Health Affairs Scholar, 2026, **4**(2), qxaf247
https://doi.org/10.1093/haschl/qxaf247
Advance access publication: December 23, 2025
Research Article

Health Affairs Scholar
EMERGING & GLOBAL HEALTH POLICY
OXFORD

Potential impact of tariffs on active pharmaceutical ingredients on the price of US-made generic drugs

Mariana P. Socal[1,*], Yunxiang Sun[1], Jeromie Ballreich[1], Joy Acha[1], Mohammad Ali Yazdi[2], Tinglong Dai[2,3], Maqbool Dada[2,4]

[1]Department of Health Policy and Management, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD 21205, United States
[2]Johns Hopkins Carey Business School, Baltimore, MD 21201, United States
[3]Johns Hopkins School of Nursing, Baltimore, MD 21205, United States
[4]Department of Anesthesiology and Critical Care Medicine, Johns Hopkins School of Medicine, Baltimore, MD 21205, United States

*Corresponding author: Department of Health Policy and Management, Johns Hopkins Bloomberg School of Public Health, 615 N Wolfe St., Suite W7503D, Baltimore, MD 21205, United States Email: msocal1@jhu.edu

Abstract

Introduction: The impact of tariffs on prescription drug prices has been poorly understood.

Methods: Using US importation data 2019-2024, this study modeled the potential impact of tariffs on the prices of generic drugs manufactured in the United States with imported active pharmaceutical ingredients (APIs).

Results: Under baseline assumptions a 100% worldwide tariff would result in average price increase of 30% (additional $21.15 per prescription) and a blended tariff based on rates proposed by the Federal Administration would result in an average price increase of 10% (additional $6.22 per prescription) for domestically produced generics using imported APIs. Estimates varied across drugs reflecting different API importation patterns. Assumptions on the tariff rate, the contribution of the API cost to the final drug price, and on the supply chain's ability to absorb the added tariff contributed markedly to determining the final price. The study findings do not generalize to US-made generics using US-made APIs but could be relevant to US-made branded drugs using imported APIs.

Conclusion: Tariffs could raise costs for US drug manufacturers using imported APIs, potentially limiting affordability and manufacturers' competitiveness in United States and global markets. Policies to incentivize "made-in-America" prescription drugs should incentivize domestic API production or reconsider API tariffs.

Key words: prescription drugs; drug manufacturing; pharmaceutical industry; supply chain; tariff; onshoring; domestic production.

Introduction

Among the reasons provided for recent US tariff policies is the intention to boost US domestic manufacturing.[1] In the pharmaceutical sector, however, the impact of tariffs has remained poorly understood. Of particular interest is the potential impact of tariffs on US generic drug manufacturers, who often rely on imported active pharmaceutical ingredients (APIs) for pharmaceutical production.

Generic drugs represent more than 90% of prescriptions filled in the United States every year.[2] Most generic drug manufacturers do not produce APIs, but instead source them from specialized manufacturers.[3,4] APIs are the chemically active substances that produce a drug's therapeutic effect. Active pharmaceutical ingredients are a key determinant of the quality of the finished drug and generally contribute between 20% and 30% of the final drug cost, although values of more than 50% have been suggested.[5,6] More than 85% of facilities producing generic APIs for the US market are located in other countries.[3]

Historically, prescription drugs have been exempted from tariffs due to concerns about the cost burden on the health care system.[7] The United States is a signatory of the 1994 Agreement on Trade in Pharmaceutical Products, which eliminated tariffs on pharmaceuticals.[8] Although generics have generally not been included in the tariffs recently implemented by the US Federal government, the Administration has signaled the possibility of implementing such tariffs, including on APIs.[9] Proposed tariffs on pharmaceuticals have included different rates for different countries or regions as well as the possibility of a rate of 100% worldwide. A federal investigation, conducted under Section 232 of the Trade Expansion Act of 1962, is underway to assess whether imports of pharmaceuticals and APIs pose risks to US national security and to inform potential policy responses.[9]

Tariffs on APIs imported into the United States for final transformation by domestic drug manufacturers could increase prices and the reduce competitiveness of US-made generic drugs in the global market. This study evaluated the potential impact of tariffs on APIs on the prices of generic drugs made in the United States with foreign APIs. Drawing on importation data from 2019 to 2024, we modeled how varying tariff rates and country-specific targets could influence the cost of US-made drugs. To account for other production costs and the contribution of other supply chain participants to the final price, we also examined how supply chain

Received: September 2, 2025; Revised: December 5, 2025; Accepted: December 12, 2025

pass-through rates and manufacturer markups would impact the final price once the tariff is added to the API. The study aims to inform ongoing policy efforts to bolster the domestic pharmaceutical production while maintaining the competitiveness of US-made products in the global market.

Methods

Importation data was obtained from USA Trade Online, a registry of US export and import records maintained by the US Census Bureau, between Jan 2019 and Dec 2024.[10] This platform tracks monthly US imports for commodities identified by Harmonized Trade System (HTS) codes.[10] To identify APIs linked to generic prescription drugs, we reviewed Chapter 29 in the list of HTS codes (Organic Chemicals), which includes APIs.[11] We excluded cases where the same code was used to identify multiple APIs, making it impossible to disentangle between individual substances. We also excluded APIs associated with branded drugs, biologics, or over-the-counter products—identified using FDA's Orange Book[12] (a database of approved drug products) and Purple Book[13] (a database of licensed biological products)—and APIs associated with controlled substances, identified using the US Drug Enforcement Administration List of Controlled Substances.[14] We extracted all importation records from the identified HTS codes and excluded APIs with total imported volume lower than 1 metric ton during the 6-year study period. The final set of APIs and HTS codes included in this study is listed in Appendix Table S1. Characteristics of the finished drugs made with the study APIs (therapeutic class, first US approval year, number of US license holders, number of finished drugs licensed in the US using the API, and routes of administration) are presented in Appendix Table S2.

