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# EFFECTS OF TRADE POLICIES ON COMPETITION BETWEEN FLORIDA AND MEXICO IN THE U.S.<sup>1</sup> WINTER CUCUMBER MARKET\*

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## THE PROBLEM

Since the 1964 United Nations Conference on Trade and Development, less developed countries (LDCs) have been united in expressing concern over their trade problems and long-run balance of payment deficits. The LDCs feel that the more developed countries (MDCs) discriminate against their products by use of tariffs. Tariff relief sought by LDCs includes reduction of tariff rates as well as effective rates applied to raw materials and semiprocessed products.<sup>2</sup>

Tariff relief for LDCs means that domestic in-

dustries in the MDSs face stronger competition from those imports that are less costly to produce in other countries. For U.S. growers of winter vegetables, this competition has become intense. Several vegetables produced in Mexico compete with Florida's in the U.S. winter market.

This paper concentrates on the cucumbers, a product of considerable economic significance to Florida's vegetable industry. Cucumbers accounted for \$11.1 million or 4 per cent of Florida growers' vegetable crop receipts in 1970-1971. The retail value of Florida-grown cucumbers was \$32.7 mil-

**Table 1. U.S. MARKET SHARES FOR PRODUCERS AND IMPORTERS OF SPRING CUCUMBERS**

|                      | U.S.<br>Consumption | Share of U.S. consumption |         |                       | Florida<br>share of<br>U.S. production | Ratio of<br>Florida<br>Production<br>to Imports |
|----------------------|---------------------|---------------------------|---------|-----------------------|--|---|
|                      | Mil. cwt.           | U.S.<br>production        | Imports | Florida<br>production |  |   |
|                      |                     | Percent                   |         |                       | Percent                                |   |
| 1956-60 <sup>a</sup> | 1.4                 | 67.1                      | 32.9    | 61.7                  | 92.0                                   | 1.88  |
| 1961-65 <sup>a</sup> | 1.7                 | 65.9                      | 34.1    | 59.8                  | 90.8                                   | 1.77  |
| 1966-70 <sup>a</sup> | 2.1                 | 51.9                      | 49.1    | 46.2                  | 89.0                                   | 0.96  |
| 1971                 | 2.6                 | 35.2                      | 64.8    | 29.1                  | 82.8                                   | 0.45  |
| 1972                 | 2.7                 | 42.1                      | 57.9    | 35.4                  | 84.0                                   | 0.61  |

<sup>a</sup> Five year average.

SOURCE: Based on calculations from [6, 8, 9].

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<sup>1</sup> Winter in general for this paper refers to late fall, winter, and early spring including November through mid-May.

<sup>2</sup> The effective rate of protection for most products is higher than the nominal rate [1, 2].

lion [5].

Reductions in Florida's share of the U. S. spring cucumber market suggest that the State's producers have reason for concern (Table 1). From 1956-1960 to 1966-70, cucumber imports as a percent of total U.S. spring consumption rose from 33 to 49 percent. Yet Florida production as a percent of U.S. spring production has decreased only slightly.

Protection from imports desired by many Florida growers is in conflict with a general desire for freer world trade expressed in various governmental policies. Thus, many fundamental and important questions are often raised by agricultural policy makers. For example, to protect Florida producers, should winter vegetable trade with foreign countries be further restricted by increasing present trade barriers? How effective are the present barriers to winter vegetable trade? Could more effective barriers better meet the needs of both consumers and producers in the United States? Is Mexico's comparative advantage so great that Florida cannot compete successfully in the U.S. Market even with substantial protection from imports?

## OBJECTIVES AND APPROACH

The analysis concentrates on effects of changing tariff barriers and Florida labor constraints on consumers, producers, and government revenues. A linear programming model, or modified transportation model, was used in the analysis to estimate changes in production and trade patterns based on predetermined information regarding the level of demand and supply as well as production coefficients and transfer costs. The objective function of the model was to minimize cost at the wholesale level. Supply origins or three production regions are Mexico, Florida, and Central America,<sup>3</sup> while 12 consumption regions encompassing the continental United States are the demand areas. Consumption regions are constructed primarily on the basis of geographic continuity and historical trade patterns. Assumptions with respect to demand for and supply of cucumbers, labor supply in Florida and tariff levels are indicated in notes to Table 2.

