Sectoral Technological Gaps, Productive Deepening, and the Macroeconomics of Green Structural Transformation: Evidence from Brazil's Ecological Transformation Plan

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Abstract

This paper examines how production structure and sectoral technological heterogeneity jointly shape green structural transformation in developing economies. While the literature on technological gaps, catching up, production networks, and structural transformation has advanced significantly, it has largely evolved separately, limiting our understanding of how sectoral technological asymmetries affect macroeconomic adjustment. To address this gap, the paper develops a continuous-time dynamic multi-sectoral input–output model (D-ESTEEM) that integrates production density, sectoral technological gaps, and disequilibrium adjustment within a unified framework. Production density captures the extent of domestic intersectoral linkages and therefore the strength of demand propagation, while sectoral technological gaps affect production efficiency, costs, competitiveness, and external performance. Their interaction generates a central trade-off: expanding domestic production linkages can strengthen multipliers, employment, and productive deepening, but may also generate inflationary pressures and inefficiencies when production shifts toward technologically lagging sectors. The model is calibrated to Brazil and applied to the context of the *Plano de Transformação Ecológica* (PTE), allowing the simulation of green reindustrialisation under alternative technological gap configurations. The paper contributes by linking innovation dynamics with macro-structural adjustment, showing that the developmental effects of industrial and green transformation policies depend critically on the sectoral distribution of technological capabilities, the structure of domestic production networks, and the coordination of capability-building with productive expansion.

Keywords: Structural transformation; Sectoral technological gaps; Input–output modelling

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