For each included API, we extracted the country of origin, imported volume (in kg), and cost (in US dollars) from all importation records, aggregating data over the 6-year study period. All costs were inflation-adjusted to July 2024 dollars using the Consumer Price Index published by the Federal Reserve Bank of St. Louis.[15] We calculated the average price per kilogram and the share of imports sourced from each country based on the aggregated values over the study period.

Using US Medicaid State Drug Utilization Data, we obtained the average price per prescription for all finished drugs made with the study APIs in 2024. We calculated this price by dividing the total spending on each drug by the total number of prescriptions for the same drug between January 01 and December 31, 2024, aggregating across all fee-for-service Medicaid programs in all 50 states.[16] While state Medicaid programs may receive confidential rebates from drug manufacturers, the prices examined in this study reflect the average prices paid to pharmacies by Medicaid programs in 2024 for these drugs.[17]

To estimate changes in finished drug prices, a range of tariff rates and target countries or regions were modeled after official announcements from the Federal Administration. Those announcements included: 25% tariffs on imports from Canada and Mexico;[18,19] 54.9% tariffs on imports from China;[20] 25% tariffs on imports from India;[21] 15% tariffs on imports from European countries;[22] and a uniform 100% tariff on imports from all countries worldwide.[23]

First, we examined each tariff rate and target country individually (i.e., assuming all other countries paid no tariff). Next, we modeled a blended tariff scenario in which all the specified tariffs were applied simultaneously to all their respective target countries. Finally, we assessed a uniform 100% tariff rate applied worldwide.

All scenarios were modeled using a Tariff Impact Calculator that incorporated empirical values of each country's share of API imports according to the importation records (Appendix Figure S1). Both percentage changes and absolute (dollar) changes in the price per prescription of the finished generic drug were examined. The calculator allowed for modeling different tariff rates, different contributions of the API cost to the final drug price, and different supply chain pass-through rates.[24]

The base-case scenario assumed that the API cost contributed 30% to the price of the finished drug, and that 100% of the added costs from tariffs would be passed through to end purchasers (insurers and patients) by supply chain participants (manufacturers, wholesalers, and pharmacies).[25,26] To assess the robustness of these assumptions, we conducted a sensitivity analysis by varying both the pass-through rates and the proportion of the final drug price attributable to API cost. In addition, we conducted a sensitivity analysis presenting a range of global tariff scenarios (10%, 25%, 100%, and 200%) to test varying assumptions about tariff intensity.

Limitations

This study has several limitations. First, the APIs examined in this study were limited to generic substances identifiable from importation records. The study findings may therefore not be generalizable to all generic drugs, branded drugs or biologic products. However, the findings yield policy implications that may be relevant for the broad range of drugs made in the United States with imported APIs, which currently includes not only generics but also branded and biologic drugs. Second, data on domestic API production was unavailable. Because domestically produced generic APIs are typically more expensive than imported ones in pre-tariff conditions, future research should examine the scale, availability, and cost of domestic API manufacturing to better understand the extent of the dependency of the US domestic pharmaceutical industry on foreign API sources and to determine under what conditions US drug manufacturers might shift toward domestic sourcing to mitigate tariff-related cost increases. Studies analyzing the comparative price of US-made drugs using foreign APIs vs US-made drugs using US-made APIs would be important not only to inform trade policies but also policies to incentivize "Made-in-America" pharmaceutical manufacturing. Third, we used average Medicaid per-prescription prices to calculate the impact of tariffs on finished drug prices. Although these prices do not account for confidential rebates that may lower the final drug cost,[27] they represent the average prices paid to pharmacies by Medicaid programs in 2024 for these drugs. This is a more realistic approach than using manufacturers' list prices because it captures any markups that may have been added by supply chain participants to the finished drug price. This approach also accounts for variations in pack sizes, dosage forms, and clinical needs across all drugs made with the same API, making it a more meaningful and standardized metric for our analysis. Fourth, the tariff rates modeled in this study have been based on US trade policies that have had various iterations over time, alternately including or excluding prescription drugs and APIs, and changing target countries and rates, generating uncertainty. The study aimed to address this uncertainty by implementing a range

Table 1. Importation of APIs to the United States, 2019-2024.