A base year, 1970-71, was simulated, and demand and market share estimates projected, for the winter season of 1980-81. The share of the U.S. fresh cucumber market for each of three production regions was projected under several sets of

assumptions with respect to tariffs and production costs in Florida and Mexico.

## BASES FOR COMPETITION AND BARRIERS TO TRADE

The winter climate in certain areas of Mexico offers conditions more suitable to production of winter vegetables than any area in the United States. Moreover, all Mexican areas suited for production of winter vegetables have adequate soil and water resources for further expansion of production.

Technology used in cucumber production has changed considerably over the past three decades with only minor differences between Florida and Mexico. Varieties have been improved, application of fertilizer increased sharply, and other production methods, such as mulching, have been introduced or changed. However, despite advances in production of winter vegetables in general and cucumbers in particular, substantial amounts of hand labor are employed. Moreover, Florida's winter vegetable producers must compete with the citrus industry and flower growers for a limited supply of labor, especially at harvest time. The West Coast of Mexico, with its principal vegetable growing area around Culiacan, has an abundant supply of relatively cheap labor. Consequently, the cost of labor differs from that in Florida where the supply of labor available to the vegetable industry is relatively scarce.

Cost coefficients for this research are the sum of production costs per bushel in the production region increased by transfer costs of one bushel from the production region to the consumption region.<sup>4</sup> Production costs are totals of growing, harvesting, and marketing costs. Production cost coefficients for Florida are adjusted for the risk of frost. Harvesting and marketing costs embody expenses for picking, grading and packing, containers, hauling and selling [3]. Transfer costs for Florida are the transportation costs. In the case of imports from Mexico and Central America, transfer costs incorporate transportation costs, export duties, and import tariffs.

The movement of vegetables between Mexico and the United States is influenced by tariff levels. The tariffs on fresh cucumbers are 1.5 cents per pound from July 1 to August 31; 3.0 cents per pound during the periods from March 1 to June 30

<sup>3</sup> Central America also includes the West Indies.

<sup>4</sup> Details of the costs used in this research are available in [4].

and September 1 to November 30; and 2.2 cents per pound from December 1 to the last day of February [10].

### RESULTS: 1980-1981 PROJECTIONS

A summary of projected supplies, costs, tariff revenues and Florida's land and labor use, under various assumptions with respect to tariffs, labor

supply, and technology, is presented in Table 2. With tariffs at the 1970-1971 level and no change in the Florida labor constraint and wage rates, Florida's production in 1980-1981 would remain constant due to the effective labor constraint (Line I compared with Line III). With no tariffs and projected labor changes in 1980-1981, Florida would be completely eliminated as a source of supply (Line VIII).

**Table 2. PROJECTION OF PRODUCTION, BY REGIONS, FLORIDA RESOURCE USE, PRODUCTION AND DISTRIBUTION COSTS, AND U.S. TARIFF REVENUE, FRESH CUCUMBERS IN THE 1980-1981 WINTER SEASON**

| Simulation                       | Production <sup>a</sup> |                 |         |                    | Florida resources used |       | Cost          |            | U.S. tariff revenue |
|----------------------------------|-------------------------|-----------------|---------|--------------------|------------------------|-------|---------------|------------|---------------------|
|                                  | Mexico <sup>b</sup>     | Central America | Florida | Florida % of total | Labor                  | Land  | Total         | Per bushel |                     |
|                                  | -----1,000 bushels----- |                 |         | Percent            | 1,000 hours            | Acres | 1,000 dollars | Dollars    |                     |
|                                  | -----1,000 dollars----- |                 |         |                    |                        |       |               |            |                     |
| 1970-1971 situation <sup>c</sup> |                         |                 |         |                    |                        |       |               |            |                     |
| I simulation, 1970-1971 tariffs  | 2,079                   | 201             | 893     | 28.1               | 993 <sup>d</sup>       | 4,108 | 19,226        | 6.06       | 2,871               |
| II simulation, no tariff         | 2,322                   | 250             | 601     | 18.9               | 668                    | 2,763 | 16,483        | 5.20       | 0                   |
| 1980-1981 <sup>e</sup>           |                         |                 |         |                    |                        |       |               |            |                     |
| III 1970-1971 tariffs            | 2,937                   | 296             | 893     | 21.6               | 993 <sup>d</sup>       | 4,108 | 25,297        | 6.13       | 3,796               |
| IV no tariffs                    | 3,207                   | 271             | 648     | 15.7               | 721                    | 2,981 | 21,317        | 5.17       | 0                   |
| 1980-1981 <sup>f</sup>           |                         |                 |         |                    |                        |       |               |            |                     |
| V 1970-1971 tariffs              | 3,786                   | 296             | 44      | 1.1                | 49                     | 202   | 33,462        | 8.11       | 5,153               |
| VI 45.63% tariff increase        | 1,788                   | 1,535           | 802     | 19.4               | 894 <sup>g</sup>       | 3,689 | 36,888        | 8.94       | 6,303               |
| VII 9.17% tariff increase        | 3,028                   | 296             | 802     | 19.4               | 894 <sup>g</sup>       | 3,689 | 33,802        | 8.19       | 4,366               |
| VIII no tariffs                  | 3,830                   | 296             | 0       | 0                  | 0                      | 0     | 28,263        | 6.85       | 0                   |

