INDIA – MEASURES CONCERNING THE IMPORTATION OF CERTAIN AGRICULTURAL PRODUCTS: RECOURSE TO ARTICLE 22.6 OF THE DSU BY INDIA

(DS430)

METHODOLOGY PAPER

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US-1	Alston, Julian M., and Grant M. Scobie. "A differentiated goods model of the effects of European policies in international poultry markets." *Journal of Agricultural and Applied Economics* 19.1 (1987): 59-68.	Alston and Scobie
US-2	Baldwin, Robert E. "Measuring nontariff trade policies." No. w2978. *National Bureau of Economic Research*, 1989.	Baldwin
US-3	Calvin, Linda, and Barry Krissoff. "Technical barriers to trade: a case study of phytosanitary barriers and US-Japanese apple trade." *Journal of Agricultural and Resource Economics* (1998): 351-366.	Calvin and Krissoff
US-4	Dastagiri, M. B. "Demand and Supply Projections for Livestock Products in India." ICAR Policy Paper 21, 2004.	Dastagiri
US-5	Deardorff, Alan V., and Robert Mitchell Stern. *Measurement of nontariff barriers*. Vol. 179. University of Michigan Press, 1998.	Deardorff and Stern
US-6	Deskan, Thyagarajan and Barathi Megarajan. "Prospects of value-added products marketed in India*." Animal and Veterinary Sciences*, Vol. 2, No. 4, 2014, pp. 118-123.	Deskan and Megarajan
US-7	Eales and Unnevehr, "Demand for Beef and Chicken Products: Separability and Structural Change," American Journal of Agricultural Economics, Vol. 70, No. 3 (Aug., 1988), p. 528.	Eales and Unnevehr
US-8	Ferrantino, M. (2006), "Quantifying the Trade and Economic Effects of Non-Tariff Measures," *OECD Policy Working Papers*, No. 28, OECD Publishing. doi:10.1787/837654407568	Ferrantino
US-9	Fugazza, Marco. *The economics behind non-tariff measures: theoretical insights and empirical evidence*. UN, 2013.	Fugazza

US-10	Laird, Samuel, "Quantifying commercial policies." *Applied Methods for Trade Policy Analysis–A Handbook* (1997) (selected pages).	Laird
US-11	Landes, M., S. Persaud and J. Dyck. 2004. *India's Poultry Sector: Development and Prospects*, USDA/ERS/MTED, Agriculture and Trade Report WRS-04-03.	Landes et al.
US-12	Linkins, Linda A., and Hugh M. Arce. *Estimating tariff equivalents of nontariff barriers*. US International Trade Commission, Office of Economics, 1994.	Linkins and Arce
US-13	Rodolfo M. Nayga, Jr. and Capps, Jr. Oral. "Tests of Weak Separability in Disaggregated Meat Products," American Journal of Agricultural Economics, Vol. 76, No. 4 (Nov., 1994), pp. 800-808.	Nayga and Capps
US-14	USDA 2016. *Poultry and Poultry Products Annual 2016*. GAIN report IN6151. Available online at: https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Poultry%20and%20Poultry%20Products%20Annual%202016_New%20Delhi_India_12-1-2016.pdf	2016 GAIN Report
US-15	Weaver, Marin. *Poultry*. Industry and Trade Summary. Publication ITS-10. Washington, DC: U.S. International Trade Commission, January 2014.	Weaver
US-16	World Trade Organization. 2012. *A Practical Guide to Trade Policy Analysis.* Available online at: *https://www.wto.org/english/res_e/publications_e/wto_unctad12_e.pdf*	Practical Guide to Trade Policy Analysis
US-17	U.S. Trade Descriptions for Poultry, August 2000 (selected pages)	U.S. Trade Descriptions for Poultry
US-18	*Cheap U.S. Chicken Leaves Indian Poultry Farmers in a Flap*, The Wall Street Journal, July 13, 2015, available at, https://blogs.wsj.com/indiarealtime/2015/07/13/cheap-u-s-chicken-scares-indian-poultry-breeders/	
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US-20	*Poultry Farmers Want Govt to Appeal Against WTO Ruling*, Business Line, October 15, 2014.	
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I. Introduction

1. In this dispute, the United States challenged and obtained Dispute Settlement Body (DSB) recommendations on India's avian influenza (AI) measures prohibiting the importation of various agricultural products into India from countries reporting notifiable AI[1] (India's "import ban"). India's import ban has caused substantial nullification and impairment of U.S. benefits under the WTO Agreement. Contrary to India's WTO obligations, India's measures have locked various U.S. agricultural products out of India's market, and U.S. producers have missed out on the rapid expansion of India's market. As of the end of the reasonable period of time to achieve compliance, India *still* had taken *no* action to remedy the breaches found by the DSB, and indeed continues to ban the importation of those U.S. agricultural products.

2. The United States has requested authorization from the DSB to suspend concessions or other obligations with respect to India at an annual level based on a formula commensurate with the trade effects caused to the interests of the United States by the failure of India to comply with the recommendations and rulings of the DSB.[2] As this methodology paper explains, for 2016 alone, and for one product alone, the level of nullification or impairment exceeded $478 million dollars. The level of nullification or impairment, moreover, grows larger with each passing year.

3. A broad range of U.S. products are impacted by India's import ban, including live poultry; poultry meat; hatching eggs; eggs and egg products; unprocessed feathers; live pigs; certain animal products; and poultry semen.[3]

4. In this methodology paper, the analysis focuses on the loss of U.S. exports of frozen, bone-in chicken leg quarters (CLQs) – that is, one subset of poultry meat – due to India's import ban.