Substance name and therapeutic class	Importation 2019-2024			Percentage of Imported Cost 2019-2024				
	Total cost (million USD)[a]	Total volume (metric tons)	Avg. price per Kg (USD)[a]	Europe[b]	China	India	Canada/Mexico[c]	Other[d]
Antibiotics								
Ampicillin	34.18	156.3	218.64	**93.7%**	3.0%	1.4%		1.9%
Erythromycin	98.06	350.2	280.06	32.8%	**50.1%**	12.3%	0.1%	4.7%
Penicillin G	91.54	3008.4	30.43	10.2%	**52.9%**	<0.1%	36.4%	0.4%
Tetracyclines	366.64	21242.2	17.26	13.6%	**79.5%**	0.2%	0.8%	5.9%
Antiepileptics								
Valproic acid	12.77	371.9	34.34	**70.2%**	<0.1%	5.8%		24.0%
Cardiovascular								
Ephedrine	14.79	156.8	94.34	36.6%	3.5%	**38.4%**	0.2%	21.3%
Epinephrine	37.39	55.1	678.49	**70.2%**	2.8%	0.2%	0.3%	26.5%
Hydralazine	35.15	189.8	185.15	<0.1%	<0.1%	33.3%		**66.6%**
Lidocaine	51.87	1767.5	29.34	**53.2%**	0.3%	24.8%	0.4%	21.3%
Hormones								
Estrogen	112.28	50.6	2217.95	**88.5%**	5.9%	2.4%	0.4%	2.7%
L-Thyroxine	41.07	52.1	787.92	**96.7%**	<0.1%	3.0%	<0.1%	0.2%
Progesterone	107.65	767.3	140.30	**54.8%**	45.1%	<0.1%	<0.1%	<0.1%
Immunosuppressants								
Hydrocortisone	65.70	150.4	436.85	4.5%	**90.9%**	2.7%	1.2%	0.7%
Mycophenolate mofetil	57.08	187.5	304.48	10.7%	2.2%	**47.2%**	1.7%	38.2%
Prednisolone	43.58	20.2	2161.04	**82.2%**	15.3%	2.1%	0.3%	<0.1%
Prednisone	72.75	59.8	1217.65	28%	**55.4%**	16.6%	<0.1%	
Quinine	26.06	534.0	48.34	29.6%	28.5%	11.2%	<0.1%	**30.7%**
Total (2019-2024)[e]	1268.56	29125.1	43.56 (137.50)	36.5%	44.4%	7.3%	3.1%	8.8%

Source: Authors' analysis of importation records from the USA Trade Online platform from the United States Census Bureau, for January 01, 2019 to December 31, 2024, accessed March 1, 2025.
[a]Costs were inflation-adjusted to July 2024 dollars using the Consumer Price Index published by the Federal Reserve Bank of St. Louis.(15).
[b]Includes Switzerland. Does not include the United Kingdom.
[c]Mexico contributed 39% and Canada contributed 3% of the Penicillin G supply; Mexico contributed less than 1% of estrogen and progesterone supply. Mexico did not have recorded supply contributions for any of the other APIs in the sample.
[d]Together, the displayed countries/regions sum up to 100% of the imported cost in the study period.
[e]Weighted average and standard deviation are displayed for price per kilogram (weighted by the imported cost).

of tariff scenarios and sensitivity analyses. Although it is not possible to account for every possible tariff scenario, the study's findings are still an important signal of the potential impacts that the US foreign trade policy may have on the domestic pharmaceutical industry. Fifth, the study did not account for drug-specific characteristics such as manufacturing complexity, market share, therapeutic value, or price trajectories. Such characteristics may result in different contributions of the API cost to the final price, or different likelihoods that manufacturers would pass the added cost of the tariff through to the supply chain. Understanding drug-specific potential impacts from tariffs would be important for drugs with strategic clinical relevance, such as antibiotics, for example, and should be the focus of future studies. Lastly, modeling US drug manufacturers' potential dynamic responses to proposed or imposed tariffs—choosing to prioritize domestic API sources or APIs from countries less affected by tariffs, for example—was outside of the scope of this study.

Results

A total of 17 generic APIs were included in this study, including antibiotics, antiepileptics, cardiovascular drugs, hormones, and immunosuppressive agents (Appendix Table S2). Fourteen APIs were used to manufacture injectable drugs and 13 for oral drugs. On average, there were 36 companies (standard deviation: 25) licensed by the FDA to market finished drugs using each API in the United States.

Between 2019 and 2024, total imports for the APIs in our study amounted to $1, 268.56 million and 29 125 metric tons, with a weighted average price of $43.56 (standard deviation: $137.50) per kilogram (Table 1). China accounted for 44.4% of the total imported value, followed by Europe at 36.5%.

Europe was the dominant source of 7 APIs: levothyroxine (96.7% of the imported cost), ampicillin (93.7%), estrogen (88.5%), prednisolone (82.2%), valproic acid (70.2%), epinephrine (70.2%), and progesterone (54.8%). China was the predominant source of 5 APIs: hydrocortisone (90.9%), tetracyclines (79.5%), prednisone (55.4%), penicillin G (52.9%), and erythromycin (50.2%). India was the dominant source of 2 APIs: mycophenolate mofetil (47.2%) and ephedrine (38.4%). The 2 remaining APIs, hydralazine (66.6%) and quinine (30.7%), were primarily sourced from other countries.

In the base-case scenario, applying a 100% worldwide tariff would increase all prices of finished drugs by 30% and applying the blended tariff rate would result in an average price increase of 10% (standard deviation: 3.9%) (Table 2). The highest price increases under the blended tariff scenario were estimated for hydrocortisone (15.5%), tetracyclines (14.0%), prednisone (11.6%) and penicillin G (11.9%). Prices would increase by on, average, 11.3% (standard deviation: 3.1%) under a 54.9% China-only tariff; 2.4% under Europe-only 15% tariffs; 2.3% under Canada/Mexico-only 25% tariffs; and 2.1% under India-only 25% tariffs.

The average price for finished drugs using the sample APIs was $70.50 per prescription (standard deviation: $86.88) before

Table 2. Estimated percentage changes to the price of US-made generic drugs under different tariff scenarios on imported APIs.

