Return to Protectionism in an Agent-Based Model of International Trade

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March 5, 2026

Keywords: agent-based; international trade; tariffs.
JEL Codes: F12; F13; F41.

Research Question. Trade shocks, including ad-valorem tariffs, do not only affect final-good prices at the border, but also reshape sourcing decisions and the distribution of intermediate input costs (Fajgelbaum et al., 2020), also inducing substantial welfare losses (Grossman et al., 2024). Furthermore, the presence of trade frictions, under the form of tariffs, limit productivity growth by distorting competition at the final-good level and by limiting the spillover effects of learning, variety, and quality (Amiti and Konings, 2007).

Starting from this set of stylized facts, we develop a new agent-based model of international trade with two-country and upstream-downstream sectors in which firm selection, production-network rewiring, entry/exit, and learning jointly shape relative prices, comparative advantages and market shares. The framework is flexible and designed with the aim of investigating the effects of symmetric or asymmetric tariffs – levied either at the input stage, at the output stage, or at both stages – on the micro-level network adjustments, productivity dynamics, comparative advantages and aggregate trade and industry outcomes. We begin by building a baseline free trade version of the model to study the emerging market structure, trade networks, comparative advantages, and lock-in effects. We then introduce tariffs and we interact them with endogenous production-network structure and firm dynamics. When downstream firms rely on upstream suppliers, changes in tariffs can propagate across production stages, altering firms' marginal costs, market selection, and the stability of the buyer-supplier relationships.

We then tackle four main research questions. First, how do tariffs applied to intermediate inputs versus tariffs applied to final goods differ in their impact on market concentration, turnover, and productivity at each layer? Second, when downstream firms can switch suppliers endogenously, under which conditions do global value chains fragment (domestic re-shoring of inputs) or intensify (cross-border sourcing and exporting)? Third, how do visibility and search frictions – proxied by market size – shape the speed and direction of adjustment after a tariff shock? Fourth, how do learning regimes (exogenous innovation versus endogenous R&D-driven innovation) mediate the long-run effects of trade policy through feedback loops between profits, innovation, and competitiveness?

By answering these questions, the model aims to connect three strands of literature related to (i) production networks and input-output linkages; (ii) market selection in international competition; and (iii) trade policies.

Related Literature and Contribution. Agent-based models (ABMs) have become a useful complement to representative-agent trade frameworks by allowing heterogeneity, bounded rationality, and out-of-equilibrium dynamics to jointly shape

international outcomes (Fontanelli et al., 2023). In multi-country evolutionary ABMs, growth and trade patterns emerge endogenously from innovation, demand formation, and structural interactions across economies (Dosi et al., 2019). At the micro level, ABMs of international trade with monopolistic competition show how exporter premia and firm heterogeneity can arise from decentralized learning and selection mechanisms (Catullo, 2013). Furthermore, recent open-economy ABMs have also quantified how external aggregate trade shocks transmit to domestic output and inflation through non-linear adjustment dynamics (Rolim et al., 2025). Relatedly, North-South ABMs emphasize how trade asymmetries and institutional differences (e.g., education and labor-market segmentation) can generate persistent divergence even with ongoing international exchange (Fanti et al., 2024).

With this paper we make three main contributions with respect to the extant literature. First, we introduce a novel two-country, two-layer (upstream–downstream) agent-based trade model in which comparative advantages and relative prices are endogenous outcomes of firm heterogeneity, market selection, and evolving production networks, rather than imposed primitives. This delivers a baseline "free-trade" environment where trade patterns, concentration, and lock-in emerge from micro dynamics. Second, we provide a microfounded mechanism linking product-market selection and input-market network formation. In both layers, choices are governed by a discrete-choice structure in which market size proxies for visibility and search frictions, while prices capture cost competitiveness. This creates an explicit channel through which trade shocks, including tariffs, can generate persistent reallocation via cumulative advantage and network hysteresis. Third, we use this environment to study symmetric and asymmetric tariffs applied at the input stage, at the output stage, or both. Because downstream marginal costs depend on the delivered price of intermediates and because supplier links can be rewired endogenously, tariffs reshape competitiveness through both price wedges and network adjustment. By allowing alternative learning regimes, the model allows for trade policy to reallocate market shares or to shift the long-run productivity frontier and therefore comparative advantages.

Model overview. The economy comprises two countries (domestic and foreign) each hosting upstream firms producing an intermediate input and downstream firms producing a final good. Upstream firms employ domestic labor and can sell intermediates to downstream buyers in either country. Downstream firms sell final goods to consumers in the domestic and foreign markets and source the intermediate from one upstream supplier at a time (one-link-only), while upstream firms can serve many buyers.

Each period, domestic final demand is allocated across active downstream firms through a discrete-choice rule that trades off low prices against a size-based visibility term – the market size is a proxy for search frictions. Realized downstream sales determine each firm's required intermediate purchases, which are then placed as orders to its supplier. Upstream production is the aggregation of these orders, thus the upstream market shares update endogenously and feed back into the future supplier choices by the downstream firms.

Prices are set by simple markup rules over unit costs in both layers. Upstream unit costs depend on domestic wages and firm productivity, with wages being country-specific and following the performance of the upstream sector average productivity. As a consequence cross-country relative costs and relative prices emerge endogenously. Downstream marginal costs depend on the delivered intermediate price and downstream productivity, so upstream competitiveness directly transmits to downstream competitiveness.

Production networks evolve endogenously. In each period, a subset of downstream firms is allowed to reconsider its supplier. Conditional on rewiring, the choice of the new supplier follows a discrete-choice rule that rewards low intermediate prices and large upstream market size. This mechanism generates persistent buyer-supplier relationships, lock-in effects, and occasional rapid reconfiguration when the competitive pressure rises.

Firm demographics are endogenous. Downstream firms exit when their market share falls below a threshold while upstream firms exit when they lose all their downstream customers. Entry in each layer is stochastic and tilted toward relatively more productive potential entrants, while entrants start small, ensuring realistic selection dynamics.

Learning operates either exogenously or endogenously. In the exogenous regime, productivity improves via stochastic shocks. In the endogenous regime, firms invest a fraction of profits in R&D, which raises the probability of successful innovation and links market success to future productivity growth.

Finally, tariffs are modeled as ad-valorem wedges that can be symmetric or asymmetric across countries and can apply to imported intermediate goods (input-stage), to exported final goods (output-stage), or both. These wedges change the delivered input prices and/or consumer prices, thereby shifting competitiveness, triggering supplier switching, altering market shares, and ultimately reshaping comparative advantage and aggregate trade outcomes.

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