THE EFFECTS OF MEXICAN IMPORTS ON FLORIDA CUCUMBER PRICES

By

Peter Hartman
Food and Resource Economics Department
University of Florida

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INTRODUCTION[2]

Most areas in the United States produce cucumbers and there is production for commercial fresh market sales in 36 states. Florida, California, Texas, North Carolina, Virginia, New Jersey, South Carolina, Maryland, New York, and Michigan are the principal cucumber producing states for this fresh market.

The cucumber is not very sensitive to differences in day length and light intensities that occur under field conditions, but it has no resistance even to light frosts. Since cucumber varieties, at present, are not resistant to frost, they cannot be grown successfully as a midwinter crop anywhere in the U.S., except in southern Florida. Occasionally in south Florida, a cucumber crop is wiped out or heavily damaged by cold weather.

Florida has not met total U.S. demand for fresh winter cucumbers and much of this demand is met by imports.

Production:

Florida cucumber growers attempt to minimize the risk of frost by planting in such a way that the most active harvest periods are from November 1 to December 31 and from April 15 to May 31. In the Culiacan area, in west Mexico, planting is done from October through February.

The winter weather, soil and water resources are all quite favorable for fresh vegetable production in certain areas of

Mexico and are adequate for further expansion of production.

The principal vegetable growing area around Culiacan is abundantly supplied with cheap labor. This is part of the difference in costs of material and labor because Florida labor is relatively scarce in the vegetable industry. Also, it is a much greater risk in Florida where temperatures in the winter season occasionally drop below freezing.

Many factors effect the location of production of fresh winter produce. The most important ones are climate, supply of hand labor, supply and quality of soil, water, and managerial resources. Also, location of packing facilities and marketing firms influence production decisions. Since climatic conditions are more favorable, the domestic production of cucumbers in the winter months is concentrated in the southern part of Florida.

Since natural conditions play such an important role in winter vegetable production, the west coast area of Mexico has quite an advantage. Mexico enjoys much better production weather than Florida within the west coast area. Favorable weather is responsible for the centering of the major production area around Culiacan. In Culiacan, planting is done from October to February and harvest occurs from December to April.

The principal area producing winter vegetables in Mexico is on the irrigated coastal plain near Culiacan in the state of Sinaloa. This area is frost free throughout the year.

The Culiacan area has good soil, adequate water, irrigation facilities, and also an adequate supply of seasonal labor

at low wages.

STATEMENT OF PROBLEM

The Florida farmer has enjoyed a large market for his cucumber in years past. However, as increases in supply have become apparent from importing countries, there appears a need to determine the relevant effect on prices.

Because of the economic contribution of the vegetable industry to Florida's economy, the industry is of great interest to many agriculturalists and state officials.

The objective of this paper will be to try and determine the effect on prices received by the Florida cucumber grower by the increased supply created by the growing imports from Mexico.

REVIEW OF LITERATURE

The literature on trade with Mexico dealing with winter vegetable crops seems to be quite abundant.

Calculations from Fliginger[3] indicate that imports of winter vegetables from Mexico into the U.S. have increased sharply since the 1950's. Dickinson[4] concluded that the entire range of winter fruits and vegetables in the U.S. in the future will be faced with increasing competition from Mexico. A 1968 study[5] demonstrates clearly how the winter vegetable export industry of northwest Mexico is expanding as a result of its access to U.S. markets.

In a dissertation by Teunis De Boon in 1974, much research was done concerning price change as a result of imports and changes in trade policy.

As the influences of the Mexican winter vegetable imports increase more literature is becoming easily available. All the data in this paper was found in Hume Library of University of Florida.

MODEL DEVELOPMENT

The objective of this paper is to determine the impact on prices as a result of increased imports from Mexico. I intend to make the price of cucumbers a function of the supply from Mexico, quantity produced in Florida, quantity produced in rest of U.S., and personal income. Data will be taken from the years, 1971-72, 1972-73, 1973-74, 1974-75 and 1975-76. Only the months from October to May will be considered because these are the primary winter producing months for cucumbers.

The supply variables are used in the model because I expect as supply increases price will fall. This should indicate that as imports from Mexico rise prices received by the Florida farmer should fall.

Personal income is included to keep in trend with the increased incomes received by the population. It is expected that as personal income goes up prices will follow because as farmers, packers, and in between people pay higher wages they will in turn try to pass it on to the consumer in the form of

higher prices.