<sup>a</sup> Total production is fixed at 4,125,588 bushels in each of the 1980-1981 simulations; for Mexico and Central America, production includes only that produced for export to the United States.

<sup>b</sup> Mexico's supply was assumed to be perfectly elastic.

<sup>c</sup> Data for the 1970-1971 situations are repeated here for convenience of comparisons.

<sup>d</sup> Labor constraints are effective at the level used in 1970-1971.

<sup>e</sup> Compared to 1970-1971, the only changes are in the regional demands including projections to reflect changes in population and a trend variable.

<sup>f</sup> Compared to 1970-1971, Florida labor is further restricted and wage rates relative to Mexico are higher, and there is no change in technology. It was assumed that real wages in Mexico would rise by 6.3 percent per year based upon a 1956-1968 trend.

<sup>g</sup> Labor constraints are effective based on the assumptions that real wages would rise by 10 percent per year from the 1970-71 base, a continuation in the trend during the 1963-1968 period, and that the labor supply would continue to shrink resulting in a 10 percent decrease by 1980-1981.

SOURCE: [4].

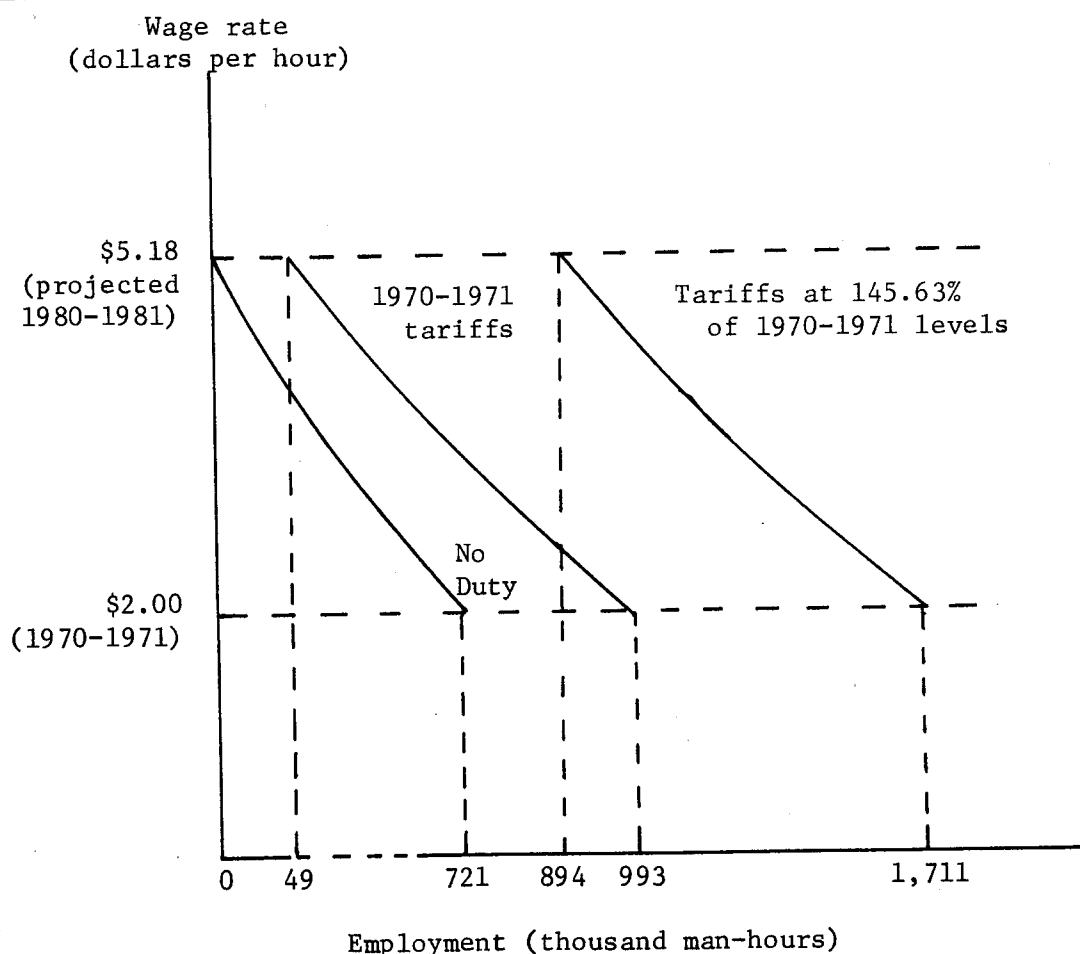
The Haley Bill is designed to protect the current or some previous market share for Florida vegetable growers by increasing tariffs annually and/or imposing quotas.<sup>5</sup> The bill suggests that the average market share of the five-year period, 1966 through 1970, should be used as a base for deter-

