Pharma's New Silk Road: Fiscal Shifts and COVID-19 Supply-Chain Failure in China, India, and the United States

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Abstract

COVID-19 exposed a single-file pharmaceutical supply chain — Chinese key starting materials feed Indian API and generic production, which feeds US pharmacies — and all three governments responded with major fiscal shifts: India's ₹15,000 crore (~$2 billion) pharmaceutical PLI scheme plus a ₹6,940 crore bulk-drug PLI, and the US's $354 million Phlow/BARDA contract atop at least $11 billion in Defense Production Act (DPA) pandemic spending.

The cascade was real and sequential: China nationalized medical-supply production in February 2020; India restricted exports of 26 drug ingredients including paracetamol on March 3, 2020; and US ongoing essential-medicine shortages jumped from 209 in March 2020 to 324 in April 2020.

These fiscal shifts represent a deliberate redrawing of pharmaceutical geography — a "new silk road" of reshoring, nearshoring, and friendshoring — but the underlying concentration persists: China roughly doubled its US-registered API facilities from 230 in 2019 to 467 in 2025, and India still sources roughly 70% of its APIs from China.

Introduction and Context

The concentration that made failure possible. In testimony to the House Energy & Commerce Subcommittee on October 30, 2019, FDA official Janet Woodcock stated that "as of August 2019, only 28 percent of the manufacturing facilities making APIs to supply the U.S. market were in our country. By contrast, the remaining 72 percent…were overseas, and 13 percent are in China," adding that "the number of registered facilities making APIs in China more than doubled between 2010 and 2019." India led global finished-drug and API facility counts, and China's share was growing fastest. Because generic drugs account for 90% of US prescriptions and India supplies roughly 40% of US generics while importing about 70% of its own APIs from China, the world built a linear dependency: Chinese KSMs → Indian APIs → US pharmacies.

China: dominance built partly on state support, then weaponized. China is the world's largest API exporter, with export values rising from roughly $29 billion in 2017 to about $51.8 billion in 2022. Its share of global API production by volume is genuinely contested — authoritative bodies place it in a 20–40% range, while Brookings economist Marta Wosińska concludes that "Chinese-produced active ingredients are included in perhaps a quarter of the generic drug unit volume sold in the United States—far less than some of the more alarmist claims." In early February 2020, the Chinese government nationalized control of medical-supply production and distribution, directing output to domestic use; subsequent NMPA export-certification requirements in April 2020 further slowed exports.

India: the pharmacy of the world curbs its own exports. On March 3, 2020, India's Directorate General of Foreign Trade restricted exports of 26 APIs and formulations — which Pharmexcil chairman Dinesh Dua noted "account for 10% of all Indian pharmaceutical exports" — including paracetamol, the antibiotics tinidazole, metronidazole and erythromycin salts, and vitamins B1/B6/B12. Most restrictions were lifted by April 6, 2020, with paracetamol APIs freed on May 28, 2020. India's structural fiscal response was the Production Linked Incentive (PLI) framework.

United States: a scramble for domestic capacity. US ongoing shortages of generic essential medicines rose from 209 in March 2020 to 324 in April 2020 and stayed above 300 until April 2021. The federal fiscal response combined the CARES Act, Defense Production Act spending, and targeted contracts such as the $354 million Phlow award.

Analysis: Fiscal Shifts in Global Pharmaceutical Supply Chains

China — Fiscal Shift and Leverage

China's rise in APIs reflects decades of scale advantages layered with state support. Documented mechanisms include government-led venture funds, biomedicine science parks (the Ministry of Science and Technology planned to spend about $1.45 billion on 20 such parks by 2020, per ITIF), and provincial incentives such as Shanghai's R&D grants of up to RMB 30 million per innovative-drug project and a 15% reduced corporate income tax rate for High-and-New Technology Enterprises. R&D expenditure by Chinese pharmaceutical manufacturing firms reached about 60.96 billion yuan in 2019 — 75.3% higher than in 2013 — according to a 2023 peer-reviewed study in Frontiers in Public Health. Made in China 2025, released by the State Council in 2015, explicitly named biomedicine as one of ten strategic sectors. Notably, a Stanford analysis found that industrial subsidies under Made in China 2025 played a "negligible role" in China's drug-innovation surge relative to market-access reforms — a caution against overstating the subsidy story.

