An Empirical Assessment of SPS Regulations on U.S. Fresh Fruit and Vegetable Imports

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Outline

• Background on fresh fruit and vegetable imports

• Overview of U.S. regulations

• Empirical estimates of effects of phytosanitary treatments on U.S. imports
Trends in U.S. Fresh Fruit and Vegetable Imports

- Fresh Fruit Imports (in billions of U.S. $)
- Fresh Vegetable Imports (in billions of U.S. $)
- Fresh Fruit Imports as a Share of Total Agricultural Imports
- Fresh Vegetable Imports as a Share of Total Agricultural Imports
U.S. Regulation of Fresh Fruit and Vegetable Imports

- Phytosanitary Treatments
  - Irradiation
    - India-Mangoes
    - Thailand-Pineapples
  - Mainland U.S. vs Hawaii
  - Areas/regions recognized as pest-free or greenhouses
    - Israel-Tomatoes
    - Peru-Mangoes
- Geographical Restrictions on Destination
- Geographical Restrictions on Origin
- Pre-clearance Procedures
- Phytosanitary Treatment and Inspection in the country of origin
- Systems Approaches to Pest Risk Management
  - Combination of pest-risk mitigation techniques
    - Mexico-Hass Avocados

Terms:
- Phytosanitary Treatments
- Irradiation
- Mainland U.S. vs Hawaii
- Areas/regions recognized as pest-free or greenhouses
- Israel-Tomatoes
- Peru-Mangoes
- Mexico-Hass Avocados
Global Fresh Vegetable Export Volume Eligible for Importation to the United States

- Artichokes
- Asparagus
- Bell peppers
- Broccoli and cauliflower
- Cabbages and other brassicas
- Carrots
- Cucumbers
- Eggplants
- Garlic
- Green beans
- Lettuce
- Mushrooms
- Onions
- Potatoes
- Pumpkins and squash
- Sweet corn
- Sweet potatoes
- Tomatoes
U.S. Phytosanitary Treatments

- Methyl Bromide
- Water Treatment
- High Temperature Forced Air
- Pest Specific/Host Variable
- Irradiation
- Vapor Heat
- Cold Treatment
- Fumigation Plus Refrigeration of Fruits
- Cold Treatment Plus Fumigation of Fruits
- Quick Freeze
Incidence of Phytosanitary Treatments

• Treatment requirements from APHIS *Fresh Fruits and Vegetables Import Manual*

• Observed import flows

• Incidence of all treatments
  • Fresh fruits: 21.7%
  • Fresh vegetables: 8.0%
Phytosanitary Treatments for Vegetables

Frequency

- Methyl Bromide: 195
- Pest Specific/Host Variable: 32
- Heat: 4
Phytosanitary Treatments for Fruits

Frequency

- Methyl Bromide
- Cold Treatment
- Water Treatment
- Fumigation/Cold Combinations
- Other

- 331
- 100
- 91
- 26
- 79
Gravity Model Specification

• Dependent variable: custom value

• Independent variables:
  • Distance
  • U.S. and exporter production
  • Exchange rate
  • Exporter share of global exports
  • Free trade agreements
  • Phytosanitary treatments
  • Treatment-export share interaction
Zero Trade Flows

- With product-line analysis, high number of zero trade flows

- Reasons for zero trade flows
  - No production in “exporting” country
  - Country doesn’t export product
  - Trade costs too high
  - Exporting country not “eligible” to ship product to U.S.
  - Cost of phytosanitary treatment too high

- 40% zero trade flows in sample
Results

• Non-treatment independent variables
  • Have expected signs
  • Values statistically significant and robust across scenarios

• Phytosanitary treatments
  • Negative and significant for treatment variable(s)
  • Positive and significant interaction term with export share

• R²: 0.56 to 0.61
Aggregate Effect of Treatments

% Change in Imports

Global Export Share
Aggregate Treatment Effects by Product

% Change in Imports

Global Export Share

-100.0
-50.0
0.0
50.0
100.0
150.0
200.0
250.0
300.0
0% 10% 20% 30% 40%

Fruits
Vegetables

0% 10% 20% 30% 40%
Effects of Cold Treatments

Global Export Share

% Change in Imports

-100.0

-90.0

-80.0

-70.0

-60.0

-50.0

-40.0

-30.0

-20.0

-10.0

0.0

1 10 20 30 40 50

Cold

Cold or FPFR

Global Export Share
Effects of Methyl Bromide

Global Export Share

% Change in Imports

Global Export Share
Constant Treatment Effects

• Negative effects (fruits)
  • Water: -52.7%
  • Fumigation plus refrigeration of fruits: -97.7%
  • Methyl bromide and cold treatment: -98.1%

• No effects:
  • Pest specific/Host variable
  • Heat – too few observations
Treatment Rankings

• Least to most restrictive:
  • Pest specific/Host variable
  • Methyl bromide
  • Water
  • Cold
  • Cold or fumigation plus refrigeration (fruits)
  • Fumigation plus refrigeration (fruits)
  • Methyl bromide and cold treatment (fruits)
Summary

• Incidence of phytosanitary treatments relatively low

• Effects of phytosanitary treatments:
  • Negative but may diminish as country’s exports increases
  • Vary by treatment type

• Cold treatments, including combinations with methyl bromide fumigation, are most trade restrictive