Substance name and therapeutic class	Country or Region-specific Tariff scenarios[a]				World tariff scenarios[b]	
	Europe[c] 15%	China 54.9%	India 25%	Canada, Mexico 25%	Blended Tariff	World 100%
Antibiotics						
Ampicillin	4.2%	0.5%	0.1%		4.9%	30.0%
Erythromycin	1.5%	8.3%	0.9%	<0.1%	10.8%	30.0%
Penicillin G	0.5%	8.7%	<0.1%	2.7%	11.9%	30.0%
Tetracyclines	0.6%	13.1%	<0.1%	<0.1%	14.0%	30.0%
Antiepileptic						
Valproic acid	3.2%	<0.1%	0.4%		4.3%	30.0%
Cardiovascular						30.0%
Ephedrine	1.7%	0.6%	2.9%	<0.1%	5.8%	30.0%
Epinephrine	3.2%	0.5%	<0.1%	<0.1%	4.5%	30.0%
Hydralazine	<0.1%	<0.1%	2.5%		4.5%	30.0%
Lidocaine	2.4%	<0.1%	1.9%	<0.1%	5.0%	30.0%
Hormones						
Estrogen	4.0%	1.0%	0.2%	<0.1%	5.3%	30.0%
L-Thyroxine	4.4%	<0.1%	0.2%	<0.1%	4.6%	30.0%
Progesterone	2.5%	7.4%	<0.1%	<0.1%	9.9%	30.0%
Immunosuppressants						
Hydrocortisone	0.2%	15.0%	0.2%	<0.1%	15.5%	30.0%
Mycophenolate	0.5%	0.4%	3.5%	0.13%	5.7%	30.0%
Prednisolone	3.7%	2.5%	0.2%	<0.1%	6.4%	30.0%
Prednisone	1.3%	9.1%	1.2%	<0.1%	11.6%	30.0%
Quinine	1.3%	4.7%	0.8%	<0.1%	7.8%	30.0%
Weighted average (SD)[d]	2.4% (0.9%)	11.3% (3.1%)	2.1% (1.6%)	2.3% (0.9%)	10.0% (3.9%)	30.0% (0)

Source: Authors' analysis of importation records from the USA Trade Online platform from the United States Census Bureau, for January 01, 2019 to December 31, 2024, accessed March 1, 2025.
Estimates assume that the cost of APIs represented 30% of the price of the final drug product and that 100% of the added cost from tariffs is passed through to end purchasers (insurers and patients) by supply chain participants (drug manufacturers, wholesalers, and pharmacies).
N/A, not applicable.
[a]Country/region tariff scenarios assume that only the specific country or region pays a tariff, and all other countries and regions pay no tariff.
[b]World tariff scenarios assume that all countries pay some tariff. The blended tariff scenario assumes that all country/region tariffs would be implemented simultaneously (Europe 15%; China 54.9%; India 25%; Mexico and Canada 25%) with 10% tariffs on products from all other countries. The world 100% scenario assumes all countries would pay the same 100% tariff.
[c]Includes Switzerland but excludes the United Kingdom.
[d]Weighted average by the total imported cost originating from each country or region for each drug.

tariffs (Table 3). The average price per prescription would increase by an average of $21.15 under the world 100% tariff and $6.22 under the blended tariff scenarios, followed by $7.47 under Canada/Mexico-only; $4.98 under China-only; $2.30 under Europe-only, and $1.49 under India-only tariff scenarios. The highest price increases would be under the world 100% tariff scenario, at $96.10 higher price for penicillin G and $80.89 higher price for epinephrine. Penicillin G would have a $38.18 average higher price per prescription under the blended tariff, $27.91 higher price under the China-only and $8.75 higher price under the Canada/Mexico-only tariff scenarios.

Estimated price increases would vary substantially according to different assumptions about the ability of the supply chain to absorb the added cost from tariffs and the contribution of the API cost to the finished drug price (Table 4). In the base-case scenario where 30% of the finished drug price was attributed to the API cost, a 75% pass-through rate (ie, supply chain participants would absorb 25% of the added cost) would result in a 12.7% average price increase under a world 100% tariff ($8.92 per prescription) and 4.2% under the blended tariff ($2.42 per prescription). For comparison, those price increases would be on average 30% ($21.15 per prescription) and 10% ($6.22 per prescription) under full pass-through assumptions (ie, if the supply chain did not absorb any portion of the added cost).

Assuming 100% supply chain pass-through rate (base-case scenario), estimated prices would increase by, on average, 80% under the world 100% tariff if 80% of the price of the final drug were attributed to the API cost (an unrealistic assumption according to the literature) and by 5% higher if 5% of the final drug price were attributed to the API cost (a more realistic assumption given that drug manufacturers may add high markups to their finished drug prices). Average prices would increase by $56.40 and $3.52 per prescription, respectively. Under the blended tariff scenario, prices would increase on average 26.6% ($16.58 per prescription) if 80% of the final drug price were attributed to the API cost and 1.7% ($1.04 per prescription) if 5% of the final drug price were attributed to the cost of the API.

Modifying the intensity of global API tariffs would yield proportional changes to per prescription finished drug prices: under the base-case scenario of 30% API contribution to the price and 100% supply chain pass-through rate, a 10% world tariff would be associated with a 3% increase in finished drug prices for all drugs. Price increases would be 30% under a 100% world tariff rate and 60% under a 200% world tariff rate for all drugs. On average, this would translate to $2.11 higher price per prescription in the world 10% tariff scenario, $21.15 higher price in the world 100% tariff scenario and $42.30 in the world 200% tariff scenario.