5. The United States focuses on this product due to the accessibility of data necessary for the modeling of trade losses with respect to this product. The focus on CLQs should not in any way be taken as an indication that the United States experienced no or minimal trade losses with respect to the other products affected by India's import ban. To the contrary, the United States is experiencing a substantial level of nullification or impairment with respect to these products. The level of nullification or impairment of at least $478 million in 2016 for CLQs therefore does not capture the full level of nullification or impairment caused by India's import ban. As discussed further below, moreover, the U.S. methodology also likely results in underestimation of the level of nullification or impairment experienced by the United States just with respect to CLQs.

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[1] *See* Panel Report, para. 2.22 ("The measures at issue in this dispute are India's AI measures, which are those measures that 'prohibit the importation of various agricultural products into India from those countries reporting [NAI]'."), Appellate Body Report para. 4.8 ("India's AI measures at issue in this dispute consist of prohibitions on the importation of various agricultural products into India from countries reporting notifiable avian influenza (NAI), as maintained through, *inter alia*, the Livestock Act and S.O. 1663(E).") (citing to Panel Report para. 2.22).

[2] *Recourse to Article 22.2 of the DSU by the United States*, *India – Agricultural Products*, WT/DS430/16 (first paragraph).

[3] *See* Panel Report, para. 2.32, citing to S.O. 1663(E).

6. Lost U.S. CLQ exports due to India's import ban are calculated using a static partial equilibrium model, which is described in detail in sections IV through VI. This analytical framework is grounded in academic literature and has been used to quantify the trade effects of similar measures.[4] Past Article 22.6 arbitrators have also relied on a partial equilibrium model.[5] Using this methodology and currently-available data, the estimate of the level of nullification or impairment for 2016, just for CLQs, due to India's AI measure is at least $478.1 million.[6]

7. The U.S. request under DSU Article 22.2 is for authorization to suspend concessions or other obligations with respect to India at an annual level based on a formula commensurate with the trade effects caused to the interests of the United States by the failure of India to bring its import ban into compliance with its WTO obligations. Accordingly, the annual level of nullification or impairment should be represented by a formula.[7] For 2017 and subsequent years, the minimum annual level of nullification or impairment may be calculated with the following formula:

$$\text{2016 nullification or impairment} \times (1 + \textit{growth rate})^{t}.$$

As discussed below in section VIII, the relevant growth rate is 15 percent, and *t* is the number of years forward from the base period in 2016. Accordingly, the United States respectfully requests that the Arbitrator determine that the minimum level of nullification or impairment may be represented by the amount of at least $478.1 million x $(1 + .15)^{t}$.

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[4] *See, e.g.*, Laird (Exhibit US-10) at 68-69 (explaining that the "price wedge technique is used frequently by World Bank economists" and scholars, as well as in the WTO context, in order to quantify the effect of NTMs); Fugazza (Exhibit US-9) at 1-2, 9-14 (describing the "standard approach to appreciate price and quantity effects of NTMs" as making such measures "equivalent to an ad valorem tariff" and the "methodologies expected to be more reliable in quantifying NTMs," including "inventory, price comparison and quantity impact"); Linkins and Arce (Exhibit US-12) at 5 ("The use of partial or general equilibrium models to estimate the economic effects of NTBs requires some measure of the price wedge generated by the import restraint."); *see* A Practical Guide to Trade Policy Analysis (Exhibit US-16) at 71-72 (stating that "[m]ost measurement methods use a simple partial equilibrium framework to develop a tariff equivalent to the NTM that reflects by how much supply, demand or trade are affected by the measure," and that "[a] relatively common approach is to calculate ad valorem equivalents of NTMs").

[5] *See, e.g., US – Tuna II (Mexico) (Article 22.6 – US)*, para. 5.155 ("In practical terms, this means that we will use a partial equilibrium model to calculate the level of nullification or impairment.")

[6] The U.S. Request Under Article 22.2 of the DSU, WT/DS430/16, sought authorization to suspend concessions based on a formula commensurate with the trade effects of India's non-compliance. The $450 million figure mentioned in the U.S. Request was an estimate of the 2016 trade effects. That estimate was based on then-available data. The 2016 trade loss figure has subsequently been updated to reflect the data that is now available.

[7] The United States notes that arbitrators in other disputes, when so requested by the complaining party, have also issued awards based on application of a formula. *See, e.g., US – Offset Act (Byrd Amendment) (India) (Article 22.6 – US)*, para. 5.2 ("Accordingly, we decide that the suspension by India of concessions or other obligations in the form of the imposition of an additional import duty above bound custom duties on a final list of products originating in the United States covering, on a yearly basis, a total value of trade not exceeding, in US dollars, the amount resulting from the following equation . . . ."; *U.S. – Upland Cotton (Article 22.6 – US I)*, para. 6.5(a) ("(a) Brazil may request authorization from the DSB to suspend concessions or other obligations under the Agreements on trade in goods in Annex 1A, at a level not to exceed the value of US$147.4 million for FY 2006, or, for subsequent years, an annual amount to be determined by applying the methodology described in Annex 4.").

8. A chart showing the specific dollar amounts produced by this formula for the years 2017-2020 is shown below in section VIII. This chart demonstrates the significant level of nullification or impairment that India's breaches of its WTO obligations have caused to the United States – as well as the harm caused to Indian consumers who could have enjoyed the affordable nutrition provided by these products.

II. India's Import Ban and the Counterfactual Scenario of No Ban

9. The DSB adopted its recommendations and rulings in this dispute on June 19, 2015.[8] On December 8, 2015, India and the United States informed the DSB that they had agreed that the reasonable period of time ("RPT") for India to implement the DSB recommendations and rulings was 12 months, expiring on June 19, 2016.[9]

10. The Arbitrator has determined that the level of nullification or impairment will be determined in light of the measures in existence on the date that the RPT expired.[10] It is undisputed that, as of the expiry of the reasonable period of time on June 19, 2016, India had not withdrawn or modified in any way the avian influenza measures that were the subject of the DSB's recommendations.[11]

11. Accordingly, for purposes of the present analysis, India's import ban is contrasted with a counterfactual scenario in which no ban exists on the importation of the products in question into India. This is consistent with the counterfactual scenarios used by past arbitrators in other Article 22.6 arbitrations.[12]

III. Background on the U.S. and Indian Poultry Sectors

A. India's poultry sector

12. From 2006-2016, India's poultry consumption has grown by 8 percent per year on average. India's poultry consumption in 2017 is estimated to increase by 7 percent from 2016.[13] Rising incomes, population growth, urbanization, and foodservice-sector expansion, including

[8] Minutes of the June 19, 2015 DSB meeting, WT/DSB/M/364, para. 7.18.

