

# Chapter 11: The Producer Welfare Effects of Trade Liberalization When Goods Are Perishable and Habit-forming: The Case of Asparagus

Peyton Ferrier and Chen Zhen

This presentation by Peyton Ferrier,<sup>24</sup> an economist at the Economic Research Service of the U.S. Department of Agriculture, focuses on how out-of-season imports of asparagus have changed consumer habits in the United States. Ferrier and his co-author, Chen Zhen, used a set of equilibrium displacement models to analyze the effects on producers' surplus of lowering or ending tariffs on asparagus in the United States under NAFTA and the Andean Trade Preference Act, and to quantify the tariff changes' offsetting effects on consumers' habits. They then compared their results with the subsidies asparagus farmers received under the 2008 U.S. Farm Bill to compensate for increased imports due to the tariff changes. Their conclusion suggests that changes in U.S. consumers' eating habits due to increased off-season asparagus imports reinforce in-season demand for domestic asparagus, and as a result, counterweigh U.S. asparagus producers' welfare loss from the imports.

## Background

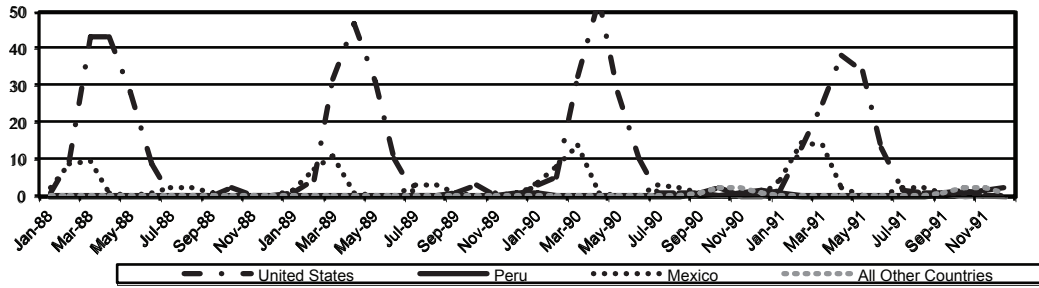
Sales of asparagus in the United States total \$451 million annually, with 95 percent of the U.S. supply coming from the United States, Mexico, and Peru. Asparagus is a springtime crop that follows a 10- to 13-year growth cycle. In the United States, its growing season is between February and June; when mature, it is harvested daily by hand for 2–3 months. Asparagus is a highly seasonal, perishable crop, and as figure 1 shows, between 1988 and 1991 fresh asparagus was largely unavailable in the United States outside its harvest season. Reduced consumption due to out-of-season unavailability may have weakened long-term demand.

Twenty years later, imports from Mexico and Peru have made fresh asparagus available almost year-round to U.S. consumers. Figure 2 shows that between 2007 and 2010, imports typically arrived outside of the periods of U.S. production. Hence domestic asparagus producers faced little if any direct competition from imports.

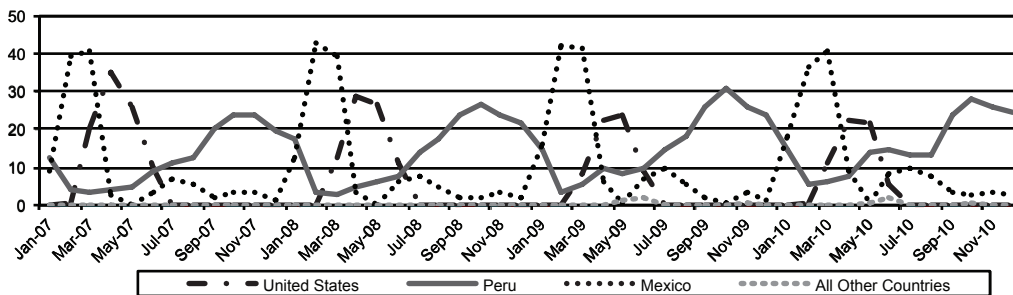
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<sup>24</sup> “Disclaimer: Peyton Ferrier’s presentation and journal article did not necessarily reflect the views of the USDA or the Economic Research Service.”

