Quantifying Trade Distortions and Exporter Competition in China's Beef Market: The Impact of U.S.–China Tensions

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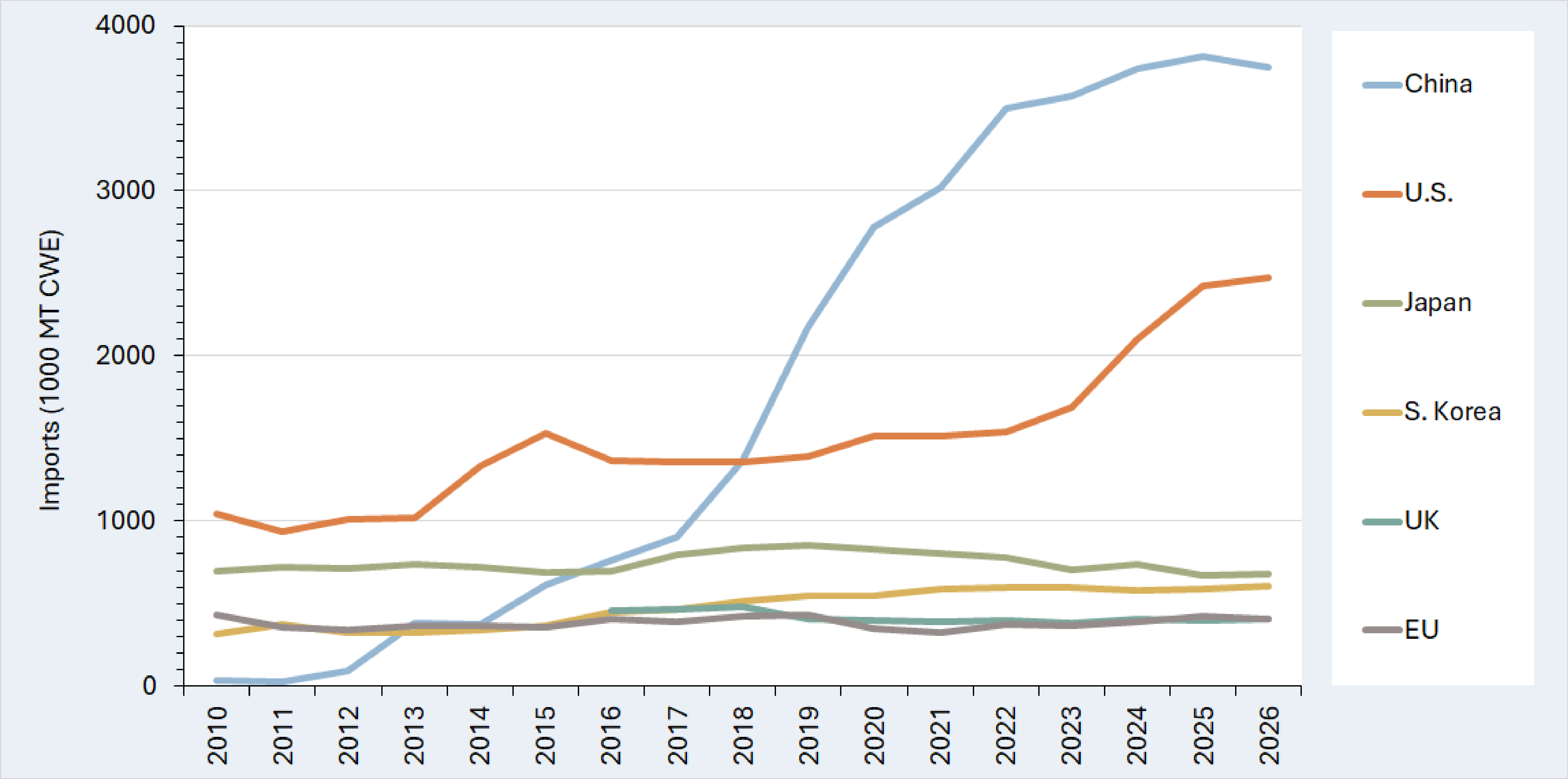
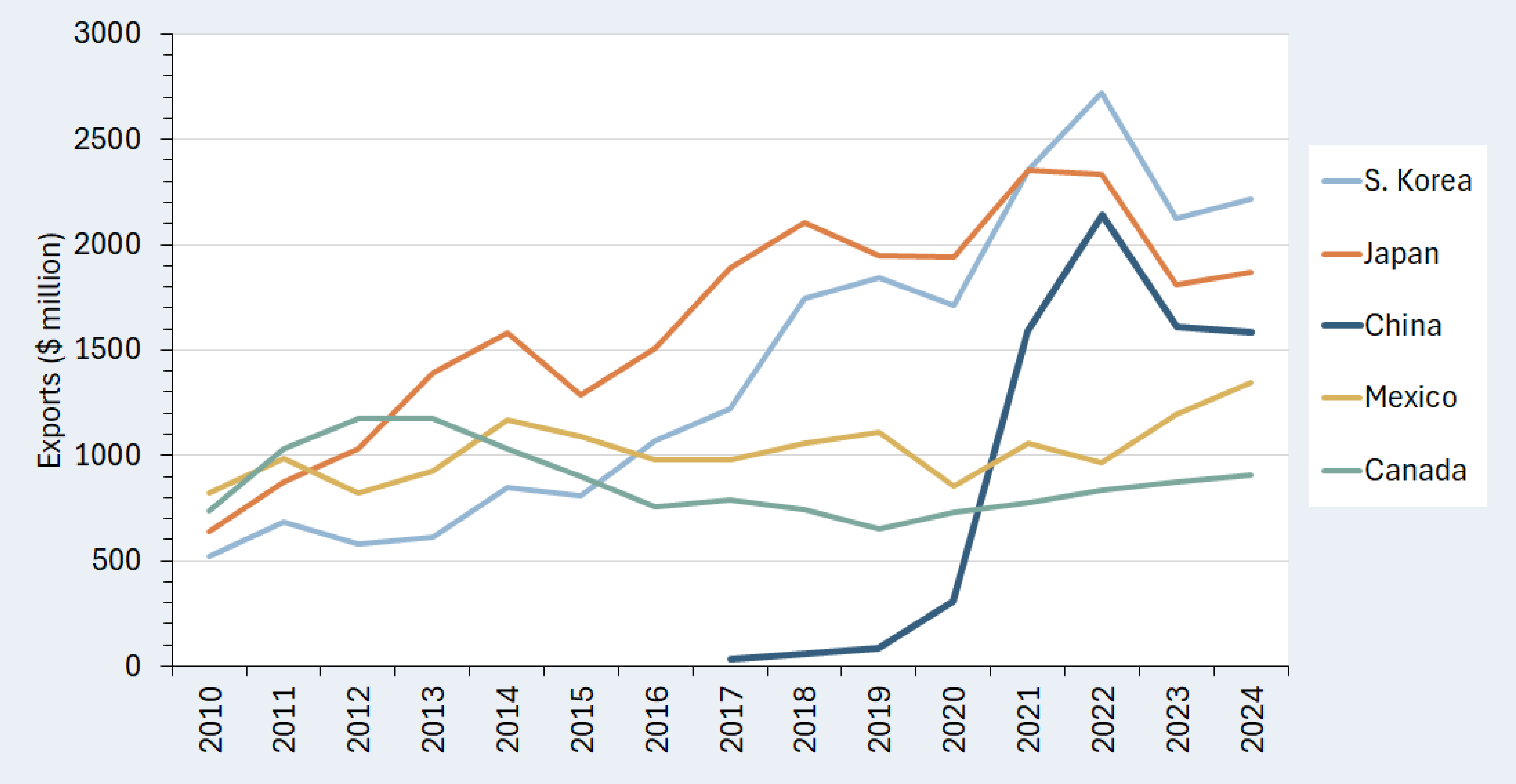
Beef and Veal Imports (Top Countries): 2010 – 2026