[9] WT/DS430/14.

[10] Communication from the Arbitrator of August 29, 2017.

[11] Communication from the Arbitrator of August 29, 2017.

[12] *See, e.g., US – Tuna II (Mexico) (Article 22.6 – US)*, paras. 4.9-4.10; *US – COOL (Article 22.6 – United States)*, para. 6.32 ("For purposes of our own determination, we follow the counterfactual of the COOL measure having been withdrawn … We note that this is consistent with the approach adopted by previous arbitrators.") (citing *EC – Hormones (US) (Article 22.6 – EC)*, para. 38 ("Upon careful consideration of the claims and arguments set forth by the parties, we consider that our starting-point is as follows: what would annual prospective US exports of hormone-treated beef and beef products to the EC be if the EC had withdrawn the ban …?"); *US – Offset Act (Byrd Amendment) (EC) (Article 22.6 – US)*, para. 3.147 ("Our core rationale is that the trade effect of the CDSOA measure can be estimated to be the nullification or impairment that the Requesting Parties have suffered as a result of the measure having not been withdrawn.").

[13] USDA Production, Supply, and Distribution (PSD) Database for poultry (Exhibit US-25), available at https://apps.fas.usda.gov/psdonline/app/index.html#/app/advQuery)

quick service restaurants (QSRs); hotel, restaurant, and institutional (HRI) businesses; and retail outlets have fueled strong growth in demand for poultry in India, as has the fact that poultry is a least-common denominator meat, the consumption of which is not prohibited by either of the major religions in India: Hinduism and Islam.

13. Since 2012, the demand for processed poultry products in particular in India has increased significantly[14] due to rising gross domestic product (GDP), population growth, urbanization, and foodservice sector expansion, including QSRs and HRI businesses, and retail outlets.

14. India's poultry sector is affected by high feed costs, which can substantially raise the cost of production and thus poultry prices. For example, an Indian feed industry official stated that "[t]he cost of processed chicken in India is $3/kg while the cost of the imported chicken leg from the US will be $1/kg."[15] As demonstrated below and in the appendices, India's domestic price for CLQs is higher than the world price for CLQs plus trade costs (including India's tariff and landing charge), meaning that imported U.S. CLQs would compete favorably with domestically-produced CLQs.[16]

B. U.S. poultry sector

15. The U.S. poultry industry is the world's largest producer of poultry meat. Fifteen to 20 percent of U.S. poultry production is exported, and U.S. poultry meat exports go to over a hundred different markets. The U.S. poultry sector is highly efficient, due to economies of scale and scope in processing and marketing. Vertical integration gives processors the ability to lower per-unit processing costs and meet consumer requirements.[17]

16. The United States is the world's largest exporter of CLQs, with average annual exports during 2012-16 of 1.6 million metric tons.[18] The average annual value of those exports was $1.597 billion.[19] No other major supplier effectively competes with the United States in the export of bone-in CLQs.

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[14] For purposes of this paper the term "processed poultry" is used to refer to poultry products that result from post-slaughter processing, such as cutting of birds into parts. This is consistent with common usage of the term "processed poultry" in economic literature. We note that in this methodology paper, the term "processed poultry" is not used in the same way that the term is used in SO 1663(E) or in the OIE Terrestrial Code, where "processed" refers to products that have undergone heat treatment or other steps to inactivate pathogens.

[15] "Indian poultry industry wants to import 1 mn tonne soy meal to compete with US imports," The Economic Times, June 19, 2015 (Exhibit US-22), available at http://economictimes.indiatimes.com/news/industry/cons-products/food/indian-poultry-industry-wants-to-import-1-mn-tonne-soya-meal-to-compete-with-us-imports/articleshow/47734664.cms?intenttarget=no, accessed on May 8, 2017.

[16] "Trade Costs" and India's "Landing Charge" are explained below in Section VI.A

[17] Weaver (Exhibit US-15), available at: https://www.usitc.gov/publications/332/poultry1.pdf

[18] U.S. Census Bureau Trade Data, U.S. Chicken Leg Quarter Exports, Quantity (Exhibit US-26).

[19] U.S. Census Bureau Trade Data, U.S. Chicken Leg Quarter Exports, Value (Exhibit US-27).

IV. Empirical Results

17. The methodology used to calculate the level of nullification or impairment is a partial equilibrium model. As discussed above, partial equilibrium models are commonly used in the academic literature to quantify the trade effects of nontariff barriers (NTBs), such as import bans,[20] and have been used by past arbitrators to assess the level of nullification or impairment.[21] This approach has been used specifically in the SPS context.[22]

18. In order to estimate the level of nullification or impairment due to India's import ban, it is appropriate to employ a "price wedge" approach. A price wedge approach is commonly used in partial equilibrium models to estimate the trade effects of an NTB.[23] The *US – Tuna II* arbitrator indicated that a price wedge approach is appropriate.[24] In the analysis here, a price wedge approach in a partial equilibrium model is used to quantify the value of U.S. exports that would have occurred in a given year if not for India's import ban.

19. It is well documented in the academic literature that NTBs distort relative prices between world and domestic markets. To estimate the effect of India's import ban on U.S. exports, one first calculates the relative price distortion – i.e., the price wedge. U.S. export losses due to India's import ban are then estimated by calculating the total quantity of U.S. exports to India that would have occurred in the absence of the import ban.

