PRODUCTIVITY RESEARCH NOTES 2609

# Energy Cost Divergence and Industrial Adjustment

## *Evidence from Germany and Japan*

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### KEY MESSAGE

*Diverging energy cost conditions have led to sustained contraction of energy-intensive industries in Germany and Japan. Spillovers to non-energy-intensive sectors are pronounced in Germany but limited in Japan, indicating heterogeneous economy-wide adjustment rather than purely sectoral reallocation.*

### WHY THIS MATTERS

Decarbonization policies have accelerated since the late 2010s, widening cross-country differences in energy cost conditions. These differences can materially affect industrial activity and productivity through energy-intensive and trade-exposed (EITE) industries, whose contraction may propagate beyond directly affected sectors.

### EVIDENCE FROM CROSS-COUNTRY INDUSTRIAL PRODUCTION: EITE AND NON-EITE

Figure 1 shows the evolution of production indices for EITE and non-EITE manufacturing in four major economies. Three stylized facts emerge. First, EITE production has diverged sharply since the late 2010s: China has expanded, while Germany and Japan have contracted, with the U.S. broadly stable. Second, the divergence extends beyond EITE sectors. Non-EITE manufacturing declines markedly in Germany, weakens moderately in Japan, and remains stable in the U.S. Third, post-pandemic recovery paths differ substantially across countries, indicating structural rather than purely cyclical adjustment.

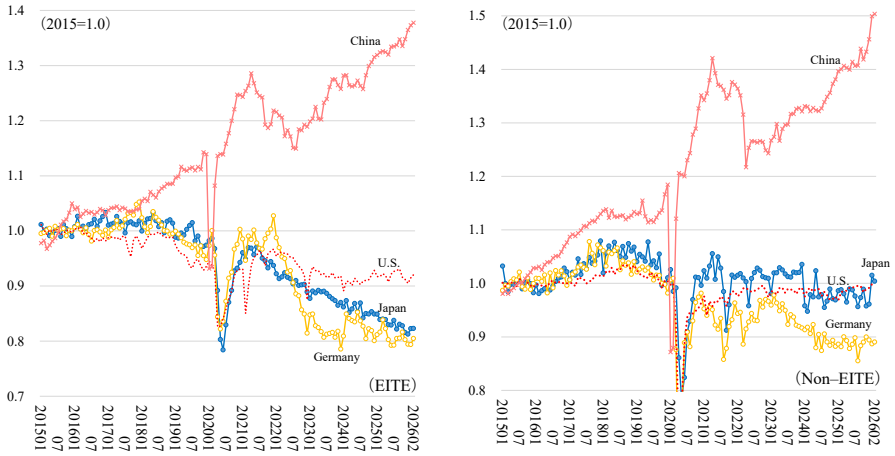


*Figure 1. EITE and Non-EITE Production Indices, 2015 Jan–2026 Feb.* Source: ECM 202604.

### MECHANISM

These patterns are consistent with the role of energy cost conditions in shaping industrial activity. Previous work based on the Real PLI framework shows that once relative energy prices exceed certain thresholds, EITE production declines nonlinearly (Nomura and Inaba 2026), particularly in advanced economies facing persistently higher costs. The contraction of EITE sectors

propagates through input–output linkages, demand effects, and relocation of downstream production—such as automobiles and machinery—toward lower-cost locations. Over time, these adjustments can reinforce the contraction of upstream EITE activities, contributing to cumulative industrial hollowing-out.

## STRUCTURAL EVIDENCE: DECOMPOSITION OF EITE

Figure 2 decomposes EITE output in Germany and Japan. Declines are broad-based across core sectors, including chemicals, basic metals, and non-metallic minerals. The composition differs, however: steel-related sectors account for a larger share of the decline in Japan, while chemicals are more prominent in Germany, reflecting differences in industrial structure rather than sector-specific shocks. These contributions are persistent in both countries, but exhibit different patterns—more closely aligned with energy price swings in Germany and more linear in Japan—indicating structural adjustment.

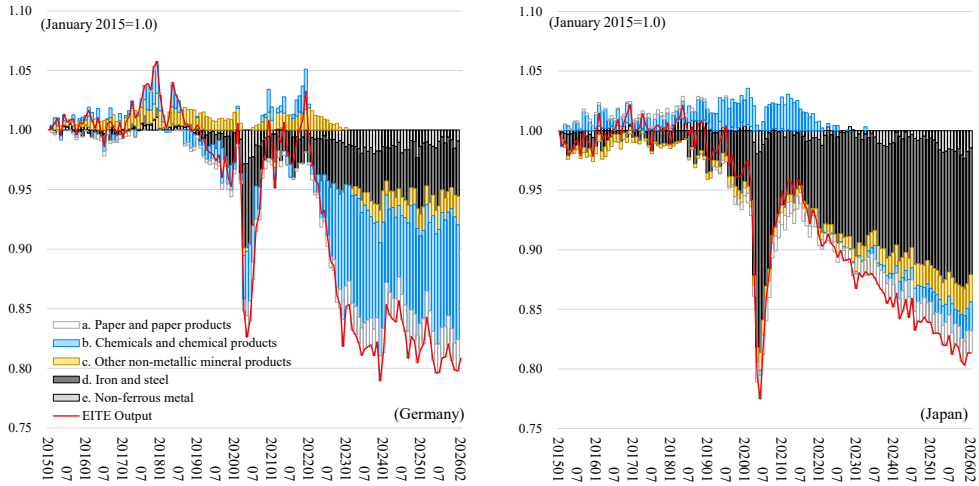


*Figure 2. EITE Output Decomposition: Germany and Japan, 2015 Jan–2026 Feb.* Source: ECM 202604.

## INTERPRETATION

The observed patterns go beyond simple sectoral reallocation. They reflect a combination of structural contraction in upstream industries, propagation through production networks, and adjustments in overall activity levels. This has direct implications for measuring productivity: apparent changes in aggregate productivity may in part reflect shifts in industrial composition and utilization rather than underlying efficiency.

## IMPLICATIONS

**01**
Energy cost conditions can act as a binding constraint on industrial activity, with effects extending beyond directly exposed sectors.

**02**
Cross-country productivity differences may partly reflect structural adjustment and relocation of production rather than purely technological factors.

**03**
High-frequency indicators, including ECM, are essential for interpreting short- to medium-term productivity dynamics under energy transition.

## REFERENCES


Nomura, K. & Inaba, S. (2026) “Measuring Real Energy Price Gaps: The Real PLI Framework for Competitiveness Monitoring,” *Sustainability*, 18(1).



*This note is part of the Productivity Research Notes series, examining key issues in productivity and economic performance in Asia. The views expressed are those of the author(s). Inquiries may be directed to sankenoffice@info.keio.ac.jp.*


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