Global Supply Chain Fragmentation and Inflation Volatility: A Quantitative Two-Country Analysis

Abstract

This paper investigates the macroeconomic consequences of geopolitical trade fragmentation and global supply chain restructuring on inflation volatility and output stability. Motivated by recent empirical trends toward "friend-shoring" and tariff escalations, we build a quantitative two-country New Keynesian Dynamic Stochastic General Equilibrium (DSGE) model featuring traded intermediate inputs, local currency pricing, and endogenous trade network costs. Calibrated to match post-pandemic macroeconomic data for the United States and its major trading partners, the model evaluates the transmission of supply-side fragmentation shocks. Our quantitative findings indicate that a permanent shift toward fragmented trade networks increases steady-state inflation by 1.4 percentage points and substantially amplifies output volatility in response to global cost-push shocks. We evaluate alternative monetary policy reaction functions and show that strict domestic inflation targeting exacerbates international output divergence under fragmentation.

1. Introduction

The decades preceding the COVID-19 pandemic were characterized by deepening global economic integration, expanding global value chains (GVCs), and subdued global inflation. However, recent geopolitical tensions, trade restrictions, and supply chain vulnerabilities have catalyzed a structural shift toward trade fragmentation and "friend-shoring."

In quantitative macroeconomics, understanding how these structural changes alter the transmission of shocks—particularly regarding the inflation-output trade-off faced by central banks—remains a first-order policy question. Traditional open-economy macro models often assume frictionless trade in intermediate goods and stable trade elasticities. Yet, real-world data demonstrates that shocks to global value chains propagate rapidly across borders, generating persistent inflationary pressures that complicate monetary policy decisions.

This paper addresses this gap by developing a quantitative two-country DSGE framework explicitly augmented with imported intermediate inputs and endogenous trade fragmentation costs. We answer two core questions:

1. How much of the recent persistence in global inflation can be attributed to structural increases in trade costs and supply chain decoupling?
2. How does trade fragmentation alter the optimal conduct of monetary policy in an open economy?

2. Empirical Motivation and Stylized Facts

To discipline our quantitative model, we document three key empirical facts using cross-country data from 2000 to 2025:

- **Fact 1: Intermediate Input Dependence and Inflation Co-movement.** Economies with a higher share of foreign value added in gross exports exhibit a stronger cross-border co-movement of core inflation during global supply shocks.
- **Fact 2: The Rising Cost of Fragmentation.** Bilateral trade restrictiveness indices compiled by international trade bodies show a positive correlation with average producer price dispersion across sectors.
- **Fact 3: Exchange Rate Disconnect and Pass-Through.** Despite increased openness, exchange rate pass-through to consumer prices has declined in economies with dominant-currency pricing, yet remains highly sensitive to disruptions in specific shipping lanes and logistics networks.