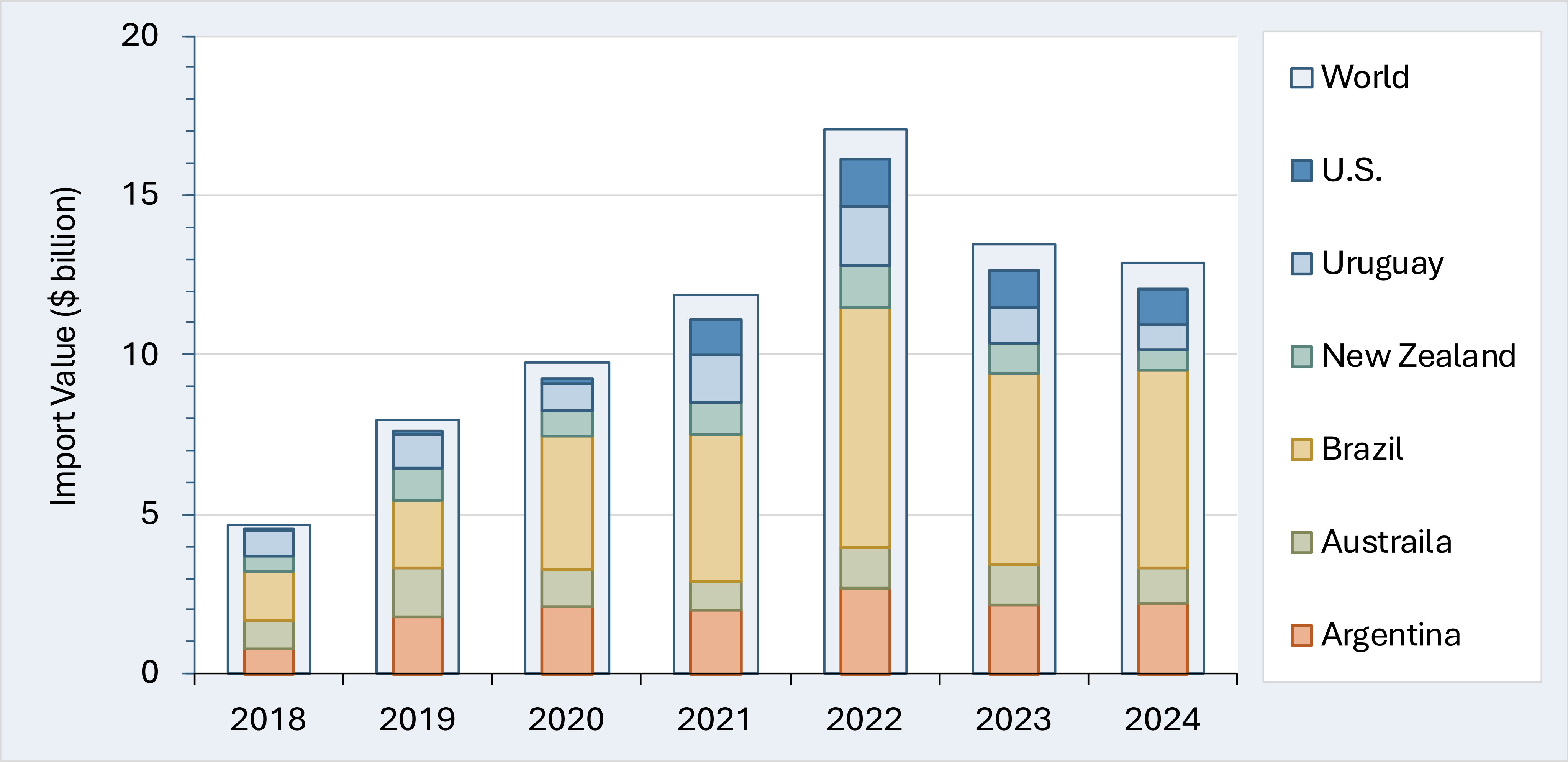
Source: U.S. Department of Agriculture, FAS PSD Database

