

The Economics of Lithium-Led Development: Production Networks, Spillovers, and Structural Change in Argentina

Topic: Input-Output Modelling: Industrial policies

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The accelerating global energy transition has elevated lithium to a strategic position within international production networks. Argentina, as part of the Lithium Triangle and holder of approximately 20% of identified global lithium resources, has experienced a rapid expansion of upstream extraction activities. However, whether lithium development can generate sustained structural transformation and broad-based regional spillovers remains an open empirical question. This paper addresses the following research question: To what extent can alternative development pathways of the lithium value chain (LVC) - ranging from extraction-led growth to deeper downstream industrial integration—generate economy-wide and interregional impacts in Argentina? To answer this question, the paper develops a novel multiregional input–output (MRIO) model for Argentina, disaggregated into four regions: Catamarca, Jujuy, Salta (the lithium-producing provinces), and the Rest of Argentina. The model includes 35 productive sectors, six of which explicitly represent stages of the lithium value chain, including lithium extraction, cathode materials, battery cells, battery packs, electric vehicles, and renewable electricity generation. The MRIO framework follows the interregional formulation of Miller and Blair (2022) and endogenizes interregional trade flows, allowing intermediate and final demand in each region to be supplied by producers located in other regions.

The MRIO is complemented by a Satellite Account of Employment (SAE) consistent with the 2017 national accounts, enabling the estimation of employment impacts by sector, region, and employment status. The regionalization of national technical coefficients relies on the Flegg Location Quotient (FLQ) methodology, while remaining matrix inconsistencies are reconciled through RAS balancing procedures. The framework therefore captures direct, indirect, and induced effects of lithium-related shocks across sectors and provinces.

The empirical base of the analysis is a newly constructed provincial MRIO database for 2017, built from Argentina’s national Social Accounting Matrix (Chisari et al., 2020), provincial accounts from INDEC, household surveys (EPH and EAHU), administrative employment records (SIPA–OEDE), and detailed project-level information on lithium extraction costs. Seven major lithium projects in Catamarca, Jujuy, and Salta are used to calibrate operating (OPEX) and capital (CAPEX) cost structures, which are mapped into the sectoral structure of the MRIO. Downstream battery-related activities are incorporated as latent sectors using international benchmark cost data, allowing the simulation of alternative industrialization pathways.

The model is used to simulate forward-looking scenarios for 2024–2035. Two stylized trajectories are considered: (i) a conservative pathway focused primarily on upstream lithium extraction, and (ii) a more ambitious scenario combining higher extraction volumes with the domestic development of downstream segments such as cathode materials, battery cells, and battery assembly. Both investment-phase and operational production-phase shocks are evaluated.

Results show that construction-phase investment generates significant but largely transitory gains in provincial output and employment, particularly in Catamarca and Salta. In contrast, production-phase impacts are more persistent but remain narrowly concentrated when development is limited to extraction. Under the extraction-only pathway, spillovers to manufacturing and advanced services are weak, and interregional effects are modest. By comparison, scenarios incorporating downstream activities produce larger multipliers, stronger backward linkages, and a reallocation of value added and employment toward manufacturing and service sectors, especially in the Rest of Argentina. These findings suggest that the developmental contribution of lithium depends critically on value-chain deepening rather than on extraction volumes alone.

The novelty of this research lies in three main contributions. First, it constructs the first provincial MRIO for Argentina that explicitly embeds the lithium value chain within the national production structure. Second, it integrates project-level mining cost data into a consistent economy-wide accounting framework, bridging micro-level industrial information and macroeconomic modeling. Third, it provides a quantitative comparison of alternative lithium industrialization strategies, highlighting the spatial and structural implications of downstream integration in a resource-rich developing economy.

By offering a flexible and replicable framework to evaluate critical-mineral development strategies, the paper contributes to the input–output literature on regional development, energy transition, and structural change, and provides policy-relevant evidence for resource-based industrialization debates in Latin America and beyond.