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THE IMPACT OF EMPTY TRUCK BACKHAULS ON THE FLORIDA F.O.B. SHIPPING POINT PRICES OF FRESH FRUITS AND VEGETABLES

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Determining a potential dollar savings from reducing empty backhauls and the impact on shipping point prices. Empty backhaul miles per trip represents 3.5 percent of the average fronthaul mileage of Florida fresh fruit and vegetable truckers.

Introduction

Rising fuel and energy prices since 1973 have focused attention on the possible improvements that can be made in the technical efficiency of product distribution. The impact of rising energy prices on farm prices could be partially or totally offset by improved technical efficiency in food distribution. This could moderate or eliminate any effect on the interregional allocation of agricultural products and prices.

The fruit and vegetable sector is an important agricultural component influencing farm gate receipts among the principal winter fruit and vegetable producing states. The three principal winter fruit and vegetable producing states (Texas, California, and Florida) had cash receipts from farming attributed to fruits and vegetables in 1979 totalling 7.6 billion dollars, of which 3.2 billion dollars were contributed by vegetables and melons and 4.4 billion dollars came from fruits, including citrus, and nuts (Table 1).

Transportation costs are relatively high for fresh fruits and vegetables (FF&V), representing 10-25 percent of the retail price for selected produce in 1979 [7]. Costs of operating refrigerated trucks for hauling fresh produce increased 55.3 percent between June 1976 and January 1980, with over half of it after January 1, 1979 [8]. Fuel prices were the leading factor in increasing truck costs during 1979 as fuel accounted for 20.5 percent of the total cost per mile in January 1979 and had risen to 29 percent by January 1980 [8] and accounted for approximately 53 percent of the total direct variable costs of operating a refrigerated truck [1]. Diesel fuel prices paid by independent truckers increased by 114 percent between June 1976 and February 1980, with about two-thirds of that increase occurring after January 1, 1979 [8]. Rates paid for shipping

TABLE 1. CASH RECEPITS FROM FRUITS AND VEGETABLES, TEXAS, CALIFORNIA, AND FLORIDA, 1979

State	Cash Receipts From Farming, 1979		
	Vegetables & Melons	Fruits, Citrus & Nuts	Total Fruits & Vegetables
	1,000 dollars		
Texas	283,266	89,290	372,556
California	2,170,000	2,880,000	5,050,000
Florida	782,314	1,412,050	2,194,364
TOTAL	3,235,580	4,381,340	7,616,920

fresh fruits and vegetables increased by only 10 to 15 percent during 1979 [8].

Trucks dominate the fresh fruit and vegetable sector in Florida and throughout the South. In 1979, only one percent of the perishable traffic from Florida was by rail, whereas truck transportation accounted for 98.67 percent of the Florida fruit and vegetable shipments [6]. Although no exact figures exist, it is estimated that 30-50 percent of the trucks hauling Florida FF&V experience empty backhauls. One possible method of improving the technical efficiency of food distribution is to decrease the empty truck backhauls. This in turn will have an effect on the shipping point F.O.B. prices [3].