U.S. beef and beef product exports by top destination: 2010 – 2024



Source: U.S. Department of Agriculture, Global Agricultural Trade System (GATS)

Figure I. Frozen Beef Imports in China by Exporting Country: 2018 – 2024



Note: Beef imports are defined according to the Harmonized System (HS) classification HS 0202 *meat of bovine animals, frozen*.
Source: Trade Data Monitor®

As the largest destination for cross-border beef trade, China plays a pivotal role in shaping global markets.

Recent tariffs (Trump administration) have led to retaliatory actions that significantly impacted U.S. beef exports to China.

Trade tensions between the U.S. and China have shifted beef demand toward competing suppliers such as Australia and Brazil.

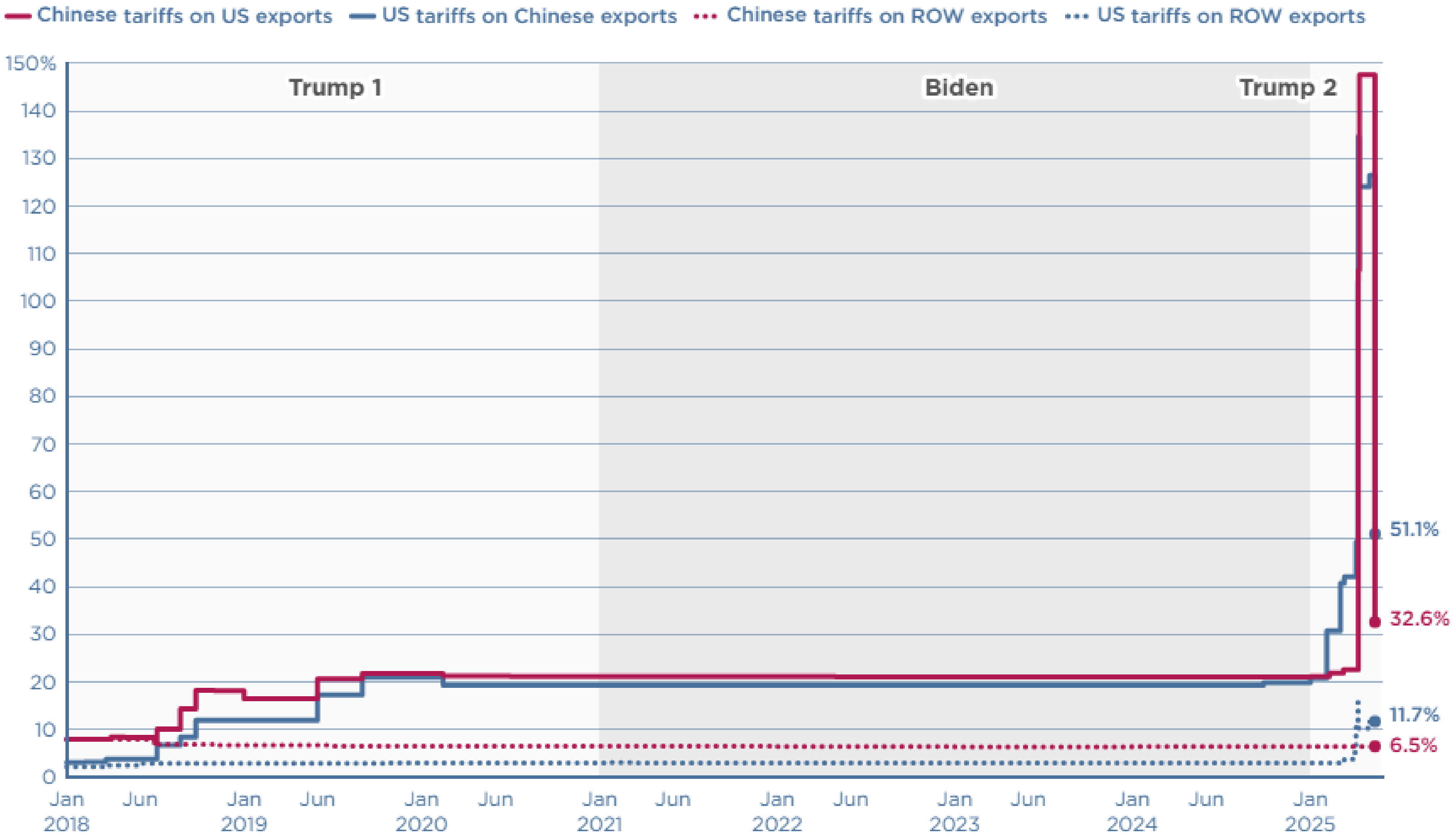
However, it is important to quantify the extent of these impacts, specifically measuring changes in market share, trade, and welfare.

