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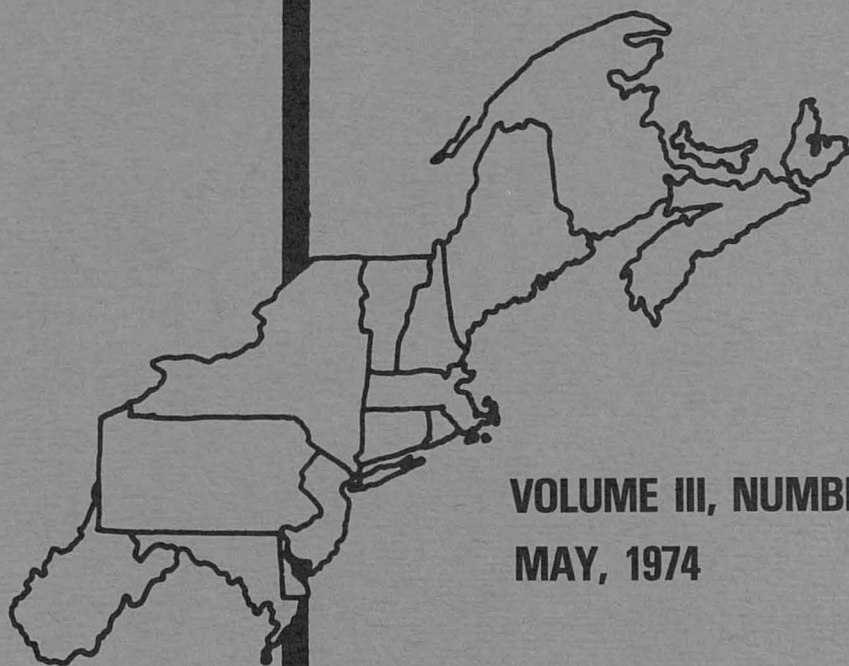
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DEMAND ANALYSES OF SELECTED POTATO PRODUCTS

Neil H. Pelsue, Jr.
Assistant Professor
Department of Agricultural & Resource Economics
University of Maine

Introduction

During the past decade about 90 percent of the potatoes utilized for human consumption was used in the form of tablestock or fresh potatoes, frozen potato products, and potato chips and shoestring potatoes. [6] Recent trends in the national per capita consumption of these potato products (Table 1) indicate that consumers have substituted processed potato products for fresh potatoes. In addition, the variety of package sizes for potato products, especially the processed products, has increased during this same ten year period.

Table 1
Potatoes: Per Capita Consumption 1961, 1966, 1971

Year	Processed Products				Total	Fresh	Total
	Frozen	Chips and Shoestrings	Dehydrated	Canned			
	----- Pounds-----						
1961	6.8	12.3	5.1	.6	24.8	84.5	109.3
1966	17.3	16.7	10.3	.6	44.9	72.4	117.3
1971	30.3	17.3	13.0	.7	61.3	57.9	119.2

Source: 1972 Handbook of Agricultural Charts. [6]

This study focused on the nature and extent of the economic impact that several of these potato products had upon each other. Specifically, the objectives of this study were to:

1. Determine the economic relationships between various package sizes and brands within general product categories,
2. Determine the economic relationships between general product categories, and

3. Determine the impact of independent pricing decisions upon potato utilization.

To fulfill the objectives of this study, a potato product was selected to represent each of the three major product groups. The three products selected were tablestock potatoes, frozen french fries, and potato chips. The conceptual model included instant mashed potatoes, but insufficient data precluded its inclusion in the empirical analysis. Various product groups within each of the major product categories were also used in the analysis.

Earlier attempts to measure the demand for potatoes identified the demand relationships as related to seasonal, varietal, or food - non food characteristics. Hee's analysis was concerned with national demand relationships for selected seasonal potato crops and included demand analyses for general utilization categories, e.g., human feed, livestock feed, starch, and storage. [4] Zusman restricted his analysis to factors influencing the market for the California long white potato and its impact upon the economy. [9] Both Brandow and Shuffet included the potato in their more general analyses of demand for selected agricultural commodities. [2,7] None of these studies appeared to have been concerned with the relationships between various types and packages of potato products, which is one of the objectives of this study.