**Figure 1. U.S. Fresh Asparagus Supply by Source: 1988-1991 (Millions of Pounds)**



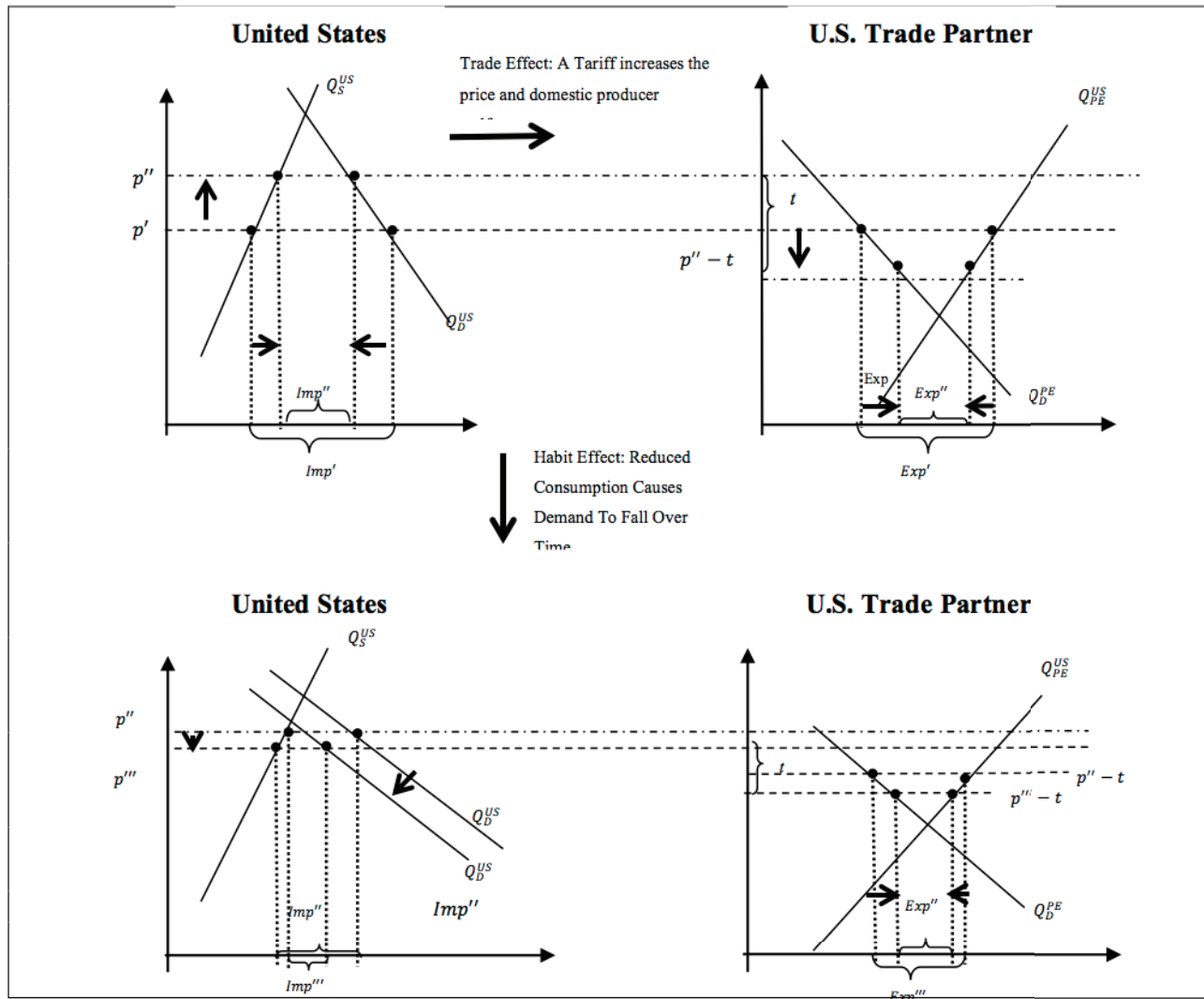
**Figure 2. U.S. Fresh Asparagus Supply by Source: 2007-2010 (Millions of Pounds)**



Source: Chen and Ferrier (2014)

Nevertheless, until the early 1990s U. S. asparagus imports were subject to a most-favored-nation (MFN) tariff rate of 21.3 percent most of the year and 5 percent during September–November. A tariff that reduces imports is thought to benefit U.S. producers by reducing import competition. The top half of figure 3 shows this classic trade effect, in which prices for U.S. producers rise following imposition of a tariff. However, high prices may short-circuit the process in which consumers develop habits around a good they consume regularly; potentially, the high prices reduce long-term demand. As the bottom of figure 3 shows, over time, persistently lower consumption eventually lowers demand and offsets a portion of the producer surplus loss from the price increase caused by the tariff.

**Figure 3: Trade-Competition and Habit Effects of a Tariff Change for the U.S. and Trade Partner**



Source: Ferrier and Zhen, 2014

The Andean Trade Preference Act (ATPA) of 1991 and NAFTA (1994), with later updates, changed the described tariff pattern for U.S. asparagus consumers. Updates to ATPA (2009, 2011) eliminated the U.S. tariff on asparagus for Peru; NAFTA phased it out for Mexico over a period of 14 years. Taking the influx of tariff-free asparagus imports into consideration, the 2008 U.S. Farm Bill provided \$15 million in market loss assistance (MLA) to U.S. asparagus producers to compensate them for competition from lower-priced asparagus imports from the four prior years (2004 to 2007). This was a direct payment of \$1.875 million per year distributed to U.S. fresh asparagus producers collectively.

