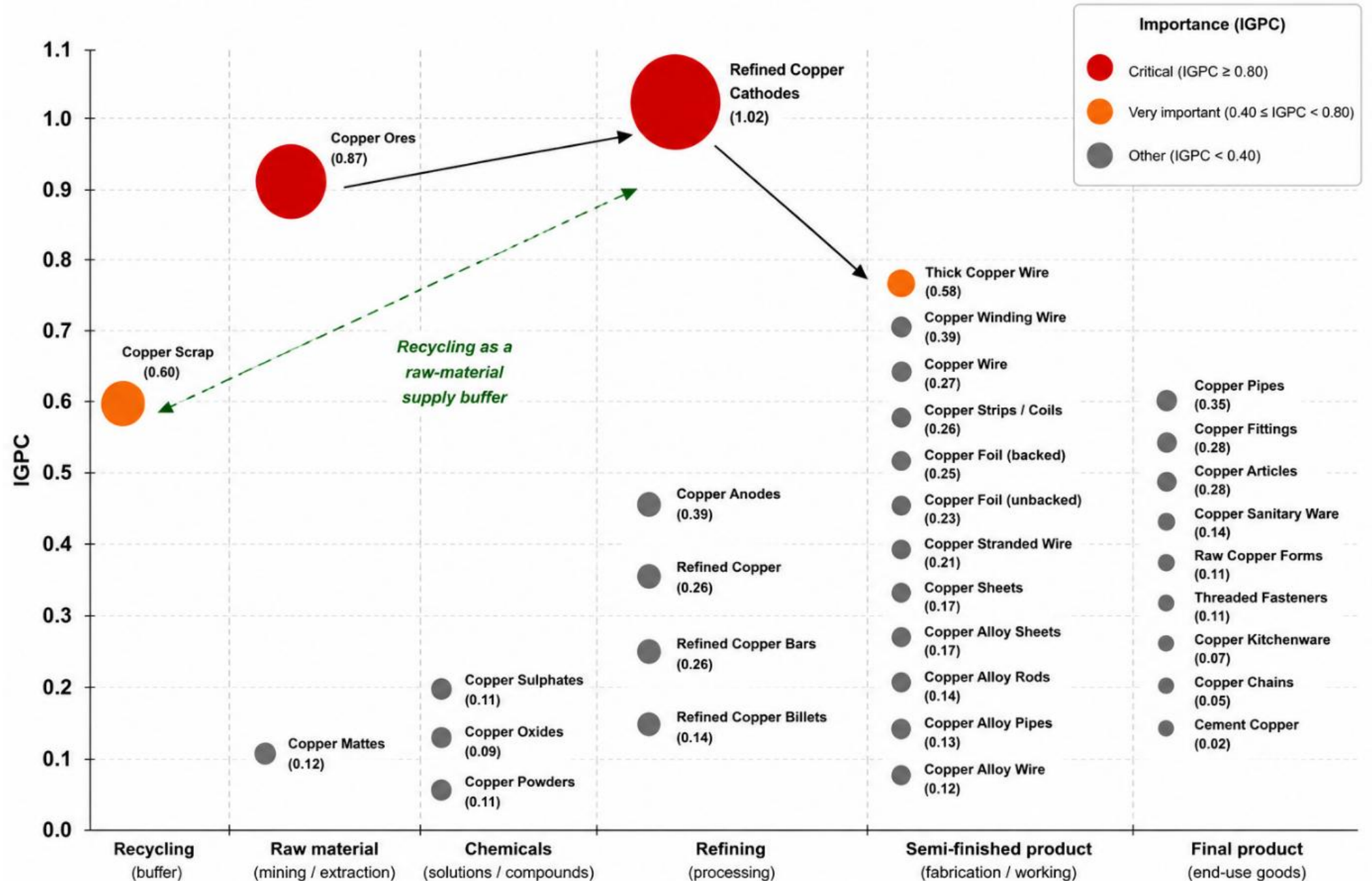
Q1: What are the dynamic effects of disaster-induced copper supply shocks on the global copper market?



Q2: Does secondary copper recovery act as an endogenous market-based adjustment mechanism following disaster-induced supply disruptions?



Q3: Do disaster-induced copper supply shocks remain sector-specific, or do they propagate to the broader macroeconomy?