Simmons, in his analysis of the United States potato industry in 1962, observed that existing trends suggest that by 1970, "more than half the potatoes used for food will be processed." [8, p.29] Published statistics show this observation to be almost on target. [1] An analysis of the interrelationship between tablestock and processed potato products should provide information to determine the effect that continuance of this trend would have upon potato utilization.

Procedure

Quite typically demand analyses have been based on the textbook presentation of demand.

$$(1) \quad Q_A = f(P_A, P_S, P_C, I, N, T, \dots)$$

where, Q_A = quantity demanded of product A,

P_A = price of A,

P_S = price(s) of substitute product(s),

P_C = price(s) of complementary product(s),

I = income,

N = population, and

T = tastes and preferences.

The variable on the right hand side of the equal sign may be determined appropriate for inclusion in the model according to the time span of the study. For a long-run analysis of demand, all of these variables, and perhaps others, may be included. For a short run study of demand, only the price variables might be included. An underlying reason for the reduced number of variables in the short run analysis is that the variables income, population, and tastes and preferences may be assumed constant during relatively short time periods, e.g., twelve months or less.

The products generally selected as substitutes are most frequently products derived from other commodities, e.g., meat influencing the consumption of tablestock potatoes. However, with the proliferation of new products from the same basic raw product it may also be useful to estimate the relationships between products within the same commodity group, e.g., french fries influencing consumption of potato chips. To the extent that a new potato product utilizes additional potatoes, this represents increased returns to growers. If, however, a new potato product is sold at the expense of an already existing product, there may or may not be an increase in returns to growers. The net effect upon producer returns depends upon a number of factors including the relative prices and fresh weight equivalents of the products.

Carrying this reasoning a step further, the variety of package sizes and brands of a particular product that a store carries may also influence sales and returns. In one case, increased selection of a product may increase the probability that a consumer will buy that product. For example, witness the concentration of gasoline stations in certain locations along the highway. On the other hand, within the selection offered there quite likely are some products which sell in greater volumes than others. The important point is whether the high volume sellers in terms of quantity are also the high volume sellers in terms of dollars.

Deviating somewhat from traditional modeling procedures, both substitute price and quantity variables were included as independent variables. The product-substitute price relationship is well known. However, the quantity of the substitute product may have as great an effect as its price upon purchases of the dependent quantity variable.* It can be reasoned that the relationship between the two quantity variables may be either inverse or direct.

In an attempt to determine the impact of these various 'within product' factors upon returns to potato growers, several models were developed. All of the models were analyzed using multiple linear regression. The Statistical Package for the Social Sciences (SPSS) program was used to perform the computations. [5]

* One reviewer pointed out the danger of inducing multicollinearity problems. The author recognized this and accepted the risk in an attempt to determine the modeled relationships.

Varietal Relationships

The first model was designed to determine the magnitude and extent of the relationship between round white and long russet tablestock potatoes. Dummy variables were included to indicate any seasonal influence. The mathematical model was of the following form:

$$(2) \quad QRW = b_0 + b_1 PRW + b_2 QR + b_3 PR + b_4 DV2 + b_5 DV3 + b_6 DV4$$

where, QRW = pounds of round white tablestock potatoes,
 PRW = price per pound of round white tablestock potatoes,
 QR = pounds of long russet tablestock potatoes,
 PR = price per pound of long russet tablestock potatoes, and
 DV2, DV3, DV4 = dummy variables for second, third, and fourth quarter
 (calendar year) observations, respectively.

The sign of the coefficient for the own price variable was expected to be negative, while that for the russet price variable was expected to be positive. No a priori assumptions were made for the independent quantity variable or for the dummy variables.

Package Size Relationships

The second set of analyses was concerned with estimating the relationships between selected sizes of packages within each of the three general product categories. Individual analyses were made for each product category. The last letter in each of the price and quantity variable names indicates the product group, i.e., T for tablestock, F for frozen french fries, and C for potato chips. The models for tablestock potatoes and potato chips included three package sizes - small, medium, and large - while that for french fries included only small and large package sizes. The package sizes are described in Table 2 in the next section. The mathematical model for tablestock potatoes is as follows:

$$(3) \quad QSMLT = b_0 + b_1 PSMLT + b_2 QMEDT + b_3 PMEDT + b_4 QLRGT \\ + b_5 PLRGT + b_6 DV2 + b_7 DV3 + b_8 DV4$$

where, QSMLT = pounds of potatoes in small package sizes,
 PSMLT = price per pound of potatoes in small package sizes,
 QMEDT = pounds of potatoes in medium package sizes,
 PMEDT = price per pound of potatoes in medium package sizes,
 QLRGT = pounds of potatoes in large package sizes,
 PLRGT = price per pound of potatoes in large package sizes, and
 DV2, DV3, DV4 = as described for equation (2).