Discussion

This study used 6 years of generic APIs US importation data to model the potential impact of tariffs on the prices of generic drugs manufactured in the United States with foreign-sourced APIs.

Table 3. Estimated change in the average price per prescription for US-made generic drugs according to different tariff scenarios on imported APIs.

Substance name and therapeutic class	Pre-tariff price per prescription (USD)[a]	Estimated added price from tariff (in USD)					
		Europe[b,c] 15%	China[b] 54.9%	India[b] 25%	Canada, Mexico[b] 25%	Blended[d]	World[e] 100%
Antibiotics							
Ampicillin	100.98	4.26	<1.00	<1.00		4.92	30.29
Erythromycin	35.59	<1.00	2.94	<1.00	<1.00	3.84	10.68
Penicillin G	320.33	1.47	27.91	<1.00	8.75	38.18	96.10
Tetracyclines	21.45	<1.00	2.81	<1.00	<1.00	2.99	6.44
Antiepileptics							
Valproic acid	27.86	<1.00	<1.00	<1.00		1.20	8.36
Cardiovascular							
Ephedrine	23.26	<1.00	<1.00	<1.00	<1.00	1.34	6.98
Epinephrine	269.62	8.52	1.25	<1.00	<1.00	12.01	80.89
Hydralazine	27.16	<1.00	<1.00	<1.00		1.22	8.15
Lidocaine	113.86	2.73	<1.00	2.12	<1.00	5.66	34.16
Hormones							
Estrogen	120.36	4.80	1.18	<1.00	<1.00	6.33	36.11
L-thyroxine	16.77	<1.00	<1.00	<1.00	<1.00	<1.00	5.03
Progesterone	23.66	<1.00	1.76	<1.00	<1.00	2.34	7.10
Immunosuppressants							
Hydrocortisone	37.41	<1.00	5.60	<1.00	<1.00	5.79	11.22
Mycophenolate mofetil	96.10	<1.00	<1.00	3.40	<1.00	5.44	28.83
Prednisolone	22.09	<1.00	<1.00	<1.00	<1.00	1.41	6.63
Prednisone	9.52	<1.00	<1.00	<1.00	<1.00	1.11	2.86
Quinine	50.30	<1.00	2.36	<1.00	<1.00	3.92	15.09
Weighted average (SD)[f]	70.50 (86.88)	2.30 (2.39)	4.98 (7.13)	1.49 (1.37)	7.47 (3.09)	6.22 (9.17)	21.15 (26.06)

Source: Authors' analysis of importation records from the USA Trade Online platform from the United States Census Bureau. (https://usatrade.census.gov/index.php) and US State Medicaid Drug Utilization Data 2024 (https://data.medicaid.gov/dataset/61729e5a-7aa8-448c-8903-ba3e0cd0ea3c).
Estimates assume that the cost of APIs represent 30% of the cost of the final drug product and that 100% of the price increase is passed through to the end purchasers (insurers and patients) by supply chain participants (drug manufacturers, wholesalers, and pharmacies).
[a]Prices represent the average amount per prescription paid by US state Medicaid programs for the finished drugs made with the APIs in this study between January 01 and December 31, 2024.
[b]Country or region-specific tariff scenarios assume that only the specific country or region pays a tariff, and all other countries and regions pay no tariff.
[c]Europe includes Switzerland but excludes the United Kingdom.
[d]The Blended tariff scenario assumes that all country/region tariffs would be implemented simultaneously (Europe 15%; China 54.9%; India 25%; Mexico and Canada 25%) with 10% tariffs on products from all other countries.
[e]The world 100% scenario assumes imports from all countries would pay the same 100% tariff.
[f]Weighted average by the total imported cost originating from each country or region for each drug.

Table 4. Estimated changes in the price of US-made generic drugs under different imported APIs tariff scenarios according to different pass-through rates and markup rates.

Tariff scenario		Estimated percentage price changes				Estimated changes in price per prescription (in USD)[a]			
World 100%[b]		API fraction of the cost[c]							
		5%	30%	50%	80%	5%	30%	50%	80%
Supply Chain Pass-through rate[d]	**25%**	0.1%	0.5%	0.8%	1.3%	0.06	0.33	0.55	0.88
	50%	0.6%	3.8%	6.3%	10.0%	0.44	2.64	4.41	7.05
	75%	2.1%	12.7%	21.1%	33.8%	1.49	8.92	14.87	23.79
	100%	5.0%	30.0%	50.0%	80.0%	3.52	21.15	35.25	56.40
Blended tariff[e]		**API fraction of the cost**[c]							
		5%	**30%**	**50%**	**80%**	**5%**	**30%**	**50%**	**80%**
Supply Chain Pass-through rate[e]	**25%**	0.0%	0.2%	0.3%	0.4%	0.02	0.10	0.16	0.26
	50%	0.2%	1.2%	2.1%	3.3%	0.13	0.78	1.30	2.07
	75%	0.7%	4.2%	7.0%	11.2%	0.44	2.62	4.37	7.00
	100%	1.7%	10.0%	16.6%	26.6%	1.04	6.22	10.36	16.58