Assumed economic transmission mechanism

Identification approach:

- Narrative sign restrictions identify the disaster-related copper supply shock.
- The remaining structural shocks are not recursively identified. **Only disaster-related copper supply shock.**

$$IRF^{disaster}(0) = \begin{bmatrix} \approx 0 \\ - \\ + \\ * \end{bmatrix}$$

$$\begin{bmatrix} e_t^{CPB} \\ e_t^{Mine} \\ e_t^{Price} \\ e_t^{Scrap} \end{bmatrix} = A_0^{-1} \begin{bmatrix} \varepsilon_t^{Global\ Demand} \\ \varepsilon_t^{Disaster\ Supply} \\ \varepsilon_t^{Copper\ Demand} \\ \varepsilon_t^{Secondary\ Supply} \end{bmatrix}$$

Variable	Impact restriction	Economic interpretation
CPB World Trade Volume Index	Approximately zero	A Chilean mining disaster should not move global activity contemporaneously.
Mine production	Negative	The disaster directly disrupts primary extraction.
Copper price	Positive	Lower primary supply raises the scarcity value of copper.
Secondary copper recovery	Unrestricted	The recycling response is estimated rather than imposed.

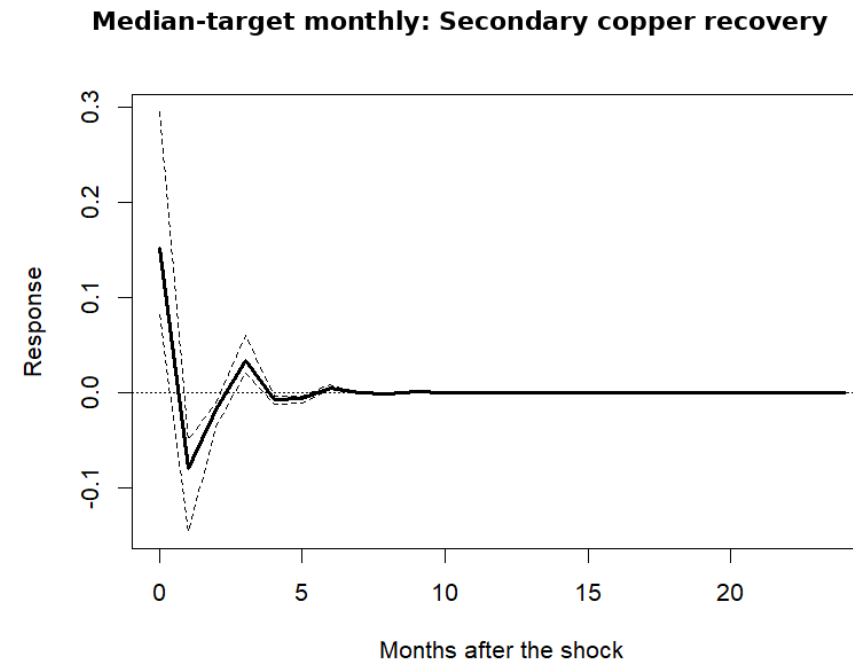
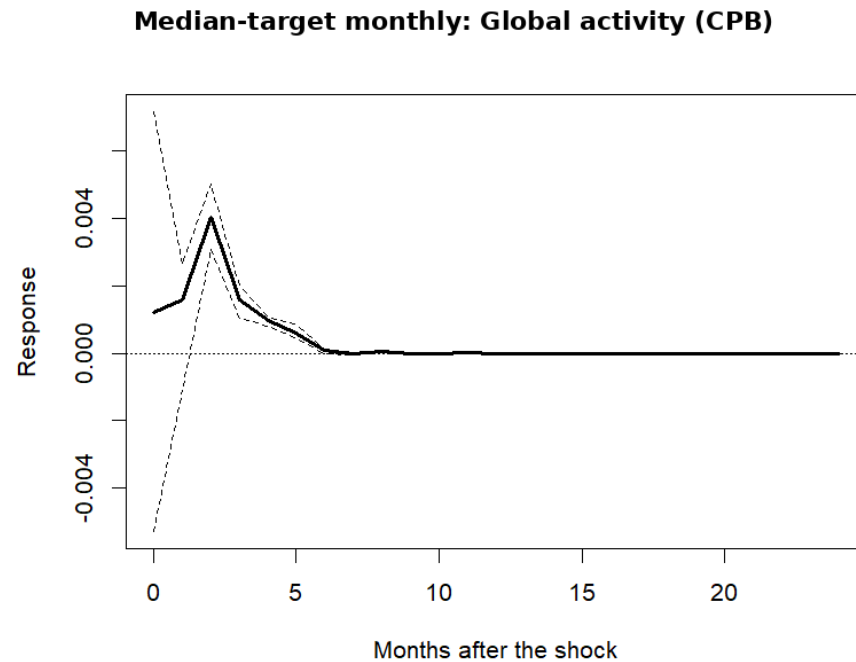
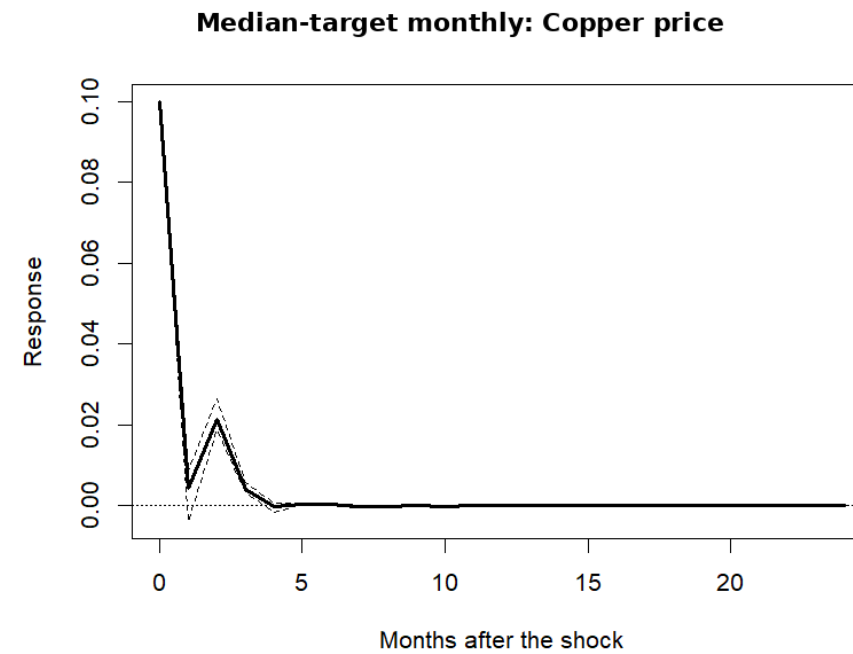
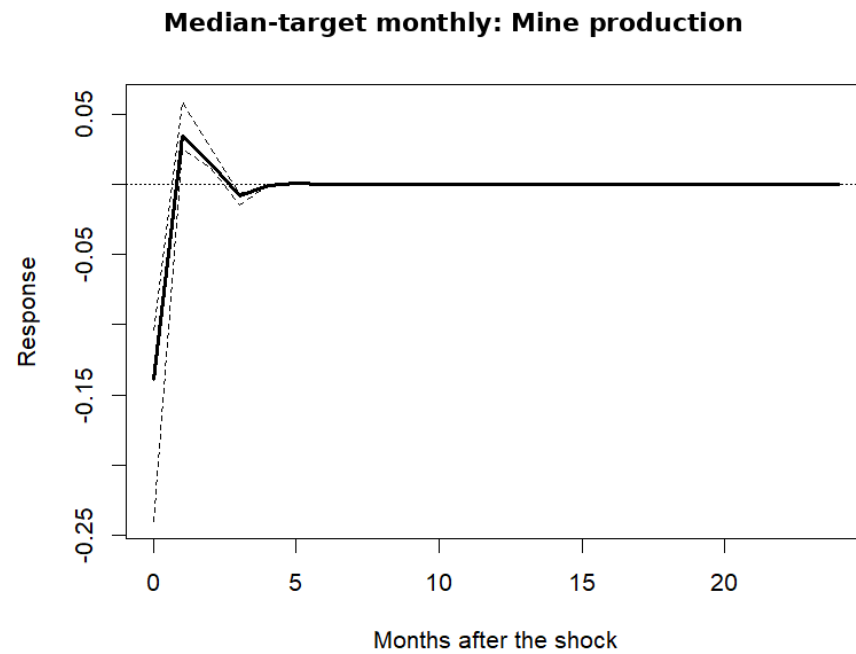
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Secondary copper recovery is intentionally left **unrestricted**.