A lag variable will be introduced to see if last years prices have any effect on this years prices. The way it might effect this years prices is this; because of high prices last years farmers will increase production to realize higher profit, but as a result of increased supply prices should fall. The lag variable is added by including it in the load statement and including it in the program.

PRICE EQUATION

Pc = a - QM - QFL - QUS - PC(-1) + PI where:

Pc	=	Price of cucumbers
a	=	Constant intercept
QM	=	Quantity from Mexico
QFL	=	Quantity from Florida
QUS	=	Quantity from rest of U.S.
PC(-1)	=	Price of cucumbers from previous year
PI	=	Personal income

The price of cucumbers, quantity from Florida, and the lag price were all taken from the Vegetable Summary 1976 put out by the Florida Crop and Livestock Reporting Service.

The quantity from Mexico and rest of U.S. was obtained from Dr. Brian Wall, an economics professor at the University of Florida.

Personal income was obtained from Survey of Current Business.

To determine the co-efficients of these variables the computer will be used and will be programmed for a method of linear regression called ordinary least squares. This method of linear regression minimizes the error between the actual data and the estimated data. This is done by minimizing the sum of squares of the distance between the observation and the estimates. Minimizing the sum of squared errors is equivalent to minimizing the sum of the absolute values of the error terms.

EMPIRICAL MODEL

The model used in this section will reflect the same understanding as in the section on Model Development and Price Equation.

A regression was run on the price of cucumbers given the data and variables on the following page. The data contains thirty-six samples for each variable.

The model equation is:

$$Pc = a - QM - QFL - QUS - PC(-1) + PI.$$

The results show co-efficients as follows:

Variable	Co-efficient	Standard Error
QM	-.45164E-06*	
QFL	-.26909E-02	
QUS	-.11131E-04	
PI	.18063E-02	
PC(-1)	.39812	
a	2.775	

This allows prediction of the price of cucumbers if the

*.01E-03 = .01 x $\frac{1}{10^3}$ = .00001

DATA

Year	Month	QM[a]	QFL[b]	QUS[c]	PI[d]	Pc[e]
1971	Nov.	15,220	756	45.434	880.3	3.6
	Dec.	75.239	498	7.514	891.3	3.4
1972	Jan.	188.378	31	6.816	902.4	3.8
	March	153.778	42	6.815	920.1	6.95
	April	72.520	548	30.406	927.0	5.9
	May	240.902	1,259	73.918	931.7	3.8
	Oct.	0.0	354	143.562	971.7	2.8
	Nov.	4.517	867	54.037	984.1	2.6
	Dec.	150.337	408	14.356	992.0	3.0
1973	Jan.	152.961	90	6.130	999.6	6.6
	March	174.736	35	15.647	1,022.4	6.4
	April	69.603	454	10.485	1,030.7	5.0
	May	7.301	1,259	46.295	1,038.3	3.75
	Oct.	0.0	169	115.979	1,090.0	5.3
	Nov.	7.581	664	57.264	1,099.1	3.35
	Dec.	148.164	327	8.065	1,107.1	5.4
1974	Jan.	190.502	35	4.355	1,109.8	5.3
	Feb.	171.629	13	7.581	1,116.1	6.65
	March	168.242	163	13.388	1,121.0	6.65
	April	62.587	521	9.840	1,128.3	7.45
	May	9.678	1,023	61.308	1,137.0	4.25
	Oct.	0.0	444	107.107	1,191.9	4.55
	Nov.	4.517	852	75.652	1,192.1	3.2
	Dec.	54.844	425	13.550	1,200.4	6.45
1975	Jan.	118.882	110	4.033	1,191.1	6.5
	Feb.	131.084	19	7.259	1,193.4	9.55
	March	85.331	217	8.388	1,195.7	8.5
	April	59.844	827	8.227	1,203.1	5.3
	May	18.227	1,023	62.587	1,214.3	3.25
	Oct.	1.129	465	130.819	1,290.8	2.85
	Nov.	27.099	681	75.652	1,300.2	4.4
	Dec.	135.819	367	7.420	1,308.2	6.3
1976	Jan.	226.473	150	7.581	1,320.8	6.6
	March	115.598	381	8.388	1,341.90	6.25
	April	63.554	1,152	10.324	1,352.4	3.2
	May	7.743	1,206	70.329	1,362.9	2.6

[a] QM = 1,000 Bushels

[b] QFL = 1,000 Bushels

[c] QUS = 1,000 Bushels

[d] PI = Billions of dollars

values for the variables are known.