Source: Authors' analysis of importation records from the USA Trade Online platform from the United States Census Bureau. (https://usatrade.census.gov/index.php) and US State Medicaid Drug Utilization Data 2024 (https://data.medicaid.gov/dataset/61729e5a-7aa8-448c-8903-ba3e0cd0ea3c).
API stands for Active Pharmaceutical Ingredient.
[a]Prices represent the estimated change in the average amount per prescription paid by US state Medicaid programs for the finished drugs made with the APIs in this study between January 01 and December 31, 2024.
[b]The world 100% scenario assumes imports from all countries would pay the same 100% tariff.
[c]API fraction of the cost represents the level of markup that drug manufacturers and supply chain participants may place on each drug to determine the price to the consumer. For example, an API fraction of the cost equal to 25% represents a manufacturer and supply chain markup of 75% in the drug's final price compared to the API cost.
[d]Pass-through rates represent the extent to which the supply chain participants (drug manufacturers, wholesalers, and pharmacies) may absorb the added costs from tariffs. A pass-through rate of 25% indicates that, collectively, each supply chain participant would absorb 75% of the added costs from tariffs.
[e]The Blended tariff scenario assumes that all country/region tariffs would be implemented simultaneously (Europe 15%; China 54.9%; India 25%; Mexico and Canada 25%) with 10% tariffs on products from all other countries.

Overall, a 100% tariff rate applied to worldwide API imports would result in 30% higher prices of US-made generic drugs ($21.15 average higher price per prescription) under the base-case assumptions that 30% of the final drug price would be attributed to the API cost and that there would be full pass-through of the added cost of tariffs by supply chain participants (manufacturers, wholesalers, and pharmacies) to end purchasers (insurers and patients). A blended tariff combining all the country-specific rates proposed by the current Administration would result in an average price increase of 10% ($6.22 per prescription) under the base-case assumptions.

The impact of tariffs varied markedly across drugs, reflecting different pre-tariff prices and different reliance on specific countries for API imports. Together, China and Europe accounted for 80.9% of US API imports 2019-2024 in our sample. China-only tariffs would not affect prices of drugs that relied primarily on Europe for their API supply, and vice-versa. Hydrocortisone and tetracyclines, whose imported API supply originated primarily from China, had estimated price increases of 15.0% and 13.1%, respectively, under the China-only tariff scenario but <1% under Europe-only scenario. Levothyroxine and valproic acid, whose imported API supply originated primarily from Europe, had estimated price increases of 4.4% and 3.2%, respectively, under Europe-only scenarios but <1% under China-only scenario.

By varying 2 key parameters—the contribution of API cost to the final drug price and the pass-through rates of the added cost in the supply chain—we tested the robustness of our assumptions. While both factors influenced the final price, the API's contribution to the final price had the greatest impact. This underscores the importance of understanding how API costs translate into finished drug prices. Although empirical evidence suggests that drug prices often reflect substantial manufacturer markups, the generic drug market operates under lower profit margins. As a result, increases in API costs could potentially have a larger proportional effect on final drug prices, leaving US-made generic drugs relying on tariff-affected foreign APIs especially vulnerable to price increases.

Pass-through rates were also important. At 75% pass-through rates (ie, if supply chain participants absorbed 25% of the added costs from tariffs), price increases would be about 50% lower than those estimated under 100% pass-through rate scenarios (i.e., if the supply chain did not absorb any of the added cost from tariffs). In the US market, this suggests that the financial burden of tariffs could be partially mitigated if supply chain participants absorbed even a modest share of the cost. However, in global markets, the capacity of supply chains to absorb such costs might be more limited, potentially reducing the competitiveness of US-made generics abroad if their prices were to increase because of tariffs on APIs. The extent to which these dynamics could affect international pricing and export potential warrants further investigation.

While tariffs may increase the cost of generic drugs in the United States, the net impact on drug spending is likely to be modest relative to the total US pharmaceutical market, given that less than 15% of drug spending is on generic drugs.[2,28] However, even modest price increases may squeeze pharmacy profit margins. Generics account for over 90% of US prescription fills, and pharmacies have extensive contracts with payers for generic drug reimbursement.[2,27,28] If generic drug prices increase rapidly, pharmacies may have little recourse to negotiate higher reimbursement rates from payers. This may particularly pressure independent pharmacies with little negotiating power. Recent findings from the Federal Trade Commission's second interim staff report on pharmacy benefit managers showed that shrinking generic reimbursement spreads have already imperiled many independent pharmacies, underscoring their limited capacity to absorb additional cost shocks.[29]

Reliance on global suppliers has played a key role in lowering the cost of generic drugs in the United States by leveraging economies of scale and market competition. However, this foreign dependence has also increased the vulnerability of the US prescription drug supply, including drug shortages.[3,30] A deeper understanding of the US dependency on foreign API sources is a critical component of assessing pharmaceutical supply resilience and should be the focus of future research.

Reshoring the manufacturing of prescription drugs, including generics, has been proposed as a strategy to strengthen the US prescription drug supply and help prevent or mitigate shortages. Yet, continued reliance on foreign-sourced APIs may undermine the effectiveness of such efforts, particularly if tariffs are imposed on imported APIs. US-made drugs may be more costly than imported ones due to higher production costs. Tariffs on globally sourced APIs could further inflate those costs, potentially undermining the competitiveness of US-made generics in both domestic and international markets.

While higher import duties could in theory spur onshoring of API production and support policies to incentivize Made-in-America drugs, the economics of onshoring would differ by molecule. Absent additional interventions, whatever capacity is added to the US generic industry would likely be concentrated in a few high-volume or high-margin drugs and therefore too patchy to stabilize overall drug supply in the near term.