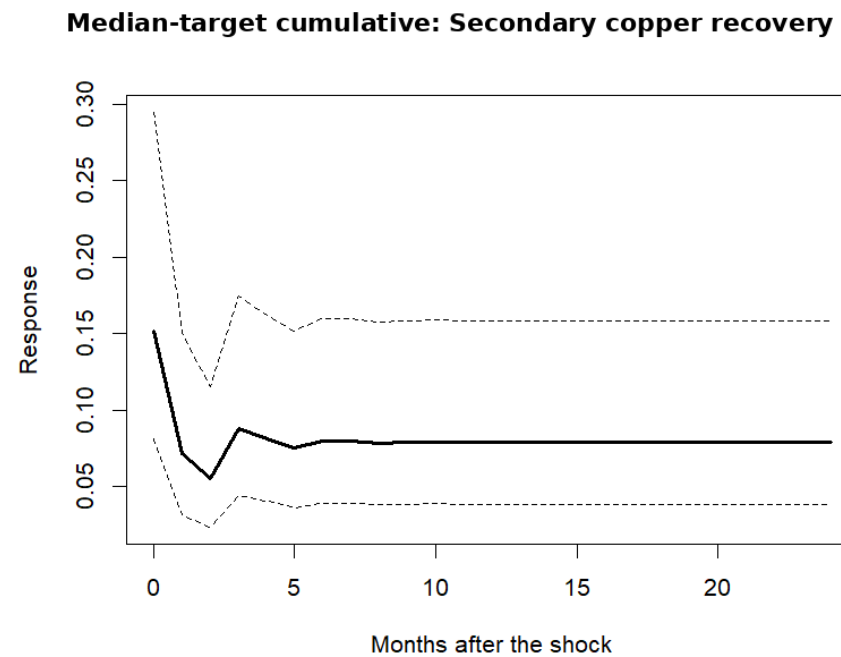
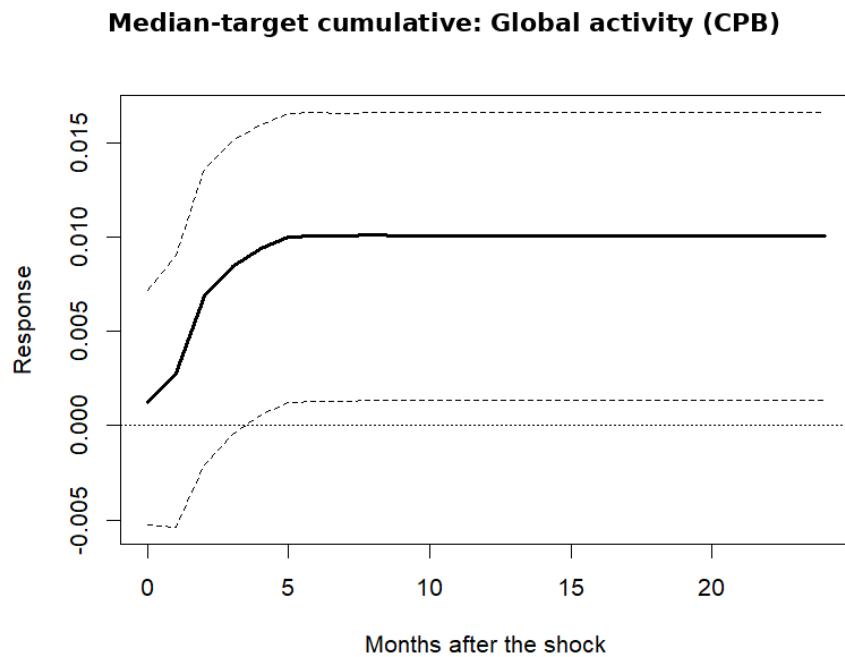