20. **Appendix A** presents the results of the model. In 2016, India's wholesale poultry (CLQs) price was $2.83 per kg. Without the import ban, India's poultry prices would have adjusted to reflect the world price, and in particular, would have been equal to the world price, plus freight, insurance, landing charges, and India's tariff.[25] In 2016, the world price, plus freight, insurance, landing charges, and India's tariff equaled $1.70 per kilogram. Using the methodology explained above, the model uses the Indian price and the world price, plus freight, insurance, and India's tariff and landing charges, to ascertain the price wedge. The calculations show a price wedge of $1.13 per kilogram, or 40 percent of India's domestic wholesale CLQ price.

21. U.S. export losses are estimated by calculating the resulting quantity effects of removing the 40 percent price wedge. As explained further below, removal of the price wedge (i.e., equivalent to removal of the ban) would result in both: (a) an increase in processed poultry consumption in India, due to greater product availability and lower prices, and (b) a reduction in domestic processed poultry production stemming from lower prices. Together, these two

[20] Calvin and Krissoff (Exhibit US-3).

[21] *See, e.g., US – Tuna II (Mexico) (Article 22.6 – US)*; *U.S. – Upland Cotton (Article 22.6 – US II)*, paras. 4.2, 4.124-4.128.

[22] Calvin and Krissoff (Exhibit US-3).

[23] Baldwin (Exhibit US-2); Deardorff and Stern (Exhibit US-5); Ferrantino (Exhibit US-8).

[24] *US – Tuna II (Mexico) (Article 22.6 – US)*, para. 5.153.

[25] As noted below, the world price is equal to the U.S. export price.

quantity effects represent the total amount of domestic consumption that would be supplied by U.S. imports if the import ban were withdrawn.

22. To ascertain the increase in consumption that would occur on withdrawal of the import ban, the price elasticity of demand is multiplied by the quantity of processed chicken in the Indian market and the price wedge as a percentage of India's domestic price. This calculation results in an increase in consumption of 378,274 metric tons.

23. To ascertain the adjustment in production that would occur on withdrawal of the ban, the price elasticity of supply is multiplied by the quantity of processed chicken in the Indian market and the price wedge as a percentage of India's domestic price. This calculation results in a decrease in Indian processed chicken production of 252,182 metric tons.

24. To calculate the level of nullification or impairment, these two results (378,274 metric tons plus 252,182 metric tons are added to obtain a total export loss of 630,456 metric tons.

25. The model projects that Indian CLQ imports from the United States in 2016 would have been 630,456 mt in the absence of the import ban. Multiplying the unit price ($758 per mt) by the quantity results in a level of nullification or impairment of **$478.1 million**.

V. Explanation of Methodology

A. A partial equilibrium model of India's CLQ market with and without AI restrictions

26. Figure 1 presents a model of India's CLQ market with and without AI restrictions. The graph depicts India's domestic supply, *S*, and domestic demand, *D*, of CLQs, which depend upon prices, *P*. In an unrestricted market, imports of CLQs, *M*, would occur where the domestic quantity of CLQs demanded, *C*, is greater than the domestic quantity of CLQs supplied, *Y*, at a given price. With India's import ban, imports of CLQs are prohibited (*M=0),* and the quantity of CLQs supplied domestically in India is equal to the quantity of CLQs demanded in India (i.e., $Y^{AI} = C^{AI}$) at the given price, $P^{i,AI}$.