On leverage, China's antibiotics dominance is near-total. Rosemary Gibson, author of China Rx, testified to Congress in October 2019 that "China controls approximately 90 percent of the global supply of key starting materials" and that "the United States can no longer make penicillin," the last US penicillin fermentation plant having closed in 2004. The February 2020 nationalization of medical supplies and the spring 2020 export-certification bottleneck demonstrated this concentration risk in practice.

China's API export values by year: ~$29 billion (2017), ~$33.7 billion (2019), ~$35.7 billion (2020), ~$51.8 billion (2022), and ~$40.9 billion (2023, a post-pandemic decline). Per USP Medicine Supply Map data, China holds 20% of FDA-registered API manufacturing sites, "with 467 facilities as of February 2025, up from 230 facilities and a 13% market share in 2019" — a near-doubling that underscores that Western reshoring efforts have not reversed the underlying trend.

India — The PLI Fiscal Shift

India's dependence on China is the structural fact of its industry: roughly 70% of its APIs, and near-total dependence (80–100%) for certain fermentation-based antibiotics like ciprofloxacin, norfloxacin, and penicillin. In 2023-24, India imported roughly Rs 377 billion in APIs and bulk drugs — about 35% of its total requirement — with China accounting for around 70% of that.

India's fiscal response came in two linked schemes under the Atmanirbhar Bharat (self-reliance) initiative:

- PLI for Bulk Drugs (KSMs/DIs/APIs): approved in 2020 with a financial outlay of ₹6,940 crore, targeting 41 identified critical KSMs/DIs/APIs specifically to reduce China dependence.
- PLI for Pharmaceuticals: approved by the Union Cabinet on February 24, 2021, with a financial outlay of ₹15,000 crore (~$2 billion), running FY2020-21 to FY2028-29 and targeting high-value products (biopharmaceuticals, complex generics, patented drugs). The government projected incremental sales of ₹2,94,000 crore and incremental exports of ₹1,96,000 crore over the scheme period.

The Government of India explicitly cited the pandemic's exposure of supply-chain vulnerabilities as prompting the prioritization of domestic production. Progress has been strikingly uneven: by March 2026, ₹6,659 crore had been disbursed under the Drugs PLI but only ₹87.70 crore under the Bulk Drugs PLI — the latter hampered by land-acquisition delays, environmental clearances, and long fermentation-drug gestation periods. India still imported over 70% of key pharmaceutical ingredients from China as of 2025, indicating the fiscal commitment has not yet delivered independence.

United States — CARES, DPA, and Reshoring

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- Phlow Corp: On May 19, 2020, Phlow received a $354 million four-year BARDA contract (potential total up to $812 million) to manufacture essential medicines and APIs domestically using continuous manufacturing — one of the largest awards in BARDA's history.
- CARES Act (P.L. 116-136, March 2020): provided the Department of Defense $1 billion specifically for DPA purchases related to COVID-19, and expanded drug-shortage reporting and manufacturer risk-management-plan requirements.
- Defense Production Act: From March 2020 to September 2021, agencies used the DPA and similar actions over 100 times; the CARES Act and other appropriations provided at least $11 billion for DPA purchases and related pandemic actions. GAO identified 43 contracts initially valued at about $3.9 billion for domestic production-expansion projects.
- Executive Order 13944 (August 6, 2020): directed the FDA to identify essential medicines and critical inputs and directed agencies to "buy American," aiming to reduce foreign dependence.
- American Rescue Plan (2021): provided roughly $10 billion for medical-supply and domestic-manufacturing investments.