The equations for the french fry and potato chip analyses, the variable descriptions being similar to (3), are shown below.

French Fries (F):

$$(4) \quad QSMLF = b_0 + b_1 PSMLF + b_4 QLRGF + b_5 PLRGF + b_6 DV2 + b_7 DV3 \\ + b_8 DV4$$

Potato Chips (C):

$$(5) \quad \text{QSMLC} = b_0 + b_1 \text{PSMLC} + b_2 \text{QMEDC} + b_3 \text{PMEDC} + b_4 \text{QLRGC} \\ + b_5 \text{PLRGC} + b_6 \text{DV2} + b_7 \text{DV3} + b_8 \text{DV4}$$

Following traditional theory the quantity-own price relationships were expected to be inverse, while the quantity-cross price relationships were expected to be direct. No a priori assumptions were made for the quantity - quantity relationships or for the dummy variables.

Product Brand Relationships

The final analyses made for the within product relationships were concerned with the impact of prices and quantities of non-store brand products upon the quantity of the same products sold under the store brand. These analyses were made only for frozen french fries and potato chips, as the stores selected for this study did not sell tablestock potatoes under their own brand label. The mathematical model for the french fry analysis is as follows:

$$(6) \quad \text{QSF} = b_0 + b_1 \text{PSF} + b_2 \text{QNF} + b_3 \text{PNF} + b_4 \text{DV2} + b_5 \text{DV3} + b_6 \text{DV4}$$

where, QSF = pounds of store-brand french fries,
PSF = price per pound of store-brand french fries,
QNF = pounds of nonstore-brand french fries,
PNF = price per pound of nonstore-brand french fries, and
DV2, DV3, DV4 = as described for equation (2).

Again the last letter in the price and quantity variable names is used to identify the product category. The corresponding equation for the potato chip (C) analyses is as follows:

$$(7) \quad \text{QSC} = b_0 + b_1 \text{PSC} + b_2 \text{QNC} + b_3 \text{PNC} + b_4 \text{DV2} + b_5 \text{DV3} + b_6 \text{DV4}$$

The own price and cross price relationships were expected to be inverse and direct, respectively. No a priori assumptions were made for the quantity or dummy variables.

General Product Relationships

The second objective of this study was to determine the effect that the prices of the three general potato product categories had upon the quantities of each of the product categories. An additional variable, the price of ground beef, was included to represent a non-potato food substitute. The letters T, F, and C were again used to identify the three potato products, tablestock, frozen french fries, and potato chips, respectively. The mathematical model for the tablestock potato analysis is as follows:

$$(8) \quad QT = b_0 + b_1 PT + b_2 PF + b_3 PC + b_4 PB + b_5 DV2 + b_6 DV3 + b_7 DV4$$

where, QT = pounds of tablestock potatoes,
 PT = price per pound of tablestock potatoes,
 PF = price per pound of frozen french fries,
 PC = price per pound of potato chips
 PB = price per pound of ground beef, and
 DV2, DV3, DV4 = as described for equation (2).

The corresponding equations for frozen french fry and potato chips analyses are:

$$(9) \quad QF = b_0 + b_1 PF + b_2 PT + b_3 PC + b_4 PB + b_5 DV2 + b_6 DV3 + b_7 DV4$$

$$(10) \quad QC = b_0 + b_1 PC + b_2 PT + b_3 PF + b_4 PB + b_5 DV2 + b_6 DV3 + b_7 DV4$$

The regression coefficient for the own price variable, b_1 , was expected to be negative. The regression coefficients for the cross price variables, b_2 , b_3 , and b_4 , were expected to be positive, based on the assumption that each of these products was a substitute for the others.

One-and two-tailed t-tests, depending upon the expected relationships between the dependent and independent variables, were used to determine the statistical significance of the regression coefficients, i.e., their relationship to zero, at the 95 percent level of probability. A single asterisk (*) denotes significance using the one-tailed test and a double asterisk (**) denotes significance using the two-tailed test. The double crossed slashes (#) indicate statistical significance at F (.95; k, n-k-1) for the entire equation. Standard errors of the coefficients are denoted by the parentheses.