Figure 1. India's CLQ market with and without the import ban

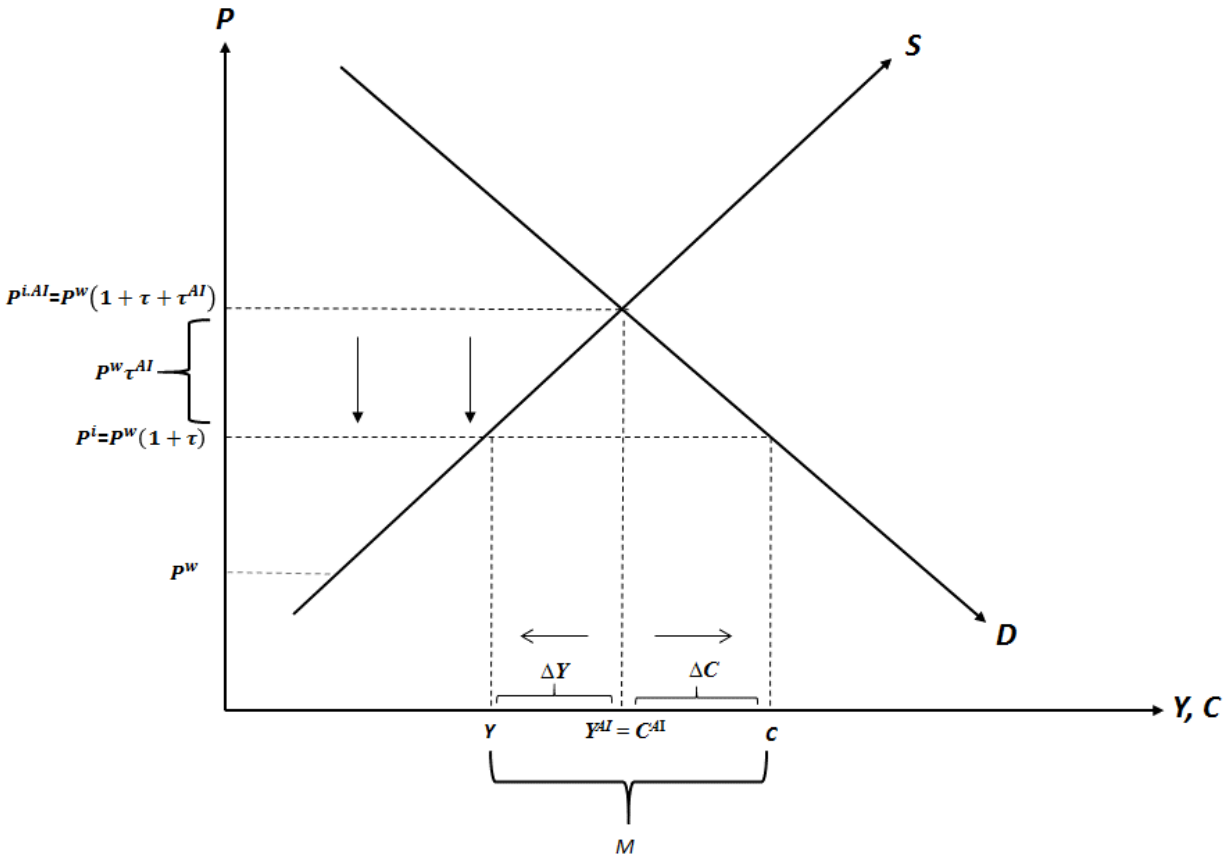

Figure 1 shows the effects of removing the import ban. The P axis represents price. The *Y,C,* axis represents quantity. Removal of the ban leads to a reduction in prices from $P^{i,AI}$ to P^i. Removal of the ban also leads to a resulting increase of consumption ($C^{AI} \rightarrow C$), a resulting contraction of production ($Y^{AI} \rightarrow Y$), and therefore imports (M).

27. $P^{i,AI}$ is the equilibrium domestic price with the import ban in place. P^w is the world price of CLQs adjusted for freight and insurance to the Indian market.[26] Due to the import ban, the domestic price of CLQs in India ($P^{i,AI}$) is higher than the world price (P^w) plus India's ad valorem tariff rate and landing charge (τ).[27] The world price (including freight and insurance to India) plus India's tariff and landing charge is represented as P^i and equals $P^w(1+\tau)$.

$$Price\ wedge = P^{i,AI} - P^w(1+\tau) \quad (1)$$

[26] Given the large volume of U.S. CLQ exports to the world, the average U.S. export price of CLQs is an appropriate proxy for the world price of CLQs. *C.f.* Calvin and Krissoff (Exhibit US-3) at 360 n.4.

[27] India levies a 100 percent ad valorem tariff on CLQs.

28. The price wedge measures, in dollar terms, the tariff equivalent effect of the import ban (τ^{AI}). τ^{AI} is the ad valorem tariff-rate equivalent effect of the import ban. The tariff-rate equivalent is the tariff rate that would restrict imports to the same level as the import ban. Here, τ^{AI} is exactly large enough to cut off imports completely. The price wedge is simply the tariff equivalent effect of the import ban (τ^{AI}) applied to the prevailing world price (P^w).

$$\textit{Price wedge} = P^w \tau^{AI} \tag{2}$$

29. If the import ban were to be removed, Indian consumers would have access to imported CLQs priced at the world price plus tariffs and landing charges ($P^w(1+\tau)$). As a result, domestic prices in India must fall to the world price plus the tariff and landing charge to stay competitive with imports. CLQ imports into India would therefore increase until the point where the domestic price (P^i) equals the world price plus the tariff and landing charge ($P^w(1+\tau)$). At this new equilibrium, depicted in Figure 1, India decreases production to *Y* due to the lower price available for domestic production, overall consumption increases to *C* due to the lower domestic price, and imports increase to *M* CLQs.

B. Calculation of quantity of the imports that would occur in the absence of the ban

30. Removing the price wedge would cause an increase in consumer demand in India, from C^{AI} to *C*. The magnitude of the increase in demand depends upon Indian consumers' sensitivity to change in CLQ prices, i.e., their price elasticity of demand[28]. In mathematical terms, the price elasticity of demand is defined as the ratio between the percentage change in quantity demanded and the percentage change in the price. Given a measure of the price elasticity of demand, (ε^{d}), one can estimate the percentage change in quantity resulting from the percentage change in prices due to the removal of the price wedge. Expression (3) shows that change in consumption can be calculated as the product of: (a) the price elasticity of demand, ε^{d}, (b) the level of consumption in the baseline period, C^{AI}, and (c) the percentage change in prices from removing the price wedge, $\frac{p^w \tau^{AI}}{p^{i,AI}}$.

$$\Delta \mathrm{C} = (-\varepsilon^{\mathrm{d}}) * (\mathrm{C}^{\mathrm{AI}}) * \frac{p^w \tau^{AI}}{p^{i,AI}} \tag{3}$$

31. Given a measure of the price elasticity of supply (ε^{s}) the change in domestic supply in India that would result from removing the price wedge can be calculated as the product of: (a) the price elasticity of supply, ε^{s}, (b) the level of production in the baseline period, Y^{AI}, and (c)

[28] Elasticities measure the responsiveness of one economic variable to a change in another variable. The price elasticity of demand is a measure of how the quantity demanded by consumers responds to changes in the domestic price.

the percentage change in prices from removing the price wedge, $\frac{p^w \tau^{AI}}{p^{i,AI}}$. That is, the percentage change in domestic supply may be estimated using the following equation:

$$\Delta Y = (\varepsilon^S)*(Y^{AI})* \frac{p^w \tau^{AI}}{p^{i,AI}} \quad (4)$$

32. The shortfall caused by the removal of the import ban and the corresponding changes in CLQ production, ΔY, and consumer demand, ΔC, is supplied by imports (M). The increase in volume of imports that would occur from withdrawal of the import ban – i.e., removal of the price wedge – can be calculated as follows:

$$M = \Delta C + \Delta Y \quad (5)$$

C. Calculation of the value of the imports that would occur in the absence of the ban

33. Once the quantity of CLQs that would be imported from the United States in the absence of the ban is known, calculating its value is simple. The quantity of imports (M) is multiplied by the per unit export price of CLQs (p^{ex}) to ascertain the level of nullification or impairment.

$$\text{Level of nullification or impairment} = M * P^{ex} \quad (6)$$

34. In this case, the per unit export price (p^{ex}) is equal to the world price (p^w), but without the value of freight (p^{fr}) and insurance costs (p^{ins}). Mathematically, this is expressed as: $p^{ex} = p^w - (p^{fr} + p^{ins})$.