S.L.	Trade Action	Country	Start Date	Effective Date	End Date	Company vs. Outright	Source
1	China restricted 22 establishments from exporting frozen beef	Argentina	November 30, 2010	November 30, 2010		Company	China's General Administration of Customs (GACC)
2	China restricted 39 establishments from exporting frozen and chilled beef	Australia	June 23, 2011	June 23, 2011		Company	GACC
3	China stopped receiving applications and registration for beef exports from six suppliers of Australia for Covid-19	Australia	May 2020 - December 2021	May 2020 - December 2021		Company	GACC
4	China imports ban on Brazilian beef due to mad cow disease	Brazil	December 13, 2012	December 13, 2012	July 2014	Outright	Reuters
5	Brazil halted beef exports to China after an atypical case of mad cow disease, and the ban was lifted about ten days later.	Brazil	June 2019	June 2019	June 2019	Outright	Reuters
6	China imposed a 102-day ban on beef imports from Brazil after discovering two atypical cases of mad cow disease.	Brazil	September 4, 2021	September 4, 2021	December 2021	Outright	GACC
7	China has suspended imports from three Brazilian beef exporters - JBS SA (JBSS3.SA), Marfrig (MRFG3.SA), and Naturafrig - for one week.	Brazil	April 2022	April 2022	April 2022	Company	Valor Economico reported, citing a statement sent to Brazil's embassy in Beijing.
8	China restricted 51 establishments from exporting frozen and chilled beef	New Zealand	November 15, 2017	November 15, 2017		Company	GACC
9	China banned imports of U.S. beef immediately after bovine spongiform encephalopathy (BSE) was discovered in the United States	United States	December 2003	December 2003	September 22, 2016	Outright	China's Min. of Ag. and General Administration of Quality Supervision, Inspection, and Quarantine (AQSIQ)
10	China restricted about twenty establishments from exporting frozen beef	Uruguay	April 21, 1997	April 21, 1997	Company	Company	GACC

US-China trade war tariffs: An up-to-date chart

Last updated May 14, 2025

a. US-China tariff rates toward each other and rest of world (ROW)



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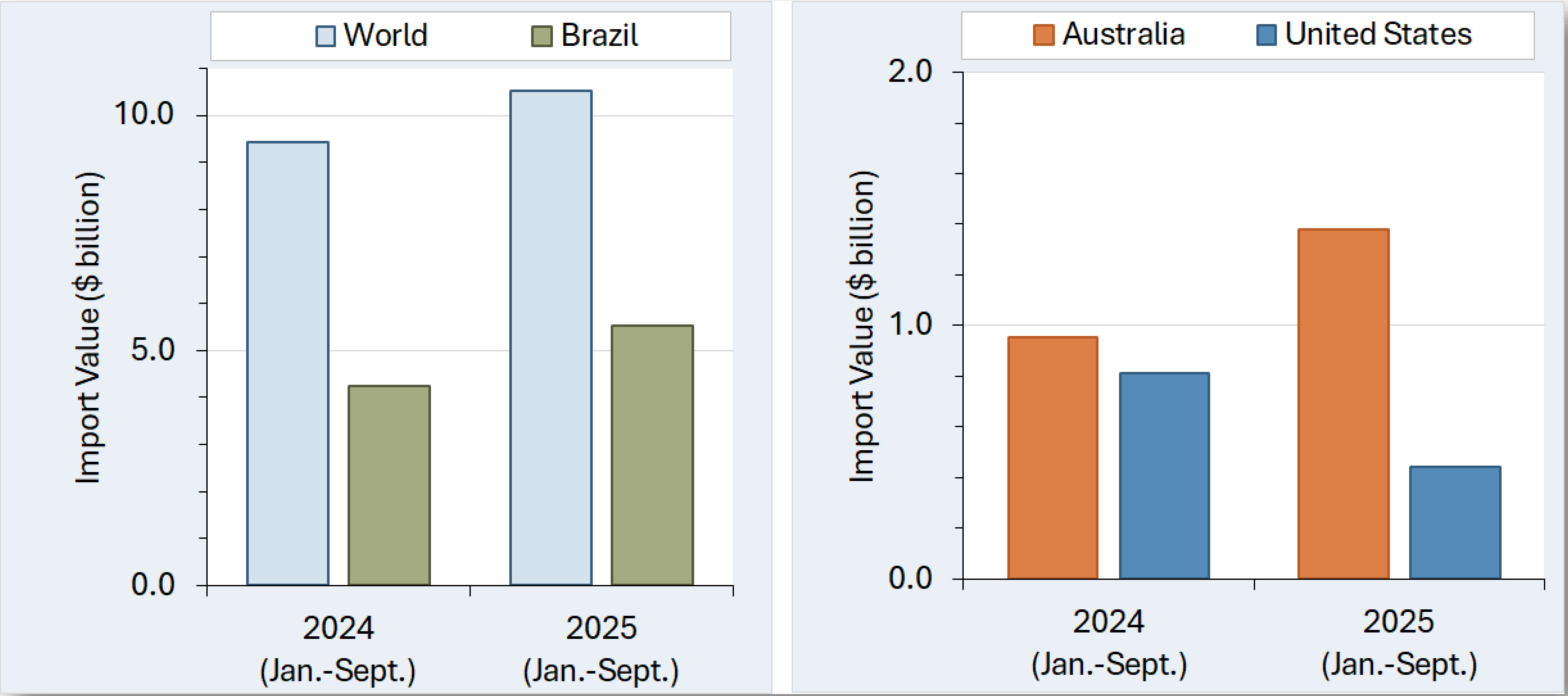
* = not tariff announcement; ITA = information technology agreement; MFN = most favored nation; ROW = rest of world; VER = voluntary export restraint; WTO = World Trade Organization

