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Why some countries are slow in acquiring new technologies? A model of trade-led diffusion and absorption[☆]

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Abstract

Drawing on the stylized facts and evidences, in a computable general equilibrium (CGE) model, this paper examines the impact on TFP of North–South, North–North trade-related triangular R&D spillovers. By constructing different technology appropriation parameters based on embodied and disembodied R&D, absorption and learning effects, it shows: (i) North–South R&D flows have a positive impact on TFP; (ii) human capital-induced skill facilitates North–South R&D flows; (iii) socio-institutional and technology adoption parameters do play roles for knowledge flows, its capture, and transmission. Such technology diffusion and assimilation counters the adverse impact of North–South geographical distance on productivity dynamics.

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“In all the cases of sustained, high growth, the [developing] economies have rapidly absorbed knowhow, technology, and, more generally, knowledge from the rest of the world.

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These economies did not have to originate much of this knowledge, but they did have to assimilate it at a tremendous pace. That we know. What we do not know—at least not as well as we would like—is precisely how they did it, and how policy makers can hurry the process along. This is an obvious priority for research. [Economies] can learn faster than they can invent. Knowledge acquired from the global economy is thus the fundamental basis of economic catch-up and sustained growth.”—Michael Spence, Spence Commission on Growth and Development, [World Bank \(2008\)](#), p. 41.

1. Introduction and motivation

Drawing on the idiosyncratic regional growth experiences and historical trajectories of development episodes, [Spence \(2011\)](#), and [World Bank \(2008\)](#) highlighted, *inter alia*, the importance of pursuing context- and case-specific policies—as emphasized in the quote that opened this article—related to trade and industry development, education, knowledge creation, technological improvement, inequality, etc.; in particular, it emphasized the preponderant role of engagement in the global economy as well as extending the knowledge frontier via investment in human capital, institutional quality, R&D, and the educative effect of trade to achieve Millennium Development Goals. In particular, Goals 2, 8A and 8F emphasize the roles of not only global partnership for technological access to reduce disparities in ICT diffusion and usage, but also on the importance of good governance and institutions ([United Nations, October 2010](#)). In a constantly evolving world of ideas, science, technology, and innovation policy aims at dispensing with the growth inertia by sparking mankind’s innate ‘lack of patience with status quo, or *sitzfleisch*’ ([Griliches, 2000](#)). Government policy plays role for orchestration of knowledge, entrepreneurial know-how, *cross-fertilization* of ideas to enrich the knowledge-capital, and institutional innovation. The important visionary role that the state could play as enabling transformer of an economy through innovation-oriented policy trajectory is widely evidenced in the literature. [Mazzucato \(2013\)](#) has emphasized the role played by state—like Prometheus, not Leviathan—in undertaking investments in innovation via policy instruments to create an innovation ecosystems, where symbiotic coexistence of public–private investments, and other supportive policies like education policy, industrial policy work concurrently. [Szirmai, Gebreeyesus, Guadagno, and Verspagen \(2013\)](#) has discussed in the context of Africa that wide range of policies related to trade, sectoral innovation, population, employment, and labor market are important for productive employment. [Bengoa and Sanchez-Robles \(2005\)](#) and [Bluedorn, Duttagupta, Guajardo, and Mwase \(2014\)](#) have discussed the importance of favorable economic policies conducive for structural reforms, institutions, and domestic factors causing take-off and sustained growth of the less-developed countries’ (LDCs). In particular, proper region-specific investment climate via policy instruments influencing infrastructure, governance features, scarcity of tertiary human capital, weak institutional capacity, and other pertinent socio-institutional factors in the LDCs matter.¹

Why, despite the State-Prometheus having a visionary role to undertake strategic policy instruments, the things are not taking shape? In this paper, we ask this policy-guided research question grounded upon theoretical rationale. We enunciate the role of host of factors underlying seizure of the potential knowledge-diffusion. Lack of education, skill mismatch, inappropriate structural change, educational bottlenecks, inadequate innovation, and lack of attention to SMEs with growth

¹ World Bank’s ‘Doing Business Project’, benchmarking different indicators for regulatory regime for 130 countries, offered Investment Climate Surveys conducted at the firm level for 26,000 firms in 53 developing nations.

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