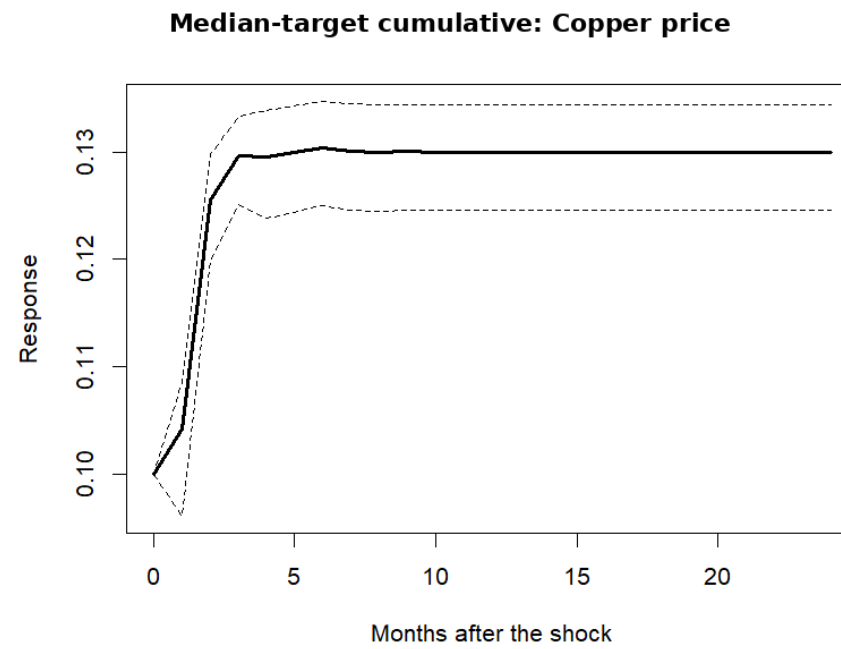
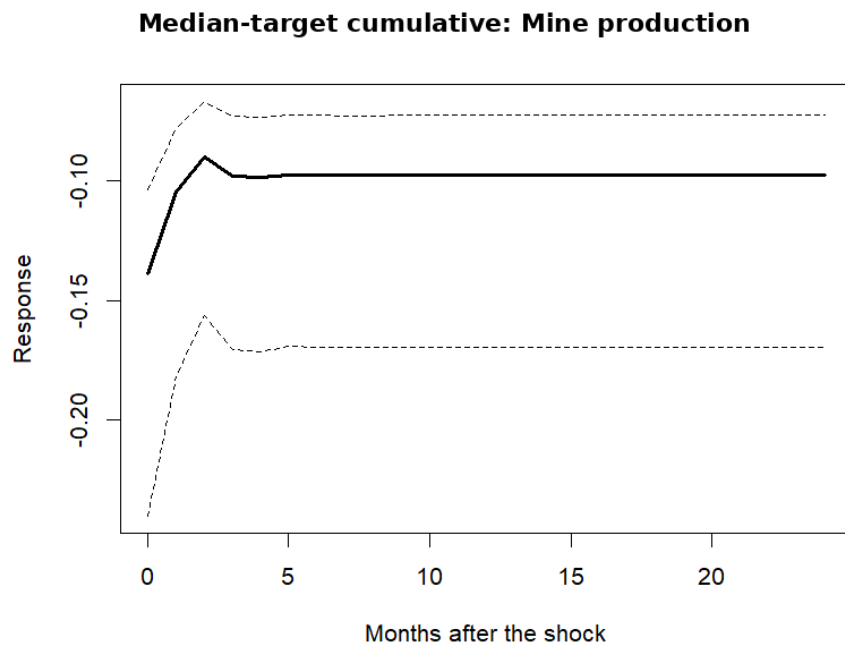