VI. Data

35. This section explains the sources of the data used as inputs in the above-described equations in order to ascertain the level of nullification or impairment caused by India's import ban.

A. Price Information

36. The domestic Indian wholesale prices for CLQs used for the price wedge calculation were sourced from a publicly available website, Poultry Bazaar (www.poultrybazaar.net) that reports wholesale poultry prices at the Murga ("Chicken") market in New Delhi, as well as other Indian regions and cities.[29] The Indian market price data for leg quarters used for this analysis are reported and documented in **Appendix B** and are based on the price information for the Delhi Murga (Chicken) Market that are regularly reported on the Poultry Bazaar website. "Leg" prices are for a combined leg and thigh portion comparable to leg quarter portions that the United States

[29] Poultry Bazaar, Average of Delhi Murga Market Rates:: (2015-2016) (Exhibit US-28); Poultry Bazaar, Average of Delhi Murga Market Rates:: (2016-2017) (Exhibit US-29). The full website URL for the poultry price portal is http://www.poultrybazaar.net/poultryrates/monthly-rates/, accessed on April 17, 2017. According to the website, the Poultry Bazaar is one of the leading poultry rate providers in India and is committed to providing real-time price information to help inform poultry producers and traders.

exports.[30] The Federal Reserve is the source of monthly exchange rate data to convert rupees into U.S. dollars.[31]

37. While domestic Indian wholesale prices for whole birds are more widely available and in different markets, the Poultry Bazaar website is the only identifiable public source that collects wholesale price data on chicken leg quarters and other processed chicken parts. In order to assess if the Murga market price for CLQs in Delhi is a representative price for other parts of India, wholesale prices for whole birds in the Delhi market were compared to prices in other major markets – particularly those to which imports would have easy access if India's import ban were withdrawn. Prices for whole broilers during 2015-16 ranged from 72.05 rupees per kg in Mumbai to 85.00 rupees per kg in Kolkata, compared to 74.87 rupees per kg in Dehli and 77.40 rupees per kg in Chennai.[32] Given that the broiler price in Delhi is on the lower side, it suggests that CLQs in Kolkata and Chennai could be priced even higher, which would result in a larger price wedge. Using the Delhi price data provides a conservative estimate of the market price in India.

38. For purposes of these calculations, the world price is considered to be equal to the average U.S. per unit export price for CLQs to the world (p^{ex}). The equivalence between these prices reflects the impact of sizable U.S. exports on the world CLQ market and the fact that export prices would be expected to adjust to a world market price. The source for data on U.S. export prices is the U.S. Census, which is the official source for U.S. trade data.[33] Average U.S. per unit export prices for CLQs are presented in **Appendix C**.

39. In order to convert the world price to an "as delivered" basis (P^i), one must account for necessary trade costs. First, to obtain a world price that includes the cost of freight and insurance,[34] those costs are added to the U.S. export price – in other words, the free on board (FOB) per unit export price is converted to a cost, insurance, and freight (CIF) price. The world price inclusive of freight and insurance costs is abbreviated as P^w. India's 100 percent tariff is then applied,[35] as well as India's landing charge of 1 percent of the CIF value of imports, to obtain the price at which imports would be sold in India absent India's import ban (P^i).

40. The calculations that: (1) ascertain the price at which imports would be sold in India without the ban (P^i); and that then (2) calculate the tariff equivalent effect of the ban on an ad valorem basis by comparing the measured Indian domestic price under the ban ($P^{i,AI}$) with the

[30] U.S. Trade Descriptions for Poultry (Exhibit US-17) provides a description and photo of a chicken leg quarter (CLQ).

[31] U.S. Federal Reserve. U.S. Dollar/Indian Rupee Exchange Rates for 2016 (Exhibit US-23).

[32] Poultry Bazaar, Average of Broiler Rates, various locations (Exhibit US-30).

[33] U.S. Census Bureau Trade Data, 2016 Monthly Export Prices for Chicken Leg Quarters (Exhibit US-24).

[34] Average freight and insurance costs were calculated based on data provided from U.S. industry sources for freight and insurance costs for U.S. CLQ exports to Asia. Taiwan was used as a proxy market. Insurance and freight cost were estimated at $100 and $2,200 per container respectively. With containers averaging 27 MTs, this translates to $85 per MT cost.

[35] India's applied tariff rate for HS 0207.14, which covers CLQs. India applied this tariff rate in the year of analysis.

price at which imports would be sold in India in the absence of the ban (P^i), are presented in **Appendix A**.

B. Production/Consumption Data

41. The data source for Indian broiler consumption used for this analysis is the official USDA estimate of Indian broiler consumption. This information is compiled on a regular basis by USDA as part of its ongoing research activities, and is made available to the public on the internet.[36] Broiler consumption for foreign countries is the residual of production and net trade. Because India does not import broiler meat and exports only a negligible amount (approximately 0.1% of total production), Indian broiler consumption is virtually equal to production.

42. U.S. CLQs would compete in the processed poultry segment in India. The processed poultry segment has been estimated at up to 20 percent of India's total poultry market.[37] The rapid rate of growth in demand for these products,[38] noted above, suggests that the actual present market share for this segment may be even higher. The model uses 15 percent as a conservative assumption. This adjustment is applied to the USDA broiler consumption data before the trade effects analysis is completed.

C. Price Elasticities

43. As described above, elasticities are used to measure the response of quantity supplied and quantity demanded to changes in price.