Data Characteristics

Price and quantity data used in this study were obtained from five grocery stores serving the Central Maine area. Gross sales for these five stores were slightly more than \$13 million in 1971. Both weekly price and quantity data for 1971 were initially collected for four potato product categories: tablestock, frozen french fries, potato chips, and instant mashed. Analyses of the instant mashed potato category were eliminated due to substantial gaps in the data. The data were obtained from weekly store invoices and adjustments were made for damaged and returned merchandise in an effort to accurately reflect the quantities actually sold to consumers. The observations were later adjusted to form bi-weekly observations as several of the products were purchased at two week intervals. In addition bi-weekly price data were obtained for ground beef.

Table 2 contains an identification of the product classifications within each of the general product categories. The quantity data were converted to pounds for all products and all prices expressed in cents per pound. Where products were combined to form the various product group variables the weighted average prices were computed.

Table 2
Product Classifications

<u>Tablestock</u>	<u>French Fries</u>	<u>Potato Chips</u>
Round White	9-20 oz. pkgs. (small)	3/4-3 oz. pkgs. (small)
Long Russets	2-5 lb. pkgs. (large)	6-14 oz. pkgs. (medium)
5 and 10 lb. bags (small)	Store brand	18 oz. pkgs. (large)
15 and 20 lb. bags (medium)	Nonstore brand	Store brand 13-14 oz. pkgs.
50 lb. bags (large)		Nonstore brand 13-14 oz. pkgs.
All potatoes	All french fries	All potato chips

Discussion of Results

Variety

In Maine, as in the Northeast, the principal potato varieties sold as tablestock are the round white and long russet varieties. The long russet potato is well known as a baking potato, although both the long russet and many round white varieties may be prepared in several ways. Generally, in tablestock form, the long russet potato is thought of as a substitute for round white potatoes. Accordingly, an analysis was made to determine the relationship between the price and quantity of long russets and the quantity of round white potatoes sold. The following equation shows the relationships obtained.

$$\begin{aligned}
 (2') \quad QRW = & -37596 + 7.387 QR^{**} + 3210.230 PR - 5309 DV2 - 5076 DV3 \\
 & (1.909) \quad (2937.115) \quad (10503) \quad (14851) \\
 & + 26177 DV4^{**} \\
 & (10650)
 \end{aligned}
 \quad R^2 = .50\#$$

Equation (2') suggest that as the quantity of russets offered for sale increases so too does the quantity of round white potatoes. The fourth quarter dummy variable was the only other variable having a statistically significant coefficient. The coefficient of the fourth quarter dummy variable being positive suggests that the demand curve for round white potatoes shifts to the right during that period. This is not a surprising

result since fall harvest had just been completed, and these potatoes are generally of a highly desirable quality, one which may diminish as the potatoes are stored over longer periods of time. Although the coefficient for the russet price variable was not statistically significant, the sign was positive as hypothesized. The F-level for the round white price variable was insufficient to permit its inclusion in the equation.

Package Size

As pointed out earlier, potato products are sold in a variety of package sizes. An effort was made to determine selected relationships between the various package sizes. In each product category the small package size group was the dependent variable. Following are the resulting equations.

Tablestock (T):

$$\begin{aligned} (3') \quad QSMIT &= -52484 - 1368.266 \text{ PSMLT} + 1.831 \text{ QMEDT}^{**} + 8858.538 \text{ PMEDT} \\ &\quad (7509.156) \quad (0.774) \quad (7439.285) \\ &\quad -8.038 \text{ QLRGT} + 1827.423 \text{ PLRGT} - 2672 \text{ DV2} + 5902 \text{ DV3} \\ &\quad (13.174) \quad (3247.510) \quad (13180) \quad (22213) \\ &\quad +22956 \text{ DV4} \\ &\quad (12751) \quad R^2 = .34 \end{aligned}$$