If recycling still responds systematically after a disaster shock, this represents an **empirical finding** rather than an identifying assumption.



Median-target monthly impulse responses to the disaster-related copper supply shock, shown against the admissible-response interval.

Source: Author's calculations.

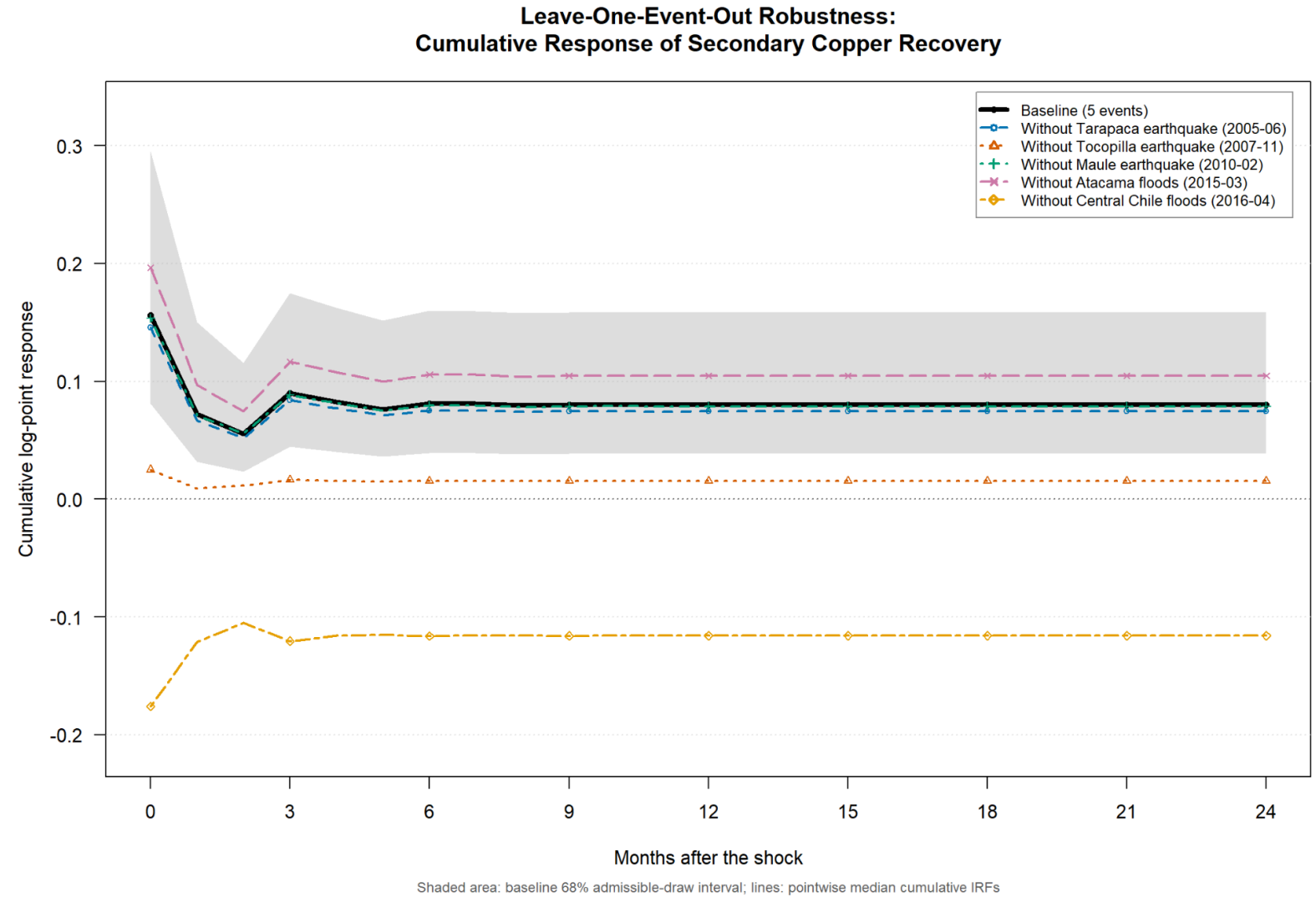


Median-target cumulative impulse responses to the disaster-related copper supply shock, shown against the admissible-response interval.

Source: Author's calculations.

Robustness check: Leave-one-event- out

The positive recycling response is preserved in four of five leave-one-event-out specifications, but remains sensitive to the narrative event set.





Not every copper supply disruption becomes a macroeconomic shock.

Secondary copper recovery partially offsets temporary production losses.



Identifying the source of commodity-price movements matters.

Physical supply shocks should be distinguished from global demand shocks.



Copper prices alone are not sufficient to diagnose supply disruptions.

Prices reflect demand, expectations, and market adaptation.

Future macroeconomic resilience will depend increasingly on adaptive supply mechanisms such as recycling, not only on primary production.

THANK YOU

The background of the image is a solid teal color. Overlaid on this background is a complex, light-colored pattern of many overlapping circles, creating a web-like or mandala-like effect. The circles vary in size and are centered at different points across the frame.

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