44. Academic estimates of price elasticity of demand for CLQs in India are not available. According to the USDA, estimates of poultry consumption growth since the mid-1990s together with growth rates in per capita income and real poultry prices during the same period are consistent with a price elasticity of demand of -1.5.[39] This estimate may be conservative when applied to CLQs, given that price elasticities for aggregate meat categories are smaller in absolute value than the price elasticities of their respective product categories.[40] For example, the price demand elasticity for parts and processed chicken were found to be over twice the size of the price elasticity for chicken.[41] Despite the conservative nature of this figure, the model applies a price elasticity of demand of -1.5.

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[36] U.S. Department of Agriculture, Production, Supply and Distribution Database, Indian Domestic Consumption of Broiler Meat (Exhibit US-25), available at https://apps.fas.usda.gov/psdonline/app/index.html#/app/home.

[37] Deskan and Megarajan (Exhibit US-6); 2016 GAIN Report (Exhibit US-14).

[38] 2016 GAIN Report (Exhibit US-14).

[39] Landes, et al. (Exhibit US-11) at 6.

[40] The broader the definition of the good (for example, chicken), the lower the elasticity because fewer or no substitutes exist. Narrowly defined markets tend to have more elastic demand than broadly defined markets because more substitutes exist. If more substitutes of the good are available (for example, chicken parts) its elasticity is higher. Mankiw (Exhibit US-31) at 90-91.

[41] *See* Eales and Unnevehr (Exhibit US-7) at 528. A separate study calculated a price elasticity of demand of -2.545 for chicken parts. *See* Nayga and Capps (Exhibit US-13) at 806.

45. Similar to the demand side, supply elasticities for CLQs in India are not available. The USDA baseline model[42] employs an elasticity of supply of 1 for poultry. In the widely used computable general equilibrium model, GTAP, the supply elasticity for processed meats is 1.12.[43] India's own Indian Council of Agricultural Research (ICAR) has made supply projections using a supply elasticity of 1.75.[44] For long run analysis, supply elasticities between 2 and 5 have been recommended.[45] To be conservative, the model employs an elasticity of supply (e^s) of 1.0.

VII. Use of Other Possible, Available Parameters in the Model Result in an Even Greater Level of Nullification or Impairment for CLQs

46. The estimate presented above is a minimum for the lost CLQ exports resulting from India's ban.

47. As discussed above, the U.S. analysis presumes an Indian domestic price for CLQs with the ban in place that likely reflects the price only in the lowest priced markets like New Delhi. For example, as noted above, prices in Chennai are predicted to be 3 percent higher than the figure used here, and prices in Kolkota are predicted to be 14 percent higher. Higher prices than the domestic price figure used in this model mean that the difference between the prevailing price and the price of imported CLQs would be greater than the 40 percent price wedge used in the calculation. The demand and supply effects of allowing in imports would thus be greater than predicted, and accordingly, so would the level of nullification or impairment. If the predicted Kolkota price is used as representative of the current Indian domestic price (but all other assumptions are kept the same), the estimated level of nullification or impairment is **$566 million**.

48. Second, the estimate of the processed poultry segment at 15 percent of the Indian market may well underestimate the size of this segment. This segment has been growing rapidly, suggesting that even slightly dated figures may underestimate its share of the market. Moreover, processed poultry is particularly popular with urban consumers and larger or chain restaurants. Urbanization of India's population and increased patronizing of chain restaurants suggest further reason to estimate that there has been additional recent growth of the processed poultry sector, and that existing estimates thus substantially underestimate its share of the overall Indian poultry market. Some sources indicate that the size of the processed poultry sector in India could be as large as 20 percent of supply.[46] If the model reflects that the processed poultry segment

[42] The USDA Baseline model is a large-scale dynamic partial equilibrium simulation system consisting of 42 country and regional models. The USDA Baseline model generates USDA's official 10-year agricultural projections and is used for analyzing alternative policy and productivity scenarios and their impacts on markets and trade.

[43] Global Trade Analysis Project: https://www.gtap.agecon.purdue.edu/.

[44] *See* Dastagiri (Exhibit US-4) at Table 14.

[45] *See* Alston and Scobie (Exhibit US-1).

[46] Deskan and Megarajan (Exhibit US-6); 2016 GAIN Report (Exhibit US-14).

comprises 20 percent of the Indian market (but keeps all other assumptions the same), the estimated level of nullification or impairment is **$637 million**.

49. Third, the price elasticity of demand used for the purpose of calculating the increase in demand resulting from a withdrawal of India's import ban and entry of lower priced imports is a price elasticity applicable to overall poultry consumption in India, not just the consumption of processed poultry or CLQs. Because CLQs are likely to be favored by convenience-seeking consumers with access to other poultry and meat products, CLQ quantity demanded may well be more sensitive to price than quantity demanded for other products like whole birds. Indeed, as discussed above, literature indicates that in general, demand for meat parts is likely to be more elastic than demand for a composite such as "poultry" in general. Accordingly, the model likely underestimates the price sensitivity of demand. A higher price sensitivity of demand would mean a larger increase in growth of quantity demanded associated with opening the market to lower-priced imports, thereby increasing the total amount of demand that the imports would supply.

50. Fourth, in an abundance of caution, the model uses a highly conservative supply elasticity of 1.0. As noted above, India's own ICAR has made supply projections using a supply elasticity of 1.75. A supply elasticity of 1.75 would result in a substantially greater adjustment in domestic supply stemming from the price effect of allowing imports. Using a supply elasticity of 1.75 (but keeping all other assumptions the same) would result in an estimated level of nullification or impairment of **$621 million.** If the model reflects that the processed poultry sector represents 20 percent and not 15 percent of the Indian market and also accepts ICAR's supply elasticity of 1.75, the resulting estimated level of nullification or impairment is **$829 million**.