Notes: Trade-weighted average tariffs computed from product-level (six-digit, 2017 version of Harmonized System) tariff and trade data, weighted by exporting country's exports to the world in 2017. US tariffs on rest of world (ROW) exports treated as unchanged whenever Section 232 tariffs on steel or aluminum were converted to quotas, VERs, or tariff-rate quotas. March 4, 2025 US tariffs imposed on imports from Canada and Mexico are not included in the estimates.

Source: Constructed by Chad P. Bown with data from UN Comtrade, Trade Map and Market Access Map (International Trade Centre, marketanalysis.intracen.org), as well as announcements from China's Ministry of Finance and the US Trade Representative.

- In March 2025, the Chinese government allowed export registrations for nearly 400 U.S. beef processing facilities (almost 60%) to expire, effectively suspending their access to the Chinese market (Marianetti, 2025).
  - This action, widely interpreted as a non-tariff barrier, created uncertainty, discouraging new transactions and undermining confidence in the reliability of U.S. supply.
- During the same period, a series of reciprocal tariff escalations pushed duties as high as 145% (Bown, 2025), making U.S. beef less competitive relative to suppliers such as Brazil and Australia.
  - Although tariffs were eventually reduced to approximately 33%, disruptions in U.S. beef exports had already taken effect.
  - These actions reflect a broader strategic shift in Chinese trade policy, which increasingly leverages both tariff and non-tariff barriers to restrict imports and exert pressure in geopolitical negotiations.

Chinese beef imports: 2024 and 2025 (year-to-date: January–September)



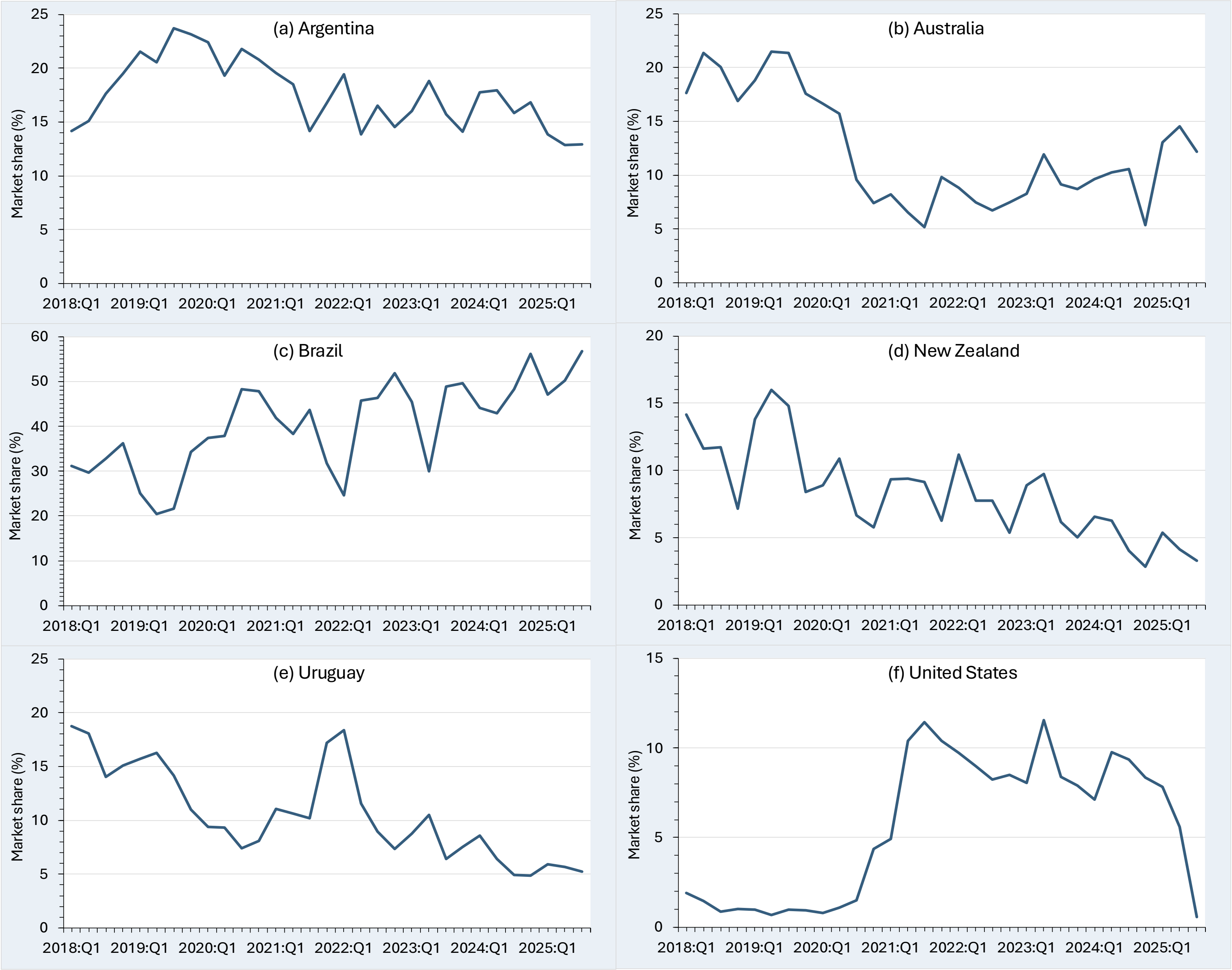
Note: Imports are defined according to the Harmonized System (HS) classification HS 0202 meat of bovine animals, frozen. Frozen beef accounts for over 90% of China's beef imports. Source: Trade Data Monitor®