Objectives

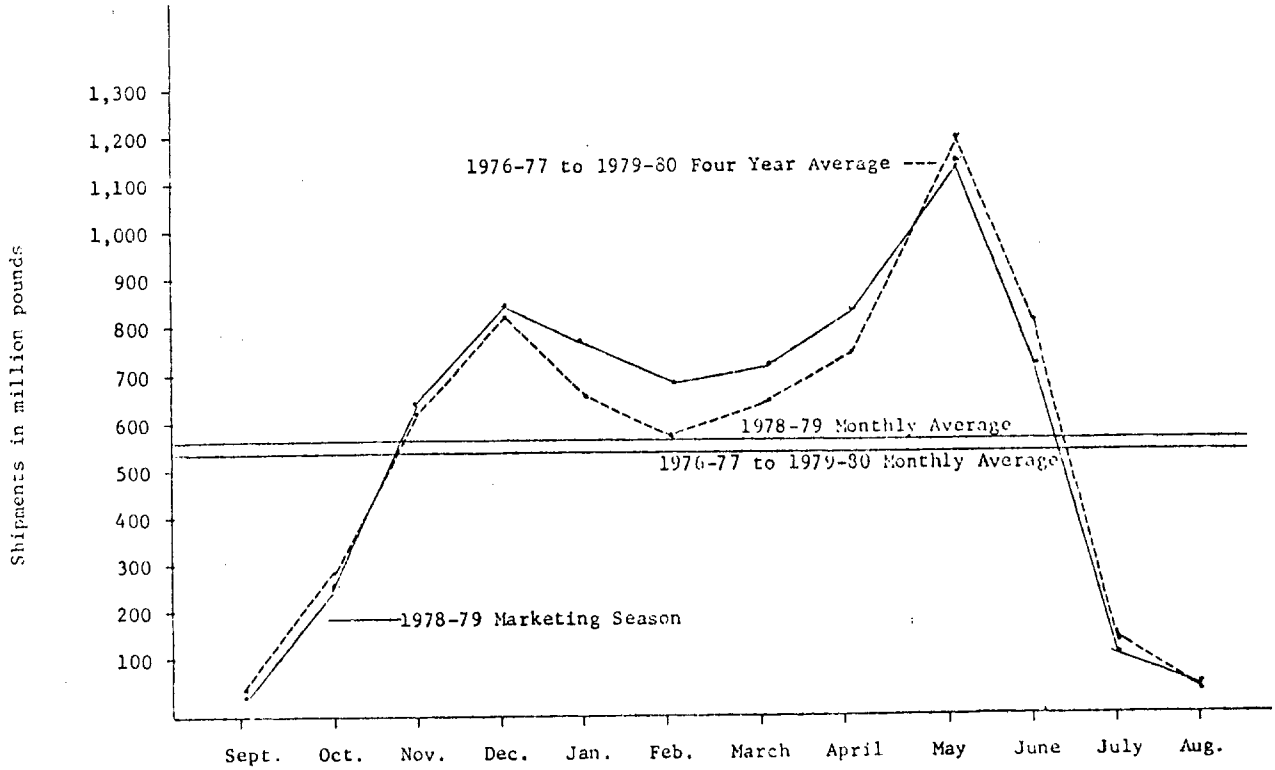
The objective of this study is to determine the impact of empty backhauls on the shipping point F.O.B. prices of Florida fresh fruits and vegetables. In order to determine the impact of empty backhauls on shipping point F.O.B. prices of Florida FF&V, the magnitude of empty backhaul miles for all trucks during an average month in the transportation of Florida FF&V must be determined. However, it is first necessary to determine the extent of empty backhaul miles per truck that is presently realized by trucks hauling Florida fresh fruits and vegetables as no secondary data exists on the amount of empty backhaul mileage for refrigerated trucks hauling Florida FF&V.

Methodology

A survey was conducted at the eastbound and southbound Florida Agricultural Inspection Stations on I-10, I-75 and I-95 so as to be assured of getting those truckers returning to Florida after hauling a load of FF&V out of Florida. These stations accounted for approximately 81 percent of the total fresh citrus traffic passing all stations (16 total stations) during the 1978-79 marketing season and 83 percent during April 1979 [5].

Sampling was performed in April 1979 in order to distribute the questionnaire before the peak and slack months for Florida FF&V shipments and April is a representative month for those months with volumes greater than the average (Figure 1). It was assumed that April was an average month for manufactured product flows into Florida which could be used as backhauls.

FIGURE 1. MONTHLY FLORIDA FRESH FRUIT AND VEGETABLE SHIPMENTS, 1976-77 TO 1979-80



Source: [Federal-State Market News Service, various issues].

The sample obtained (55 returned questionnaires of which 48 were usable) was small compared to the total number of Florida FF&V truckloads (17,373) going interstate during April of 1979 to domestic destinations east of the Mississippi (not including Miami) plus Toronto and Montreal, Canada. While the sample is small, we can address the question of its credibility.

In 1978-79, 85.2 percent of the Florida fresh fruit and vegetable unloads were taken to destimations east of the Mississippi River (including Miami) plus Toronto and Montreal, Canada. In April of 1979, 85.98 percent of the unloads were east of the Mississippi River (including Miami) plus Toronto and Montreal, Canada. Thus, the results of this sample are representative of truckers hauling Florida FF&V east of the Mississippi River where most of Florida's FF&V are consumed.

The percentage distribution of questionnaires and unloads among states was determined. It was found via distribution free tests for central tendency and dispersion that the percentage distributions of questionnaires and unloads among the state are not significantly different at the 99 percent confidence level. This indicates taht even though the fronthaul destination of truckers hauling Florida FF&V was not controlled when the questionnaires were distributed, the percentage destination of the questionnaires and unloads is not statistically different. Thus, the information contained in the sample appears representative of the geographical distribution

of the destinations to which truckers hauled Florida FF&V in April of 1979.