Pc = 2.775 - .45164E-06QM - .26909E-02QFL - .11131E-04QUS
+ .18063E-02PI + .39812PC(-1)

This seems to hold up the assumption in the model development that quantity has an inverse effect on price. As quantity increases prices fall. Further, in the model for each unit of increased export from Mexico there is a .00000045164 decrease in unit price of cucumbers.

However these results seem to indicate that last years price has a positive effect on this years price. This then leans more toward a trend of increasing prices rather than a price structure that's cyclical in nature.

Also in these results personal income has a positive effect on prices as expected. As people receive higher wages suppliers are generally forced to increase price.

The error terms, which is a statistical method of determining the error in the regression, is .6915. The term would be 1.0 if there were no errors. The prediction of this model is not as accurate as it could be because of all the things that effect price. It would not be feasible to include even near the majority of things that effect price. The purpose here is to derive a simple model that could give reasonable results.

PRICE FLEXIBILITIES[1]

Price flexibility is often treated as the inverse of price elasticity. The flexibility co-efficent gives the percen-

tage change in price associated with a one percent change in quantity, other factors constant.

The price flexibility co-efficent (Fi) is defined as:

$$Fi = \frac{\frac{\Delta P}{P}}{\frac{\Delta Q}{Q}} = (\frac{\Delta P}{\Delta Q})(\frac{Q}{P})$$

or

$$\frac{\partial P}{\partial Q} \quad \frac{\bar{Q}}{\bar{P}} = Fi$$

Under some conditions it is approximately equal to the reciprocal of the corresponding price elasticity, and like the price elasticity of demand, the direct price flexibility co-efficient has a negative sign. A price flexibility of -4.0 means that there is a 4 percent price response to a one percent quantity change.

In our situation we have:

$$P = a - QM - QFL - QUS + PI + P(-1)$$

We can lump all quantities together and have:

$$P = a - Q + PI + P(-1)$$

with the co-efficients we have:

$$P = 2.775 - .00270248164Q + .0018063PI + .39812P(-1)$$

$$\frac{\partial P}{\partial Q} = -.00270248164$$

$$\bar{P} = 5.0403$$

$$\bar{Q} = 619.046$$

therefore, $Fi = \frac{\partial P}{\partial Q} \frac{\bar{Q}}{\bar{P}}$

$$Fi = (.00270248164)(\frac{619.046}{5.0403})$$

$$= .33197684$$

This means there is a .33197684 percent change in price for every one percent change in thousands of bushels supplied.

This is a small change but does reflect the supply and demand law of increased supply implies decrease prices.

CONCLUSION

In the paper there was no mention of the demand for cucumbers. It was assumed to be held constant although in fact it probably increases because of the trend of population which is upward.

The empirircal data and computer results indicate that the Florida farmer receives less for his production because of expanded Mexican production. With the frost free winter, many Mexican products hit the U.S. market before Florida produce. They then receive the higher early prices.

However this doesn't seem to hurt the Florida farmer critically because of the size of the U.S. demand. Florida could not possibly produce the entire needs of the winter vegetable market. With this in mind it's easy to see why free trade between the U.S. and Mexico is supplying the demand of America for winter vegetables.

COST COMPARISON

Cost of producing and marketing fresh winter cucumbers, Mexico, in the 1970-1971 season.

ITEM	U.S. DOLLARS	
Producing	Per Acre	Per Bushel
Labor	$ 39.78	
Equipment	70.74	
Materials	86.51	
Cash Overhead	54.62	
Non-cash overhead	26.88	
Total	$278.53	$1.21
Marketing		
Harvesting		$ .41
Packing and selling		.89
Mexican export to Nogales		2.26
Sales commission & promotion		.44
Shipping & selling		2.70
Total F.O.B.		$4.00
Total Producing and Marketing		$5.21

Source: 3

COST COMPARISON

Cost of producing and marketing fresh winter cucumbers, Florida in the 1970-1971 season.

ITEM	U.S. DOLLARS	
Producing	Per Acre	Per Bushel
Labor	$134.66	
Equipment	133.67	
Materials	104.13	
Cash Overhead	12.49	
Non-cash overhead	38.67	
Total	$423.62	$1.91
Marketing		
Harvesting		$1.50
Packing and selling		.56
Sales commission & promotion		.14
Shipping & selling		.16
Total F.O.B.		$2.36
Total Producing & Marketing		$4.27

Source: 6

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