Chinese beef imports (selected exporters): 2024 and 2025 (year-to-date: January–September)

Source	Variable	2024	2025	Δ	%Δ
World	Value ($ billion)	9.44	10.25	0.82	8.65%
	Quantity (million kg)	2,049.34	2,000.03	-49.31	-2.41%
	Unit Value ($/kg)	4.61	5.13	0.52	11.33%
Australia	Value ($ billion)	0.95	1.36	0.40	**42.23%**
	Quantity (million kg)	143.62	219.63	76.01	**52.92%**
	Unit Value ($/kg)	6.64	6.18	-0.46	**-6.99%**
Brazil	Value ($ billion)	4.25	5.30	1.05	24.75%
	Quantity (million kg)	924.10	1,007.96	83.86	9.07%
	Unit Value ($/kg)	4.60	5.26	0.66	14.37%
U.S.	Value ($ billion)	0.81	0.44	-0.37	**-46.03%**
	Quantity (million kg)	88.29	47.87	-40.42	**-45.78%**
	Unit Value ($/kg)	9.22	9.17	-0.04	**-0.47%**

Note: Year-to-date comparisons are based on the January-September imports. Beef imports are defined according to the Harmonized System (HS) classification HS 0202 meat of bovine animals, frozen.
Source: Trade Data Monitor®

Figure II. Share of Frozen Beef Imports in China by Exporting Country: 2018:Q1 – 2025:Q3



Note: Beef imports are defined according to the Harmonized System (HS) classification HS 0202 *meat of bovine animals, frozen*.
Source: Trade Data Monitor®

We analyze the competition among foreign beef suppliers using a dynamic, multi-country demand framework and estimate exporter-specific demand elasticities (Armington), offering detailed insights into how import demand responds to overall market conditions and price changes.

Using the model estimates and Monte Carlo simulations, we evaluate the effects of recent trade actions, such as China's non-renewal of export licenses for U.S. firms.

By comparing observed trade flows with a counterfactual scenario absent retaliation, we derive tariff and subsidy equivalents and estimate the welfare change from retaliation.

Data

- Monthly import data (Jan. 2018 – Sept. 2025). Trade Date Monitor®.
  - quantity (liters) and value ($) (unit values are used as prices)
  - Estimation (up to March 2025)
  - Projections (forecast April – Sept. 2025)
- Frozen beef is defined according to the HS Heading: 0202 *meat of bovine animals, frozen*.
- Major suppliers: Australia, New Zealand, Other South America (Uruguay and Argentina), Brazil, and U.S.
  - Includes *rest of world* (ROW)

Table II. Demand Estimates for Imported Beef in China: January 2018 – March 2025

Country	Constant (γ_h)	Own lag (γ_{hh})	Marginal share (θ_h)	Australia	New Zealand	Other S. America	Brazil	U.S.	ROW
				Slutsky price effect (π_{hg})					
Australia	0.020	0.035	0.046	-0.107	-0.056	0.036	0.107	0.016	0.004
	(0.007)**	(0.015)*	(0.025)	(0.038)**	(0.022)*	(0.036)	(0.049)*	(0.018)	(0.014)
New Zealand	0.010	0.064	0.032		-0.100	0.047	0.048	-0.009	0.070
	(0.004)*	(0.012)**	(0.015)*		(0.055)	(0.045)	(0.037)	(0.018)	(0.017)**
Other S. America	-0.004	0.110	0.192			-0.136	0.096	-0.011	-0.032
	(0.009)	(0.028)**	(0.032)**			(0.069)*	(0.069)	(0.024)	(0.020)
Brazil	-0.042	0.085	0.726				-0.334	0.074	0.010
	(0.014)*	(0.018)**	(0.049)**				(0.113)**	(0.028)**	(0.022)
U.S.	0.008	0.039	-0.002					-0.069	-0.001
	(0.004)*	(0.004)**	(0.012)					(0.018)**	(0.01)
ROW	0.007	0.019	0.007						-0.050
	(0.003)*	(0.006)**	(0.010)						(0.012)**

Note: Asymptotic standard errors are in parentheses. Homogeneity and symmetry are imposed on the model. * and ** denote the 0.05 and 0.01 significance levels, respectively. Other S. America is Argentina and Uruguay. ROW is *rest of the world*. Equation R^2 (respectively): 0.74, 0.71, 0.70, 0.86, 0.86, and 0.53.

