A Case Study of Fresh-Fruits Trade among NAFTA, CAFTA, and MERCOSUR

Hovhannes Mnatsakanyan, Graduate Research Assistant, School of Agriculture,
Texas A&M University-Commerce, hmnatsakany@leomail.tamuc.edu

Jose A. Lopez, Associate Professor of Agribusiness, School of Agriculture,
Texas A&M University-Commerce, Jose.Lopez@tamuc.edu

A Case Study of Fresh-Fruits Trade Among NAFTA, CAFTA, and MERCOSUR

Hovhannes Mnatsakanyan and Jose A. Lopez
hmnatsakany@leomail.tamuc.edu and jose.lopez@tamuc.edu

**TEXAS A&M UNIVERSITY COMMERCE**

AGRICULTURAL SCIENCES

I. Introduction

- U.S. is one of the world's major importers of fresh fruits with a constantly increasing import trend and a 50% average share of import in domestic consumption from 2014 to 2015 (USDA-ERS, 2016).

- Given the increasing dependence on fresh-fruit imports, it is important that the U.S. monitors trends, develops future trade scenarios, and establishes corresponding action plans.

- Estimation of import demand elasticities is an effective approach for building economic models and analyzing likely trade scenarios.

Figure 1.
The Main Sources of U.S. Fresh-Fruits Imports in 2015

- NAFTA — 46%
- CAFTA-DR — 20%
- MERCOSUR — 3%
- Chile and Peru — 19%
- Other — 12%
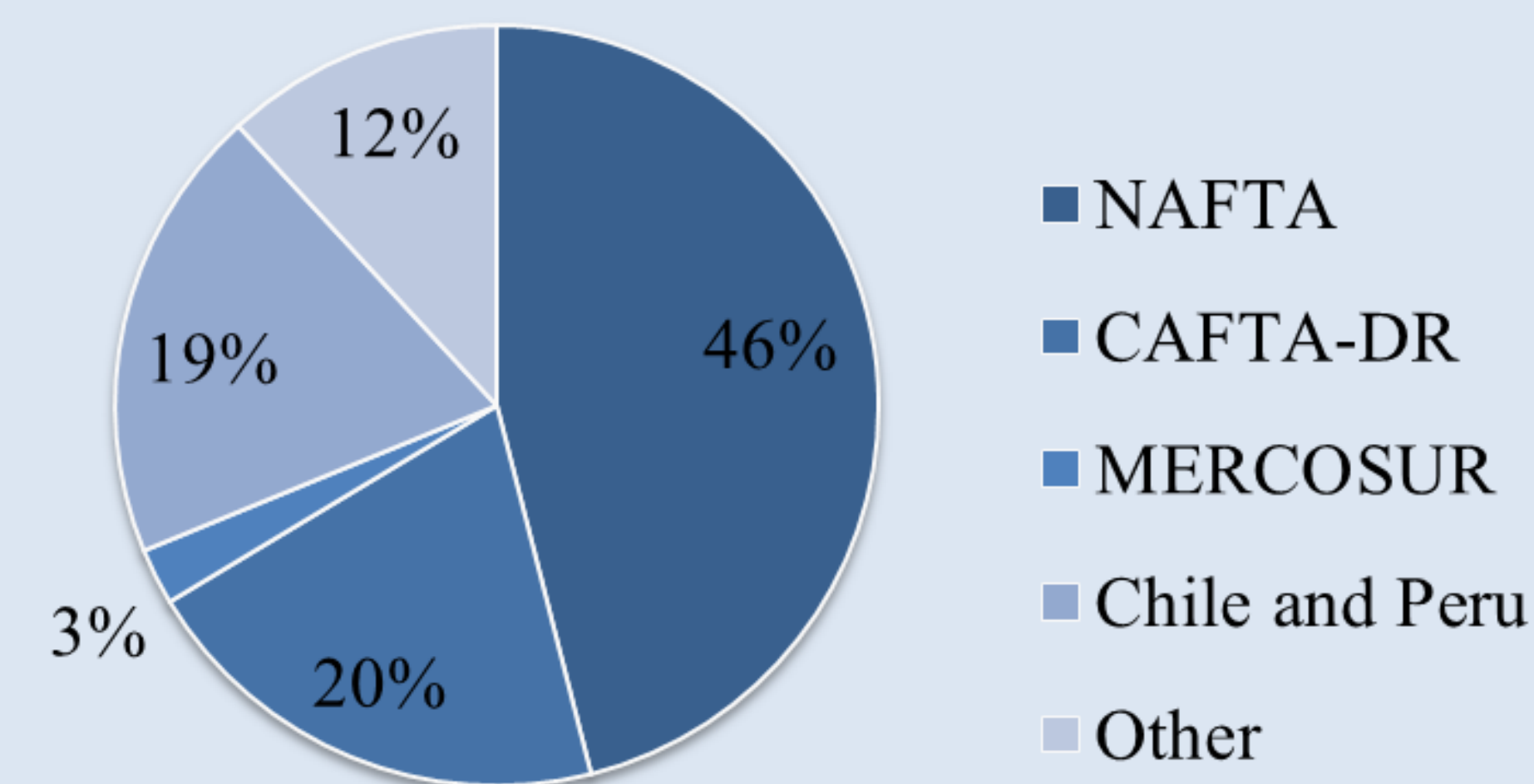
II. Research Objectives

The main objective of this study is to analyze the U.S. demand for the fresh fruits differentiated by their sources of origin. The specific objectives are:

- Estimate and interpret the own-price, cross-price, and expenditure elasticities of demand;

- Discuss the policy implications of the study results.

