PRODUCTIVITY RESEARCH NOTES 2602

Can AI Revive Japan's Productivity?

Technology Implementation Scenario to 2040

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KEY MESSAGE

AI-driven technology implementation could raise Japan's TFP growth rate from 0.5% to 1.1% per year in 2020–40 under the TSI scenario, while simultaneously increasing labor productivity, wages, and employment. But these gains are conditional: they require stable and affordable electricity supply, domestic investment, and broad-based structural reform.

WHY THIS MATTERS

Japan faces a structural imperative: a shrinking workforce requires productivity-led growth. Total factor productivity (TFP) captures overall production efficiency and can be interpreted as a weighted combination of labor, capital, and energy productivity growth. Since gains in one factor may come at the cost of another—labor-saving automation often deteriorates capital productivity—TFP merits particular attention alongside single-factor measures.

EVIDENCE FROM THE SBI-FERI BIP MODEL

Using the SBI-FERI BIP model—a high-resolution sectoral general equilibrium model of Japan's 828-activity economy—we evaluate two 2040 scenarios: Business-as-Usual (BaU), in which current policy persists, and Technology and Societal Implementation (TSI), in which structural impediments are removed under stable and affordable electricity supply.

Under BaU, real GDP grows at 0.5% per year; under TSI, it accelerates to 1.5%, with nominal GDP reaching ¥1,005 trillion. Of the ¥257 trillion increase in value added, ¥132 trillion stems from AI-related contributions. Figure 1 compares TFP, labor, capital, and energy productivity growth across industries (2020–40). TSI generates broad-based TFP gains—including in agriculture and healthcare, which historically show near-zero growth. Aggregate TFP accelerates from 0.5% to 1.1% per year, a net TSI lift of 0.6 percentage points.

INTERPRETATION

The productivity gains under TSI reflect the simultaneous implementation of 167 technology sub-categories—spanning smart manufacturing, digital infrastructure, healthcare innovation, and ageing-society services—which interact and amplify one another through supply chains and intermediate demand linkages. Smart factories and smart healthcare are the largest contributors to value added, while digital public administration reduces nominal value added despite real efficiency gains, because productivity improvements compress nominal output.

A key structural finding is that while services account for the bulk of value-added expansion under TSI (over ¥180 trillion), the underlying growth engine is manufacturing. The competitiveness of Japan's industrial base—supported by affordable electricity and advanced information services—propagates through intermediate demand linkages to drive broad service

sector expansion. Japan's growth path under TSI is not simply a shift toward a service economy; it is a reactivation of manufacturing-anchored industrial linkages.

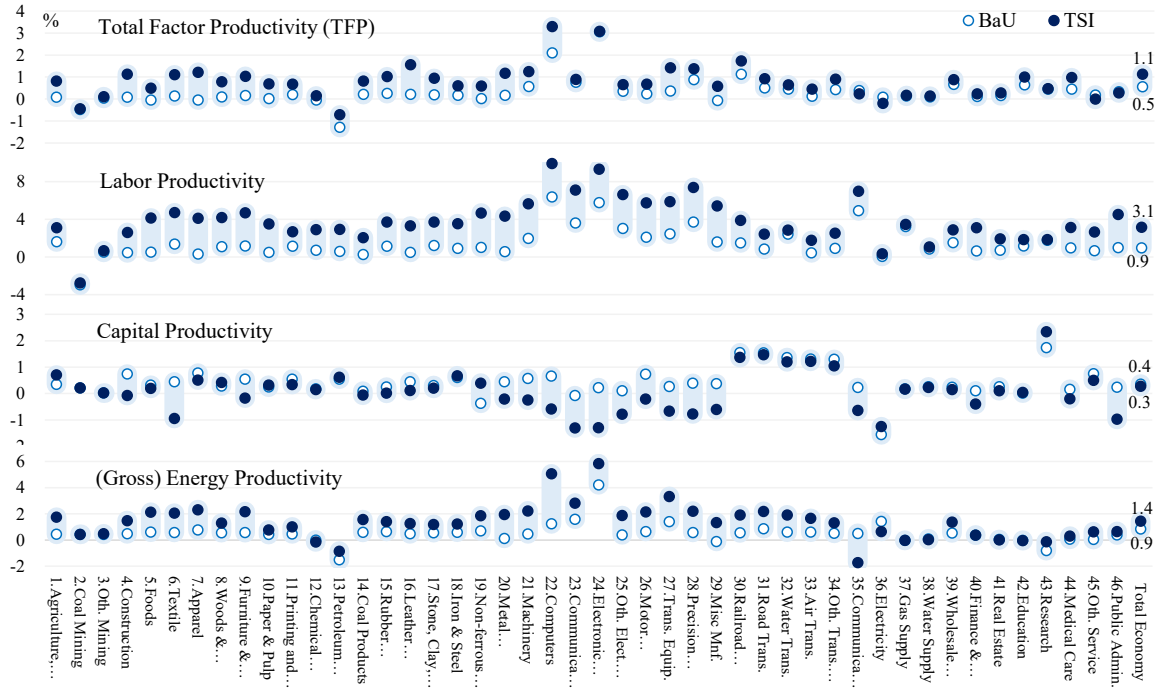

Figure 1. TFP, labor, capital, and energy productivity growth

Unit: Percentage (annual average growth rate in 2020–40). Source: Nomura (2026).

MEASUREMENT CONSIDERATIONS

BaU inputs are calibrated against KEO Database long-run productivity trends. TSI is a conditional scenario—not a forecast—in which structural impediments are removed; individual technology assumptions draw on literature surveys, expert consultations, and generative AI assessments, and are subject to revision as evidence accumulates. The 2020 COVID base year imparts some upward bias to BaU TFP; TSI-attributable gains should be read as net of this effect.

IMPLICATIONS

01

AI and technology implementation could lift Japan's TFP growth by 0.6 percentage points per year—broad-based across sectors, not confined to high-tech industries.

02

Labor productivity gains of this scale can simultaneously raise real wages and reduce working hours, provided that electricity supply remains stable and affordable.

03

Realizing these gains requires removing structural impediments to domestic long-term investment—including energy policy reform—rather than technology adoption alone.

REFERENCE

Nomura, K. (2026). "How Does the Social Implementation of Technological Innovation Transform the Japanese Economy?—Visualizing Structural Change with the High-Resolution Economic Model BIP," *SBI Research Review*, 9, 27–49, SBI Financial and Economic Research Institute. (in Japanese)

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.