51. Public comments by Indian industry officials similarly suggest that the model's figure for CLQs is underestimated. For example, in urging the Indian government to appeal the Panel's report in this dispute, the president of the Karnataka Poultry Farmers and Breeders Association told a business publication that U.S. imports, if allowed, "could potentially occupy about 40 per cent of the Indian market."[47] Other industry figures predicted that U.S. imports would capture 15-20 percent of the overall Indian poultry market in the event of a withdrawal of the import ban.[48]

VIII. Projected Level of Nullification or Impairment Over Time

52. The annual level of nullification or impairment will not be static. Rather, it will increase each year due to India's rapid population growth and resulting increases in consumption of the affected products. The determination of the level of nullification or impairment should account

[47] *Poultry farmers want Govt to appeal against WTO ruling*, Business Line, October 15, 2014 (Exhibit US-20).

[48] *Cheap U.S. Chicken Leaves Indian Poultry Farmers in a Flap*, The Wall Street Journal, July 13, 2015 (Exhibit US-18) available at, https://blogs.wsj.com/indiarealtime/2015/07/13/cheap-u-s-chicken-scares-indian-poultry-breeders/; *Poultry industry fears huge import of chicken legs and meat from US as India loses case in WTO*, Business Standard, July 16, 2016 (Exhibit US-19).

for this growth by taking the initial minimum figure ($478.1m) and using a formula to adjust the level of nullification or impairment for subsequent years.

53. Due to a growing middle class, India's processed poultry consumption is increasing at a rate higher than overall poultry consumption. Processed poultry consumption in India is growing at more than 15% per year.[49] Employing this figure, one can project forward the equivalent level over time with the following formula: $478,053,668 x $(1 + \textit{growth rate})^t$. In this formula, *t* is the number of years forward from the base period in 2016. Assuming a 15% growth rate, the projected minimum level of nullification or impairment for each year from 2017 to 2020 would be as follows:

Year	Projected Minimum Level of Nullification or Impairment
2017	$ 549,761,718
2018	$ 632,225,976
2019	$ 727,059,873
2020	$ 836,118,853

54. While this does not include years subsequent to 2020 in the chart above, the formula $478,053,668 x $(1 + .15)^t$ would be used to determine the minimum level of nullification or impairment in each year.

[49] 2016 GAIN Report (Exhibit US-14).

APPENDIX A

Calculation of Trade Damages

Figure/Units/Abbreviation	**Source/Equation**	**Amount**
Indian Price with Ban		
Wholesale Price ($/kg) with import ban	From India Price Worksheet (Appendix B)	2.83
Indian Price Without Ban (World Price)		
Price in $/kg (CIF India +100% tariff + landing duty charge)	From World Price Worksheet (Appendix C)	1.70
Price Wedge ($kg) (India-World Price)		
PW	Indian Price – World Price	1.13
PW(%)	PW/Indian Price	40%
Price Elasticities		
e^d -Demand Elasticity		-1.5
e^s -Supply Elasticity		1.0
India Poultry Market		
India Domestic Consumption in MTs		4,196,000

Estimated processed sector in MTs	(15% * Indian domestic consumption)	629,400
U.S. Average Per Unit Export Value (2016)		
$/MT	From World Price Worksheet (Appendix C)	758
Indian Imports from U.S. without Indian ban		
Change in CLQs Demanded (in MTs)	e^d*Q1*PW	378,274
Reduction in CLQs Supplied (in MTs)	e^s*Q1*PW	252,182
US exports lost due to India's measure (in MTs)	Change in CLQs Demanded plus Reduction in CLQs supplied	630,456
US Exports lost due to India's measure in $	US exports lost due to India's measure (in MTs) * U.S. Average Per Unit Export Value	**478,053,668**

APPENDIX B

India Price Worksheet

Month	Monthly avg (Rupee/Kg)	USD/Rupee Exchange Rate	Monthly average (USD/kg)
Jan-16	173.70	67.3332	2.58
Feb-16	182.60	68.2395	2.68
Mar-16	207.60	66.8909	3.10
Apr-16	230.58	66.4219	3.47
May-16	251.92	66.8895	3.77
Jun-16	210.96	67.2655	3.14
Jul-16	174.62	67.158	2.60
Aug-16	136.80	66.9035	2.04
Sep-16	150.38	66.7138	2.25
Oct-16	187.31	66.7415	2.81
Nov-16	193.60	67.6395	2.86
Dec-16	179.26	67.8052	2.64
2016 Average Price	**189.94**		**2.83**

APPENDIX C

World Price Worksheet

Converting U.S. per unit export value from fob to cif including customs duty and landing charge, $/kg

	Per unit export price (fob)	Insurance and freight	Per unit export price (cif)	Customs duty (100% of cif value)	Landing Charge (1% of cif value)	U.S. export price, cif basis, including customs duty and landing charge
	a	b	c=a+b	d=c*100%	e=c*1%	f=c+d+e
Jan-16	0.68	0.085	0.77	0.77	0.01	1.54
Feb-16	0.69	0.085	0.77	0.77	0.01	1.55
Mar-16	0.70	0.085	0.79	0.79	0.01	1.58
Apr-16	0.76	0.085	0.85	0.85	0.01	1.71
May-16	0.82	0.085	0.91	0.91	0.01	1.83
Jun-16	0.84	0.085	0.93	0.93	0.01	1.87
Jul-16	0.78	0.085	0.87	0.87	0.01	1.74
Aug-16	0.78	0.085	0.87	0.87	0.01	1.74
Sep-16	0.75	0.085	0.84	0.84	0.01	1.69
Oct-16	0.77	0.085	0.85	0.85	0.01	1.71
Nov-16	0.78	0.085	0.87	0.87	0.01	1.75
Dec-16	0.73	0.085	0.82	0.82	0.01	1.64
Average	**0.758**					**1.70**