III. Model

The following Source-Differentiated Almost Ideal Demand System was estimated:

$$w_{i_t} = \alpha_i + \sum_j \gamma_{ij} \log(p_{j_t}) + \beta_i \log\left(\frac{x}{P}\right)_t + s_i sin_t + c_i cos_t + z_i t_t$$
$$+ \rho\left(w_{i_t} - \left(\alpha_i + \sum_j \gamma_{ij} \log(p_{i_{t-1}}) + \beta_i \log\left(\frac{x}{P}\right)_{t-1} + s_i sin_{t-1} + c_i cos_{t-1} + z_i t_{t-1}\right)\right) + \varepsilon_i;$$

where i and j represent fruit-source combination indices; w_i is the import expenditure share for each fruit-source combination; p_j is the import price of jth fruit-source combination; x is the expenditure on all fresh fruits included in the model; t represents a trend variable; $\alpha_i, \gamma_{ij}, \beta_i, c_i$ s_i and z_i are the population parameters that will be estimated; P is the nonlinear price index; $Sin_i = f(t_i, SL)$ and $cos_i = g(t_i, SL)$ are trigonometric functions capturing seasonality; ρ (or rho) is the first-order autoregressive coefficient; and ε_i is the error term.

IV. Data

- This study analyzes data on monthly import values ($) and quantities (kg) from 2005 to 2016 (a total of 132 observations) reported by the United States International Trade Commission.

- Unit values (import values divided by import quantities) were adjusted for inflation, using the CPI reported by the U.S. Bureau of Labor Statistics.

- Gross Domestic Product data reported by the U.S. Department of Commerce was used to address potential endogeneity between w_i and x.

V. Estimation Results

Table 1. The uncompensated own-price and expenditure elasticities, and compensated cross-price elasticities of demand

i	1	2	3	4	5	6	7	8	9	10	Exp.
1	-0.945**	-0.134*	0.168**	0.393**	0.126	0.111	0.083	0.002	0.024	0.023**	2.482**
2	-0.354*	-1.088**	0.113	0.342	-0.047	1.214**	-0.276	-0.002	0.059	0.035	0.079
3	0.447**	0.114	-1.147**	0.699**	0.199	-0.846**	0.435*	0.013*	-0.014	0.060**	1.767**
4	0.064**	0.021	0.043**	-0.677**	0.008	-0.006	0.084*	-0.001	0.029	0.008	1.168**
5	-0.823**	-0.005	0.020	0.013	-0.155	0.015	-0.020	0.005	-0.032	0.009	0.523**
6	0.029	0.118**	-0.082**	-0.009	0.014	-0.223	0.012	-0.005	-0.009	-0.001	0.663**
7	0.113	-0.142	0.223*	0.697*	-0.100	0.064	-0.958**	-0.002	-0.014	0.028	2.075**
8	0.060	-0.029	0.176*	-0.203	0.611	-0.630	-0.062	-0.241	0.290	0.024	2.449**
9	0.060	0.056	-0.013	0.433	-0.289	-0.084	-0.025	0.021	-0.246*	0.083	0.221
10	0.195**	0.113	0.189**	0.407	0.265	-0.041	0.170	0.006	0.281	-1.598**	1.915**

Note: i = 1, 2, …, 10, where 1 = mangos imported from NAFTA, 2 = mangos from MERCOSUR, 3 = mangos from ROW, 4 = bananas from CAFTA-DR, 5 = bananas from ROW, 6 = avocados from NAFTA, 7 = avocados from ROW, 8 = papayas from CAFTA-D, 9 = papayas from NAFTA, and 10 = papayas from ROW. Asterisk (*) and double asterisks (**) indicate statistical significance at 5% and 1%, respectively.

- The own-price elasticities (highlighted by the darker blue color) suggest that demand was price- elastic for mangos from MERCOSUR and ROW, and for papayas from ROW; while for the other fruits, demand was price-inelastic.

- Cross-price elasticities highlighted by a softer blue color had positive sign indicating that these fruits were substitutes.

- Cross-price elasticities highlighted by a white color had negative sign indicating that the corresponding fruits had complementary relationships.

- The expenditure elasticities suggested that mangos imported from NAFTA and ROW, bananas imported from CAFTA-DR, avocados imported from ROW, and papayas imported from CAFTA-DR and ROW were considered as luxury goods.

VI. Policy Implications and Conclusions

The estimated elasticities of demand can be used for conducting the following economic analyses.

- Evaluating the impact of various economic factors that can influence the price of fresh-fruits imported to the U.S. For example:
  - 20% tariff on imports from Mexico, if imposed, would reduce the average monthly imports of fresh fruits by nearly $1 million (measured in 2015 dollars).
  - On the other hand, a 5% tariff on imports from Mexico, if imposed, would reduce the average monthly imports of fresh fruits by nearly $0.3 million.

- Measuring the degree of the responsiveness of the U.S. to the changes in prices of the imported fresh fruits.
  - For example, the fresh fruits that were found to be price inelastic are expected to be less impacted by the price changes than those with higher own-price elasticity of demand. This information can be useful in policy making.

- Developing possible scenarios of U.S. fresh-fruit imports.