Table III. Demand Elasticities for Imported Beef in China: January 2018 – March 2025

Country	Expend. (η_h)	Own-price (η_{hh}^u)	Australia	New Zealand	Other S. America	Brazil	U.S.	ROW
			Cross-price (η_{hg}^u)					
Australia	0.39	-0.95		-0.50	0.20	0.75	0.11	0.01
	(0.21)	(0.32)**		(0.19)**	(0.32)	(0.43)	(0.15)	(0.01)
New Zealand	0.37	-1.20	-0.69		0.44	0.41	-0.13	0.80
	(0.18)*	(0.64)	(0.26)**		(0.53)	(0.44)	(0.21)	(0.01)*
Other S. America	0.67	-0.53*	0.05	0.11		0.07	-0.08	-0.15
	(0.11)**	(0.24)	(0.13)	(0.16)		(0.25)	(0.08)	(0.01)*
Brazil	1.83	-1.57	0.05	-0.04	-0.28		0.08	-0.08
	(0.12)**	(0.29)**	(0.12)	(0.09)	(0.18)		(0.07)	(0.01)*
U.S.	-0.04	-1.15	0.27	-0.15	-0.18	1.26		-0.01
	(0.21)	(0.30)**	(0.30)	(0.30)	(0.41)	(0.49)**		(0.01)
ROW	0.13	-0.92	-0.08	-1.28	0.54	-0.22	0.01	
	(0.19)	(0.21)**	(0.26)	(0.30)**	(0.36)	(0.41)	(0.19)	

Note: The own- and cross-price elasticities are uncompensated. Asymptotic standard errors are in parentheses. * an ** denote the 0.05 and 0.01 significance levels, respectively. Expend. (expenditure). Other S. America is Argentina and Uruguay. ROW is *rest of world*.

Trade projections (Gustavsen and Rickertsen, 2003; Kastens and Brester, 1996; Muhammad, 2007).

$$\ln \hat{q}_{h,t^*} = \left[\frac{\hat{\theta}_h}{\overline{\overline{w}}_h} D\hat{Q}_{t^*} + \sum_{g=1}^{6} \frac{\hat{\pi}_{hg}}{\overline{\overline{w}}_h} \left(\ln p_{g,t^*} - \ln p_{g,t^*-12}\right)\right] + \ln q_{h,t^*-12}$$

$$\hat{q}_{h,t^*} = \exp\left(\ln \hat{q}_{h,t^*}\right)$$

Here we follow a similar procedure as Gustavsen and Rickertsen (2003) and derive $D\hat{Q}_{t^*}$ via a vector autoregressive (VAR) procedure, where an aggregate import price index and the domestic beef price are included as variables.

Assuming observed differences between the projected and actual values are due to recent trade actions, then $TE_h = \frac{1}{\eta_{hh}^{u}}\left(\frac{\hat{q}_{h,t^*} - q_{h,t^*}}{q_{h,t^*}}\right)$ (Becko, 2024; Yue et al., 2006).

However, take the following general equation: $q = f(u)$ where $u = p(1 + \tau)$; p is the price and τ is the tariff rate. If we define the own-price elasticity (η) as $\frac{\partial f}{\partial u}\frac{u}{q}$, we get the following relationship: $\frac{d(1+\tau)}{1+\tau} = \frac{1}{\eta}\frac{dq}{q} - \frac{dp}{p}$.

This suggests that the implied tariff rate associated with the observed quantity change should be adjusted to account for actual price movements:

$$TE_h = \frac{1}{\eta_{hh}^{u}}\left(\frac{\hat{q}_{h,t^*} - q_{h,t^*}}{q_{h,t^*}}\right) - \left(\frac{p_{h,t^*} - p_{h,t^*-12}}{p_{h,t^*-12}}\right)$$

The welfare change from the implied tariffs is evaluated using the concept of compensating variation (CV), which quantifies the income required to maintain consumer utility following a tariff or price change. In this context, CV reflects the estimated income loss resulting from tariffs and can be derived as follows (Azzam and Rettab, 2012; Roosen et al., 2022):

$$CV = \sum_{h=1}^{6} p_h^0 q_h^0 \left(TE_h + \frac{dq_h^*}{q_h^0} + TE_h \frac{dq_h^*}{q_h^0} \right)$$

Note that p_h^0 and q_h^0 denote the price and quantity before the tariffs and dq_h^* is the income-compensated change in quantity from tariffs. Given equation (1), the income-compensated change in quantity (dq_h^*) can be derived as $dq_h^* = \left(\sum_{g=1}^{6} \frac{\hat{\pi}_{hg}}{\bar{\bar{w}}_h} TE_g \right) q_h^0$ (Azzam and Rettab, 2012).