The scale shift is quantifiable: from FY2010 through FY2019, Congress appropriated $952 million to the DPA Fund for Title III purposes; from FY2020 through FY2025, at least $4.4 billion — a roughly fourfold increase driven by the pandemic.

The COVID Cascade and Export Nationalism

The failure was systemic. The Congressional Research Service documented that reduced Chinese exports caused US shortages, and that India — supplying about 40% of US generics while importing nearly 70% of its APIs from China — imposed March 2020 restrictions that raised fears of global generic shortages, escalating after India's nationwide lockdown. Export nationalism was widespread: per the WTO (via Sidley Austin), "85 countries imposed such restrictions, with around 58% of the products targeted being medical devices or medical consumables." The US reported its first COVID-linked drug shortage in late February 2020. Per Pedersen et al.'s 2020 ASHP national survey, "eighty-seven percent of hospitals changed operational activities…Hospitals experienced shortages of many medications, including albuterol inhalers (60%), sedatives and anesthetic agents (58%), neuromuscular blockers (43%), corticosteroids (34%), cardiovascular agents (24%)."

The "New Silk Road" Framing

The post-COVID response reoriented pharmaceutical geography around resilience rather than pure cost. "Friendshoring" — coined by US Treasury Secretary Janet Yellen in an April 2022 speech — joined nearshoring and reshoring as organizing concepts, describing supply chains built with politically aligned partners. Biden's Executive Orders 13987 and 14001 (2021) and the February 2021 supply-chain review institutionalized the shift. Yet the new map remains concentrated: China surpassed India in annual API Drug Master File filings for the first time in over two decades in 2024, signaling that the next generation of generics will be even more Chinese-dependent.

Conclusion and Policy Implications

- Anchor the "new silk road" thesis in fiscal-shift contrasts, not disputed volume shares. The strongest empirical spine for the analysis is the tri-national fiscal pivot — India's ₹15,000 crore + ₹6,940 crore PLI commitment, the US's at-least-$11 billion in DPA pandemic spending (a ~4× Title III increase), and China's diffuse but large state support. Explicitly flag that China's "share of global API" is contested (20–45%) and present Brookings' ~25%-of-US-drug-volume figure as the most methodologically rigorous, since it avoids conflating facility counts with output.
- Track disbursement, not allocation, as the primary benchmark. India's Bulk Drugs PLI has disbursed only ₹87.70 crore against a ₹6,940 crore outlay — the clearest signal that fiscal commitment has not translated into China-independence. If that disbursement rises sharply and China's share of India's API imports falls below 70%, the reshoring thesis gains real support; if it stays flat, the schemes are announcements more than structural change.

Test whether US reshoring is structural or cyclical. Phlow and continuous-manufacturing bets depend on sustained procurement. If DPA Title III appropriations revert toward pre-2020 levels (~$95 million/year average), US reshoring should be interpreted as a pandemic-era spasm rather than a durable shift. Watch the FDA Essential Medicines list and BARDA renewal contracts as leading indicators.

Limitations

- API "market share" figures conflate three distinct metrics — FDA facility counts, Drug Master File filings, and actual production volume — that are frequently confused. Facility counts and DMF filings measure capability, not output; the FDA has itself testified it cannot determine the volume of API China actually produces or how much enters the US market.

Several vivid statistics (notably "45% of global API by volume") trace to industry/trade sources without verifiable primary citations and should be treated with caution; the more defensible framing is the ~20–40% range from WHO/ITIF and Brookings' ~25% US-exposure estimate.

Some sources are think tanks or advocacy bodies with policy positions (ITIF, Coalition for a Prosperous America, Council on Foreign Relations); their factual data can be used but should be distinguished from their framing.

Post-2024 figures (2026 PLI disbursement data, US tariff threats on generics) describe a rapidly evolving situation and may date quickly.

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