The sample mean is used to make projections to the population. The precision of the sample mean of empty backhaul miles per truck when used to estimate the population mean is computed as follows. Given the sample characteristics of (1) sample size ($n = 48$), (2) sample Mean ($\bar{Y} = 364.9$ miles), (3) the standard deviation of the sample ($\hat{S} = 353.3$), and (4) the size of the population ($N = 17,373$), there is a 95 percent probability that the population average empty backhaul mileage per truck hauling Florida FF&V during April 1979 lies between 263.1 miles and 466.7 miles. Thus, we are 95 percent confident that the sample mean is at most 27.9 percent larger (smaller) than the population mean.

Results

The total empty backhaul mileage (EBM) for all Florida FF&V truckers that hauled produce during April of 1979 will now be estimated. In estimating the population average, N (the number of truckloads of Florida FF&V during April 1979) is equal to 17,373 trucks, $\bar{Y}$ (the average number of empty backhaul miles per truck is 364.9 miles), S (standard deviation of $\bar{Y}$) is 353.3 miles, and n (the number of trucks in the April 1979 sample) is 48. The total empty backhaul mileage for Florida truckers during April 1979 is determined as follows:

$$(1) \quad EBM = N\,\bar{Y}$$

$$= (17,373) \quad (364.9)$$

$$= 6,339,407.7 \text{ miles}$$

Given that the 6,339,407.7 miles is a sample estimate, we are 95 percent confident that the actual number of empty backhaul mileage lies between 4,507,004 and 8,108,812 miles for an error of estimation of 28 percent. The empty backhaul mileage represents 35.3 percent of the total fronthaul mileage for April 1979. Calculated from the average fronthaul mileage per truck of 1,033 miles from the survey.

The potential transportation cost decrease as a result of reducing empty backhaul miles to zero is 6,339,408 dollars.[1] The likelihood that empty backhaul mileage could be reduced to zero is improbable, and possible economically inefficient; however, with deregulation and more information on the location of backhauls, empty backhaul mileage can be reduced.

The price incidence on producer prices from a change in the marketing margin caused by a decrease in empty backhaul cost can be summarized in the following equation [3, p. 261]:

$$(2) \quad I_p = \frac{1}{1 + e_p/\alpha n}$$

where I_p = the proportion of the marketing cost change borne by the shipper

e_p = the price elasticity of shipper supply

$\alpha = P_p/P_r$

P_p = shipper price

P_r = consumer (retail) price

n = the price elasticity of consumer demand

Assuming that the price elasticity of supply is zero (inelastic supply of fruits and vegetables in the market), then the proportion of price incidence from a decrease in empty backhaul mileage on shippers is 1 (one). This means that if there were adjustments in the market place correcting for technical inefficiencies by decreasing empty backhaul cost, shipper prices would increase while consumer (retail level)

prices would remain unchanged.

The estimated retail value of Florida FF&V in April 1979 amounted to 398.1 million dollars [calculated from 2, 4, 9]. Transportation charges for FF&V are relatively high, representing 10 to 25 percent of the total retail value [7]. If an average of 17.5 percent is used, then April 1979 transportation charges for FF&V total approximately 68,092,500 dollars. The estimated empty backhaul cost (6,339, 408 dollars) is 1.63 percent of the retail value and 9.3 percent of the total transportation charges for Florida FF&V for April 1979.

The potential savings of 364.9 dollars per truck[2,3] from eliminating a technical efficiency attributed to empty backhaul miles should therefore be realized in its entirity by the shipper in terms of higher shipper prices, given the inelastic supply of fresh fruits and vegetables at the market.

Summary and Implications

The purpose of this article was to determine a potential dollar savings from reducing empty backhauls in the transportation of Florida FF&V and that impact on shipping point F.O.B. prices of Florida FF&V. Empty backhaul miles per trip represents 35 percent of the average fronthaul mileage of Florida fresh fruit and vegetable truckers. This represents 9.3 percent ($6,339,408) of the average monthly FF&V transportation bill, or $365 per truck trip. A reduction of empty backhaul miles to zero is virtually impossible to to imperfect knowledge of backhauls, the cost of finding backhauls, and the opportunity cost of using specialized equipment to haul general freight. However, reducing the empty backhaul mileage to zero could potentially increase shipper prices $365 per truck, or 0.9 cents per pound of FF&V shipped. This assumes an inelastic supply of FF&V at the market and a price elasticity of supply equal to zero.

FOOTNOTES

[1](17,373 trucks)*(364.9 average empty backhaul miles/truck)*($1.00/mile cost [1, p. 10]) = $6,339,408 total cost of empty backhaul miles for Florida FF&V, April 1979.

[2](264.9 average backhaul miles/truck)*($1.00/mile cost [1, p. 10]) = $364.90 average cost of empty backhaul miles/truck.

[3]The potential savings of $364.90/truck equates to 0.92¢/pound of shipment [($364.90/39,479.6 pounds/truck. Calculated from 2].

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