The hundreds of millions of dollars required to build or retool facilities and the long regulatory approval times that may delay commercial output mean that meaningful expansions of domestic generic API production capacity might require additional incentives. Providing grants, low-cost loans, or direct investments for the construction or expansion of API-manufacturing facilities could help expand capacity for priority APIs such as antibiotics.[31]

Understanding the domestic API production capacity and incentivizing the expansion of domestic API production would be important measures to help strengthen and speed up commercial output. These would also be in line with measures recently announced by the Federal Administration to support domestic manufacturing, including expedited regulatory review of domestic API-manufacturing facilities.[32]

Tariff policies may also carry unintended consequences with potentially serious implications for American patients. One of the most concerning risks is retaliatory action by countries targeted by tariffs, such as the imposition of export quotas. For instance, China is the largest supplier of imported APIs for US-made tetracyclines; if China were to restrict exports of this API to the US, a widespread shortage across the US would be all but certain. Other unintended consequences include supply chain disruptions stemming from manufacturer relocation, retaliatory tariffs that may harm US exporters, and cost-cutting measures in the generic supply chain that could compromise the quality and safety of generic pharmaceutical products exported to the US.

As US trade policy continues to evolve, the tariff rates, target countries and products affected by tariffs may continue to shift. In this changing landscape, it is important to recognize how US foreign trade policy may negatively impact the US domestic pharmaceutical industry. This study demonstrated that

tariffs on imported APIs could increase the cost of domestically manufactured generic drugs, potentially reducing their competitiveness in both US and global markets. Tariffs on imported APIs may inadvertently undermine Made-in-America policies and other efforts to strengthen domestic pharmaceutical manufacturing. Such tariffs also may carry additional risks, including retaliatory measures by tariff-affected countries. Any implementation of API tariffs should be carefully evaluated to avoid unintended harm to drug affordability, access, and supply chain resilience in the United States.

Supplementary material

Supplementary material is available at *Health Affairs Scholar* online.

Funding

This work was supported by research grants from Johns Hopkins University Nexus Research Award, 2024-2026 and from the Uniformed Services University of the Health Sciences, Center for Health Services Research via a grant from the U.S. Department of Defense, Defense Health Agency, Grant # HU00012520014. The funding sources had no role in the concept, preparation, review, and approval of the manuscript, nor in the decision to submit the manuscript for publication.

Conflicts of interest

Please see ICMJE form(s) for author conflicts of interest. These have been provided as supplementary materials.

M.P.S. receives research grants to the institution from Arnold Ventures and from the California Department of Health Care Access and Information. J.B. receives research grants to the institution from Arnold Ventures. T.D. receives support from the Bernard T. Ferrari Professorship. M.D., M.A.Y., J.A., and Y.S. have no conflicts of interest to disclose.

