Abstract:
Natural laboratories (NLs) have received growing attention as sites of competitive advantage for scientific and technological development afforded by their unique geographic characteristics. Emerging economies are increasingly seeking to capitalize on the scientific potential of NLs and the technological and economic spillovers they may create, frequently by collaborating with international expert communities. This study explores the policy strategies to harness NLs for technological learning and institutional capacity building with a particular focus on international collaboration. We draw upon an in-depth case study of one of the world's most prominent NLs, the astronomic observatory cluster in the Atacama Desert in Chile, slated to concentrate more than 70% of the world's astronomical infrastructure by 2025. We develop a conceptual framework for spillover generation associated with NLs to capture the processes by which institutional, knowledge, infrastructure, economic, and social capital spillovers were generated or missed. We find that spillover generation is a complex
systemic phenomenon with links between different spillover types, including trade-offs between positive and negative spillovers. Our findings suggest that host countries can—and arguably should—design custom-tailored policy strategies and collaborative frameworks in ways that strengthen local opportunities early on (e.g., through formalized participation strategies or regular renegotiations) to avoid NLs becoming enclaves dominated by international partners. Governments should pursue inclusive, adaptive, and sustainable policy strategies to harness the long-term scientific, social, and economic benefits of NLs. Without such strategies, NLs risk reinforcing patterns of dependency and inequality, both nationally and internationally.

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