mining required duty. Total U.S. demand for the projected 1980-1981 period was estimated to be 4,124,588 bushels. Average market share for Florida over that period was almost 57 percent or 2,337,578 bushels. The required duty for 1980-81 would be 145.63 percent of the 1970 level, giving

Florida the desired market share but without a labor constraint. However, under the projected labor constraint, Florida could produce only 802,427 bushels, or 19 percent. Thus, in order for Florida packers to ship 57 percent, the remaining 1,535,131 bushels would have to be imported through Florida from Central America or countries in the Caribbean. The break-even point duty, where Florida could just supply 19 percent based on the labor constraint, would be 109.17 percent of the 1970 level.

Under conditions of the projected increase in wage rates and decrease in labor available in Florida for 1980-1981, tariffs at 1970-1971 levels (Line V, Table 2) compared to no tariffs (Line VIII) would increase total costs somewhat more than the tariff revenue that would be generated, \$5.20 million versus \$5.15 million, respectively. The higher tariff level (Line VI) would increase tariff revenue to \$6.3 million and increase cost by \$3.4 million over the 1970-1971 tariff (Line V) and \$8.6 million over no tariff (Line VIII). Tariffs

**Figure 1. DERIVED DEMAND FOR LABOR IN FLORIDA CUCUMBER PRODUCTION IN THE WINTER SEASON 1980-1981, AT VARIOUS TARIFF LEVELS**



at 9.17 percent over the 1970-1971 levels (Line VII) would permit Florida to produce at the level constrained by available labor. In this case, total costs would be \$.34 million higher than with 1970-

1971 tariff levels, and tariff revenue would be \$.79 million lower. These changes occur as a result of an increase in Florida production and a decrease in imports.

<sup>5</sup> Because the competitive position of the vegetable industry in Florida depends greatly on the tariffs levied on vegetable imports, a bill was introduced in the U.S. House of Representatives in 1972 to protect Florida producers. At present (November, 1974) the proposed bill, "The Fresh Fruits and Vegetables Market-Sharing Act of 1972" [7], has not been enacted.

Effects of changes in tariffs and wage rates on employment in cucumber production in Florida are summarized in the form of an approximation of derived demand curves given in Figure 1. For total labor income the employment effect is inverse to the effect.