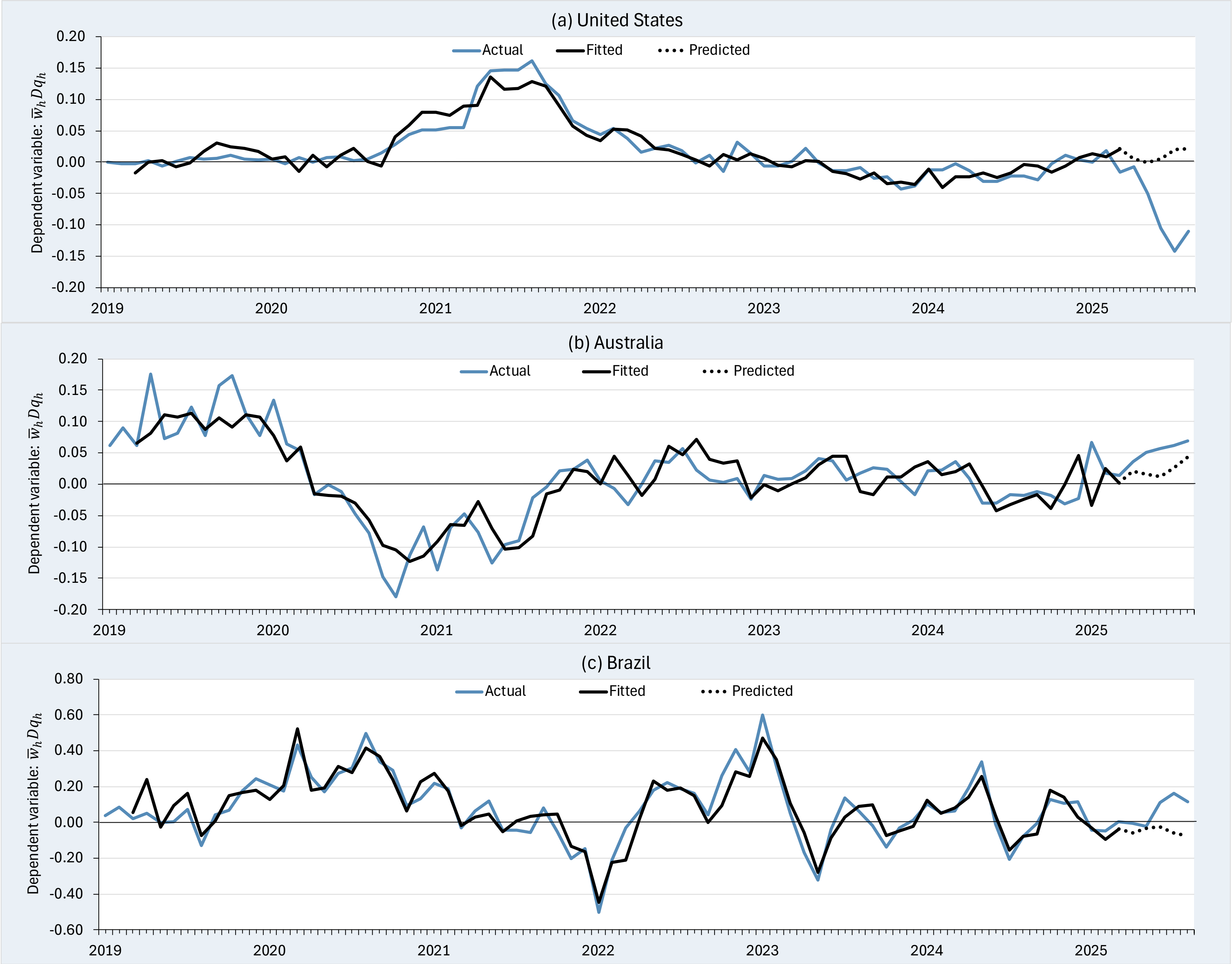


Figure III. Actual, Fitted, Predicted Values for Selected Countries: Jan. 2019 – Sept. 2025

Note: The data are based on the dependent variable in equation (1). Fitted values are based on the estimated model using data from January 2019 – March 2025. Predicted values are based on forecasts using the data from April 2025 – September 2025.

Table IV. Impacts of Trade Actions on Imported Beef in China

Exporting Country	Baseline (2024)	Prediction (a) (2025)†	Actual (b) (2025)	Δ (b) – (a)†	%Δ	Δ Value ($ mill.)	TE (%)
	million kilograms						
Australia	92.7	112.6 [98.5, 128.8]	150.1	37.5 [21.2, 51.5]	33.3	259.6	-28.3
New Zealand	71.3	86.0 [75.0, 98.5]	56.4	-29.6 [-42.2, -18.6]	-34.4	-154.1	24.9
Other S. America	384.5	375.2 [354.2, 397.5]	321.4	-53.7 [-76.1, -32.8]	-14.3	-233.2	14.9
Brazil	593.5	515.6 [482.6, 550.9]	699.1	183.6 [148.2, 216.5]	35.6	1,007.3	-37.7
U.S.	61.0	72.5 [63.7, 82.4]	20.6	-51.9 [-61.9, -43.1]	-71.7	-469.7	65.6
ROW	95.2	90.4 [80.8, 101.2]	90.2	-0.2 [-11.0, 9.4]	-0.3	-1.2	-6.6
Total	1,298.2	1,252.2	1,337.7	85.5		408.6	

Note: All data and estimates are based on trade during the second and third quarters (April – September) in 2024 and 2025. Values are derived using 3-year average prices (2022-2024). TE is the tariff equivalent where TE < 0 is an implied subsidy. Tariff and subsidy equivalents are based on the uncompensated own-price elasticities and relative quantity and price changes. †95% confidence intervals are in [brackets], derived via Monte Carlo simulations.

The analysis shows a sharp decline in U.S. beef exports to China, **with losses exceeding $469 million and an implied tariff nearly double the formal 33% tariff.** China's retaliation has reshaped global beef trade and benefited Brazil and Australia while marginalizing others through implicit discrimination in market access.

The compensating variation (*CV*) analysis reveals a substantial welfare loss of **$526 million, with a confidence interval ranging from $203 to $846 million.** This estimate reflects the income-equivalent loss to Chinese consumers resulting from reduced access to imported beef driven by trade restrictions.

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