Growth in tariff-free U.S. imports of asparagus increased both availability and consumption of out-of-season asparagus. U.S. consumers may develop habits around a good they consume regularly by learning its quality characteristics, techniques for cooking it, and how to use it in various dishes. And these new habits for goods such as asparagus can change the tariff pattern described above, because, as Ferrier noted, “availability during off season strengthens and sustains demand” for in-season crops. That is, imports create a consumption “habit” in U.S. consumers, which creates an overall positive effect for domestic as well as foreign producers. But how strong is this “habit effect” for asparagus? Specifically, Ferrier wanted to know which was more beneficial to U.S. producers: the “habit effects” or the MLA subsidies.

### **Measuring the Offset Effects of New Habits vs. Total Net Benefits of Re-imposing the MFN Tariff**

To measure the effects of offsetting asparagus habits, and see what happens if one decreases a tariff rate for a time period, Ferrier and Zhen used a two-step analysis employing demand estimation and equilibrium displacement models. They first estimated a flexible Translog Demand System, gathered quantity data for asparagus, carrots, broccoli, and cauliflower from USDA’s Agricultural Marketing Service, and used lagged consumption as a demand shifter. They calculated a lag quantity term that consists of the discounted sum of 12 months’ previous consumption of each of the vegetables and estimated a discount rate of 55.89 percent; this rate discounts the estimated effect of the previous month’s consumption by about one-half. Then, they estimated the elasticity for demand with respect to lagged consumption. Next, they computed a pair of equilibrium displacement models (A and B) which used estimated demand elasticities as consumption patterns. Ferrier and Zhen also assumed that quality is homogenous (due to well-established quality grades for asparagus) and that the cross-commodity supply elasticities of other vegetables with asparagus are zero. As a result, Equilibrium Displacement Model A simulates the positive effect of re-establishing MFN tariffs on U.S. producers and assumes no effects on consumer habits, while Equilibrium Displacement Model B simulates the losses associated with reduced consumption habits on U.S. producers.<sup>25</sup>

### **Welfare Effects**

The effects examined show that U.S. producers initially lose when this tariff is removed or lowered. In the model without the “habit effects,” U.S. producers’ welfare drops by 0.28 percent. When the tariff reduction rate (a 21.3 percent or a 5 percent tariff reduction, depending on the month it is applied) is multiplied by the total revenue of the asparagus industry, this calculated figure is the approximate total

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<sup>25</sup> For additional details and actual equations of the model, please refer to paper.

effect of tariff reduction on U.S. consumers and producers. As mentioned, the initial effect is not always positive for all parties. When NAFTA was enacted and Mexico lowered its tariffs, the loss to Peruvian producers due to increased competition from Mexican asparagus was 0.1 percent. When ATPA was put in place, reducing the tariffs on Peruvian asparagus, the loss to Mexico due to increased competition from Peru was 0.13 percent, slightly more than the United States' 0.09 percent losses. Then when both NAFTA and ATPA went into effect, the United States lost 0.36 percent of its potential producer revenue. Nonetheless, the results show that when no "habit effects" are taken in to account, the MLA's cost was higher than the welfare loss from the tariff reduction.

Moreover, as previously mentioned, having out-of-season asparagus imports also causes consumers to take advantage of asparagus's increased availability. Regular availability results in newly acquired tastes, and after consumers have formed new habits, consumption increases. In these circumstances, the tariff reduction may become a benefit to U.S. producers as well as consumers. As Ferrier noted, "When we liberalize trade by reducing tariffs, the quantity supplied increases. That creates a positive habit for U.S. goods that will actually offset a good bit of the harm." In this case, when NAFTA is in place, the effect on U.S. producer welfare goes from -0.28 percent without the habit effect to -0.1 percent with it. When both ATPA and NAFTA are put in place, the effect on U.S. producer welfare goes from -0.36 percent without the habit effect to positive 0.04 percent with it. In this case, once the "habit effects" are factored in, the welfare losses to U.S. producers decrease or vanish. These results show that under NAFTA, as Ferrier explained, "seasonality and habit formation offset some of the harm to producers from trade liberalization by about 64 percent" of the welfare losses to U.S. asparagus producers from increased Mexican imports. Furthermore, when both NAFTA and ATPA are in place, the "habit effects" offset 100 percent of the U.S. producer welfare losses from increased Peruvian imports under ATPA.

Asparagus may be the prime example of off-season habit formation's potential for offsetting some or all of the harm to agricultural producers from trade liberalization, but it is probably not the only one. For example, the approach used in this presentation may well be applicable to Chilean agricultural goods that are widely sold in the United States, including grapes, berries, and stone fruits (peaches, plums, and nectarines); all of these, like asparagus, are highly perishable. It would also be interesting to learn whether U.S. producers of preserved (canned and frozen) asparagus have been harmed by liberalization, but getting enough data to study these goods, unfortunately, is very difficult.

## References

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[http://www.dallasfed.org/assets/documents/research/events/2014/14nafta\\_ferrier.pdf](http://www.dallasfed.org/assets/documents/research/events/2014/14nafta_ferrier.pdf) (accessed November 13, 2014)

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