### EFFECTS ON CONSUMERS AND PRODUCERS

Quantities of winter cucumbers demanded were held constant, within regions, so the effects of different tariff levels on consumers could be determined by differences in total costs and in costs per bushel (Table 2). An increase in tariff augments costs to U.S. consumers by the amount of the duty increase, if it is assumed that differences in cost at

the wholesale level are passed on to consumers. Under an additional assumption that tariff revenues are used for consumer welfare, difference in costs are reduced by the amount of these tariff revenues. A transfer of benefits from cucumber consumers to those not consuming cucumbers is a result of the duty on imports. Effects of tariff levels on consumer expenditure under projected demand conditions and Florida labor constraints and wage rates in 1980-1981 are shown in Table 3.

Simulated effects of various tariff levels on net returns to import suppliers from Mexico and Central America in the 1980-1981 winter season are shown in Table 4. It is assumed that differences in wholesale prices minus tariffs and transportation costs would reflect differences in price paid to pro-

**Table 3. EFFECTS ON U.S. CONSUMER EXPENDITURES FOR WINTER CUCUMBERS AND CONDITIONS PROJECTED FOR DEMAND AND THE FLORIDA LABOR CONSTRAINT AND WAGE RATES IN THE 1980-1981 SEASON**

|                         | 1970-1971<br>tariffs    | 1970-1971<br>tariffs raised<br>by 45.63% | 1970-1971<br>tariffs raised<br>by 9.17 % |
|-------------------------|-------------------------|--|--|
|                         | -----1,000 dollars----- |  |  |
| Total cost at wholesale | 33,462                  | 36,888                                   | 33,802                                   |
| Less cost at no tariff  | 28,263                  | 28,263                                   | 28,263                                   |
| Gross increase          | 5,199                   | 8,625                                    | 5,539                                    |
| Less tariff revenue     | 5,153                   | 6,303                                    | 4,366                                    |
| Net increase            | 46                      | 2,322                                    | 1,173                                    |

SOURCE: [4].

ducers. Under these specified conditions, tariffs would have relatively small effects on income of import suppliers in relation to costs to consumers. These results are influenced by the assumption of fixed demands in the model. Real effects probably would entail somewhat lower consumer prices and lower returns to import suppliers in comparison with those shown in Tables 3 and 4.

Calculations of effects on net returns to Florida producers in the 1980-1981 winter season are given in Table 5. Again, the assumption is that differences in wholesale prices minus transportation costs would reflect differences in wholesale prices

minus transportation costs would reflect differences in prices paid to producers. With no tariffs, under assumptions in the model, Florida would have no production. While tariffs would result in substantial gross payments to producers, net gains are relatively small.

As anticipated, most of the gain from tariffs would go to factors employed in cucumber production in Florida; most of the loss would fall on U.S. consumers with smaller losses accruing to import suppliers. Tariffs levied above 109.17% of the 1970-1971 rate tend to shift the incidence of the duty from import suppliers to U.S. consumers, yet

**Table 4. EFFECTS ON NET RETURNS TO IMPORT SUPPLIERS OF WINTER CUCUMBERS FROM MEXICO AND CENTRAL AMERICA IN THE 1980-1981 WINTER SEASON <sup>a</sup>**

|  | No<br>tariffs           | 1970-1971<br>tariffs | 1970-1971<br>tariffs<br>raised by<br>45.63% | 1970-1971<br>tariffs<br>raised by<br>9.17% |
|--|-------------------------|----------------------|---|--|
|  | -----1,000 dollars----- |                      |   |  |
| Wholesale value of<br>imports (costs) <sup>b</sup> | 28,263                  | 33,088               | 29,436                                      | 26,371                                     |
| Less transport cost                                | 5,889                   | 5,817                | 4,602                                       | 4,385                                      |
|  | 22,374                  | 27,271               | 24,834                                      | 21,986                                     |
| Less tariffs                                       | 0                       | 5,153                | 6,303                                       | 4,366                                      |
|  | 22,374                  | 22,118               | 18,531                                      | 17,620                                     |
| Plus reduction in<br>production costs <sup>c</sup> | 0                       | 206                  | 3,759                                       | 3,759                                      |
| Payment to growers                                 | 22,374                  | 22,324               | 22,290                                      | 21,379                                     |
| Less payment to growers<br>with no tariffs         | --                      | 22,374               | 22,374                                      | 22,374                                     |
| Net gain or (loss)                                 | --                      | (50)                 | (84)  | (995)                                      |

<sup>a</sup> Direct comparisons of values at the three tariff levels are not possible because of differences in supply allocation. Transportation charges for the 45.63% and 9.17% levels differ, even though import volume is equal, because of shifts between Mexico and Central America. The Central American share (see Table 2) is high for the 45.63% level because Florida could only meet the desires of the Haley Bill by packing imports from Central America.