Notes

1. Patrick W, David L. US steps up probes into pharmaceutical, chip imports, setting stage for tariffs | Reuters [Internet]. Accessed August 4, 2025. https://www.reuters.com/markets/us-initiates-section-232-investigations-into-pharmaceutical-semiconductor-2025-04-14/
2. Biosimilar Council, a division of AAM. 2024 U.S. Generic & Biosimilar Medicines Savings Report [Internet]. Association for Accessible Medicines. Accessed August 4, 2025. https://accessiblemeds.org/resources/reports/2024-savings-report/
3. Socal MP, Ahn K, Greene JA, Anderson GF. Competition and vulnerabilities in the global supply chain for US generic active pharmaceutical ingredients. *Health Aff (Millwood)*. 2023;42(3):407-415. https://doi.org/10.1377/hlthaff.2022.01120
4. Mallu UR, Nair AK, Sankar J, et al. Impact of API (active pharmaceutical ingredient) source selection on generic drug products. *Pharmaceut Reg Affairs*. 2015;4(2):11.
5. Hill AM, Barber MJ, Gotham D. Estimated costs of production and potential prices for the WHO Essential Medicines List. *BMJ Glob Health*. 2018;3(1):e000571. https://doi.org/10.1136/bmjgh-2017-000571
6. Leake L. Patients Will Pay More for Prescription Meds and Face Drug Shortages Amid Trump Tariffs, Pharma Groups War | American Medical Manufacturers Association [Internet]. Accessed August 3, 2025. https://www.ammaunited.org/2025/patients-will-pay-more-for-prescription-meds-and-face-drug-shortages-amid-trump-tariffs-pharma-groups-war/
7. Kyle M. AJMC [Internet]. Trump's New Tariffs Could Drive Up Health Care Costs, Experts Warn. 2025. Accessed August 3, 2025. https://www.ajmc.com/view/trump-s-new-tariffs-could-drive-up-health-care-costs-experts-warn
8. The WTO's Pharma Agreement [Internet]. Accessed August 3, 2025. https://www.wto.org/english/news_e/news19_e/ddgaw_05dec19_e.htm
9. Federal Register [Internet]. Notice of Request for Public Comments on Section 232 National Security Investigation of Imports of Pharmaceuticals and Pharmaceutical Ingredients. 2025. Accessed August 4, 2025. https://www.federalregister.gov/documents/2025/04/16/2025-06587/notice-of-request-for-public-comments-on-section-232-national-security-investigation-of-imports-of
10. The Website Services & Coordination Staff UCB. U.S.A. Trade Online [Internet]. Accessed August 3, 2025. https://usatrade.census.gov/index.php
11. United States International Trade Commission. Harmonized Tariff Schedule—2025 HTS Revision 17 [Internet]. Accessed August 4, 2025. https://hts.usitc.gov/?query=853340
12. U.S. Food and Drug Administration. Research C for DE and. Approved Drug Products with Therapeutic Equivalence Evaluations | Orange Book. FDA [Internet]. 2025 Jul 11. Accessed August 4, 2025. https://www.fda.gov/drugs/drug-approvals-and-databases/approved-drug-products-therapeutic-equivalence-evaluations-orange-book
13. U.S. Food and Drug Administration (FDA). FDA Purplebook: Database of Licensed Biological Products [Internet]. Accessed August 4, 2025. https://purplebooksearch.fda.gov/
14. United States Drug Enforcement Administration (DEA). Alphabetical Listing of Controlled Substances [Internet]. Accessed Mar 15, 2025. https://www.deadiversion.usdoj.gov/schedules/orangebook/c_cs_alpha.pdf
15. Consumer Price Index for All Urban Consumers: All Items in U.S. City Average [Internet]. 2025. Accessed August 4, 2025. https://fred.stlouisfed.org/series/CPIAUCSL
16. Data.Medicaid.Gov. State Drug Utilization Data 2024. [Internet]. 2024. Accessed Oct 31, 2025. https://data.medicaid.gov/dataset/61729e5a-7aa8-448c-8903-ba3e0cd0ea3c
17. Dolan R. Understanding the Medicaid Prescription Drug Rebate Program. [Internet]. 2019. Accessed Oct 31, 2025. https://www.kff.org/medicaid/issue-brief/understanding-the-medicaid-prescription-drug-rebate-program/
18. The White House [Internet]. Imposing Duties to Address the Flow of Illicit Drugs Across Our Northern Border. 2025. Accessed August 4, 2025. https://www.whitehouse.gov/presidential-actions/2025/02/imposing-duties-to-address-the-flow-of-illicit-drugs-across-our-national-border/
19. House TW. The White House. Imposing Duties to Address the Situation at Our Southern Border. 2025. Accessed August 4, 2025. https://www.whitehouse.gov/presidential-actions/2025/02/imposing-duties-to-address-the-situation-at-our-southern-border/
20. Bown CP. US-China Trade War Tariffs: An Up-to-Date Chart | PIIE [Internet]. 2019. Accessed August 8, 2025. https://www.piie.com/research/piie-charts/2019/us-china-trade-war-tariffs-date-chart
21. Shalal A, Kumar M, Kumar M. Trump imposes extra 25% tariff on Indian goods, ties hit new low. Reuters [Internet]. 2025 Aug 7. Accessed August 8, 2025. https://www.reuters.com/world/india/trump-imposes-extra-25-tariff-indian-goods-ties-hit-new-low-2025-08-06/
22. Sarah S. EU and US agree trade deal, with 15% tariffs for European exports to America [Internet]. 2025. Accessed August 8, 2025. https://www.bbc.com/news/articles/cx2xylk3d07o
23. The White House. The White House. Fact Sheet: President Donald J. Trump Declares National Emergency to Increase our Competitive Edge, Protect our Sovereignty, and Strengthen our National and Economic Security. 2025. Accessed May 2, 2025. https://www.whitehouse.gov/fact-sheets/2025/04/fact-sheet-president-donald-j-trump-declares-national-emergency-to-increase-our-competitive-edge-protect-our-sovereignty-and-strengthen-our-national-and-economic-security/

24. Weyl EG, Fabinger M. Pass-Through as an Economic Tool: Principles of Incidence under Imperfect Competition [Internet]. Rochester, NY: Social Science Research Network; 2013. Accessed August 4, 2025. https://papers.ssrn.com/abstract=1324426
25. Socal MP, Dada M, Dai T. Prescription for made in America? Tariffs and U.S. drug manufacturing. *Health Aff Sch*. 2025;3(7): qxaf122. https://doi.org/10.1093/haschl/qxaf122
26. Dada M, Dai T, Sun Y, Socal M. Tariffs as a Hidden Tax: Price Pass-Through in Multi-Stage Supply Chains [Internet]. Rochester, NY: Social Science Research Network; 2025. Accessed Jul 29, 2025. https://papers.ssrn.com/abstract=5237643
27. Socal MP, Kandula NR, Bareamichael PI, et al. Improving affordability of pharmaceutical treatments for diabetes: a call for action. *Diabetes Care*. 2025;49(1):30–43. https://doi.org/10.2337/dci25-0002
28. Biosimilar Council, a division of AAM. Generic Medicines [Internet]. Association for Accessible Medicines. Accessed August 7, 2025. https://accessiblemeds.org/about/generic-medicines/
29. Federal Trade Commission. FTC Releases Second Interim Staff Report on Prescription Drug Middlemen. January 25, 2025. Accessed August 7, 2025. https://www.ftc.gov/news-events/news/press-releases/2025/01/ftc-releases-second-interim-staff-report-prescription-drug-middlemen
30. Noh IJ, Gray J, Ball G, Wright Z, Park H. Are all generic drugs created equal? An empirical analysis of generic drug manufacturing location and serious drug adverse events. *Prod Oper Manag*. 2025;34(9): 2601-2617. https://doi.org/10.1177/10591478251319691
31. Sandoz. Sandoz opens new antibiotic production facility in Austria, to significantly increase capacity for life-saving medicines. March 21, 2024. Accessed August 7, 2025. https://www.sandoz.com/sandoz-opens-new-antibiotic-production-facility-austria-significantly-increase-capacity-life-saving/
32. The White House. Regulatory Relief to Promote Domestic Production of Critical Medicines. Executive Order. May 5, 2025. Accessed August 7, 2025. https://www.whitehouse.gov/presidential-actions/2025/05/regulatory-relief-to-promote-domestic-production-of-critical-medicines/