<sup>b</sup> The wholesale value of imports is wholesale cost minus costs for Florida's share of the U.S. market (see Table 2).

<sup>c</sup> Reduction in production costs is an accounting adjustment to cover costs that would have resulted under the three tariff levels if imports had supplied the entire U.S. market.

SOURCE: [4].

benefits to Florida producers change only slightly because the labor constraint limits production to 19.4 percent of the U.S. market (Table 6).

### CONCLUSIONS

Regardless of better technology, both quantity and wage conditions in the labor market will probably continue to erode the ability of the Florida fresh winter cucumber industry to compete with suppliers from Mexico. The restrictive assumptions

on labor supply, i.e., a reduction in number of workers and an increase in real wage rates in comparison with Mexico, have a substantial impact on the results in terms of production in Florida. However, these assumptions appear to be quite realistic in view of recent trends in actual wage rates, in minimum wages imposed by law, and in view of the United States' tendency to become more restrictive with regard to entry of off-shore labor that has been an important source for Florida in past years.

**Table 5. EFFECTS OF TARIFFS ON NET RETURNS TO FLORIDA PRODUCERS IN THE 1980-1981 WINTER SEASON<sup>a</sup>**

|                                      | 1970-1971<br>tariffs    | 1970-1971<br>tariffs raised<br>by 45.63% | 1970-1971<br>tariffs raised<br>by 9.17% |
|--------------------------------------|-------------------------|--|---|
|                                      | -----1,000 dollars----- |  |   |
| Wholesale value (cost)               | 374                     | 7,452                                    | 7,431                                   |
| Less transportation cost             | 22                      | 1,042                                    | 1,020                                   |
| Gross payments                       | 352                     | 6,410                                    | 6,411                                   |
| Less increase in<br>production costs | 336                     | 6,127                                    | 6,127                                   |
| Net gain                             | 16                      | 283                                      | 284                                     |

<sup>a</sup> Florida production would be zero when there is no tariff.

SOURCE: [4].

**Table 6. NET EFFECTS OF CUCUMBER IMPORT DUTIES ON CONSUMER, FLORIDA PRODUCER AND IMPORT SUPPLIER INCOMES IN THE 1980-1981 WINTER SEASON<sup>a</sup>**

|                   | 1970-1971<br>tariffs    | 1970-1971<br>tariffs raised<br>by 45.63% | 1970-1971<br>tariffs raised<br>by 9.17% |
|-------------------|-------------------------|--|---|
|                   | -----1,000 dollars----- |  |   |
| Consumers         | -46                     | -2,322                                   | -1,173                                  |
| Florida producers | 16                      | 283                                      | 284                                     |
| Import suppliers  | -50                     | - 84                                     | - 995                                   |

<sup>a</sup> Florida production would be zero when there is no tariff.

SOURCE: Tables 3, 4 and 5.

Duties on imports of fresh winter cucumbers are quite important to the competitive position of Florida's fresh winter cucumber industry. Higher tariff rates during the 1970-1971 winter season would not have benefited Florida much, due to its labor constraint. The projections to 1980-1981, based on a restrictive set of assumptions in the linear programming model employed, show that the Florida fresh winter cucumber industry, with-

out major technological advances, would be eliminated in a few years if 1970-1971 tariffs are maintained or reduced.

Gains from tariffs are distributed primarily to workers and growers in Florida while costs are borne primarily by U.S. consumers rather than import suppliers. The assumption of a perfectly inelastic demand for cucumbers in each consumption



region may distort, somewhat, the projections of size and distribution of gains and losses. However, the share of a household budget spent on winter cucumbers is very small and the range in price variation is no more than 25 to 35 percent. Thus,

if not perfectly inelastic, it is believed that the price elasticity of demand would be highly inelastic over the projected range of price differences. For these reasons it is likely that this assumption had a negligible effect on the results.

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