French Fries (F):

$$\begin{aligned} (4') \quad QSMLF &= 2912 - 43.646 \text{ PSMLF} - 0.081 \text{ QLRGF} + 20.856 \text{ PLRGF} \\ &\quad (43.336) \quad (0.134) \quad (98.653) \\ &\quad -259 \text{ DV2} - 676 \text{ DV3}^{**} - 475 \text{ DV4} \\ &\quad (307) \quad (312) \quad (374) \quad R^2 = .40 \end{aligned}$$

Potato Chips (C):

$$\begin{aligned} (5') \quad QSMLC &= 65 + 0.378 \text{ PSMLC} + 0.025 \text{ QMEDC}^{**} - 0.945 \text{ PMEDC} \\ &\quad (1.920) \quad (0.012) \quad (1.192) \\ &\quad -0.005 \text{ QLRGC} + 0.203 \text{ PLRGC} + 16 \text{ DV2} + 16 \text{ DV3} + 5 \text{ DV4} \\ &\quad (0.007) \quad (0.335) \quad (11) \quad (15) \quad (20) \\ &\quad R^2 = .72\# \end{aligned}$$

The package sizes were classified as small, medium, and large for tablestock and potato chips, and small and large for frozen french fries. There appeared to be a strong association between the quantity of medium and small package sizes for both tablestock potatoes and potato chips. It appears that the availability of the medium package sizes had a definite positive effect on sales of the smaller package sizes. In no case did the price of any of the package sizes appear to have a significant effect upon sales.

The association between package sizes might very well be influenced by a seasonal supply pattern for tablestock potatoes, since all container size groups would tend to be more available when potatoes are in greatest supply. However, such would not be the case for potato chips or french fries since

both of these products are generally available in sufficient quantities throughout the year.

Product Brand

The final within product analyses were concerned with estimating the relationship between prices and quantities of store and nonstore brands of the same product. The resulting estimating equations for french fries and potato chips follow.

$$\begin{aligned} \text{French Fries (F):} \\ (6') \quad \text{QSF} = & 3339 - 75.390 \text{ PSF} - 0.053 \text{ QNF} - 313 \text{ DV2} - 446 \text{ DV3**} \\ & (46.257) \quad (0.048) \quad (192) \quad (197) \\ & -501 \text{ DV4**} \\ & (198) \quad R^2 = .46\# \end{aligned}$$

$$\begin{aligned} \text{Potato Chips (C):} \\ (7') \quad \text{QSC} = & -823 + 13.616 \text{ PSC} + 0.228 \text{ QNC} + 6.405 \text{ PNC} + 125 \text{ DV3} \\ & (5.427) \quad (0.172) \quad (7.411) \quad (256) \\ & +167 \text{ DV4} \\ & (307) \quad R^2 = .40\# \end{aligned}$$

Neither equation showed any significant association between the store and nonstore brands. Most of the variation in sales of store brand french fries was explained by seasonal variation in product sales. In equation (6') the own price variable had the correct sign, but was not statistically different from zero. In equation (7') the result was reversed. The F-level was insufficient to permit the nonstore brand price variable to enter into equation (6') and for the second quarter dummy variable in equation (7').

General Product

The second objective of the study was concerned with estimating the relative influence of changes in the price for each potato product group upon the quantities of each of the groups. The regression equations resulting from these analyses are the following.

$$\begin{aligned} \text{Tablestock (T):} \\ (8') \quad \text{QT} = & 804414 - 5984.520 \text{ PT} + 1157.664 \text{ PF} + 1389.896 \text{ PC*} \\ & (4904.071) \quad (1269.630) \quad (460.295) \\ & -11134.966 \text{ PB} + 14462 \text{ DV2} + 49027 \text{ DV3**} + 62246 \text{ DV4**} \\ & (10720.379) \quad (11540) \quad (20199) \quad (27412) \\ & R^2 = .63\# \end{aligned}$$

French Fries (F):

$$(9') \quad QF = 51449 - 267.502 PF^* + 154.852 PT - 538.719 PB - 819 DV2 \\ (51.142) \quad (238.460) \quad (384.839) \quad (559) \\ -826 DV3 + 138 DV4 \\ (985) \quad (1182) \quad R^2 = .73\#$$

Potato Chips (C):

$$(10') \quad QC = 59380 - 76.870 PC^* + 218.364 PT - 14.703 PF - 662.964 PB \\ (18.451) \quad (128.514) \quad (49.497) \quad (374.769) \\ +514 DV2 + 527 DV4 \\ (365) \quad (830) \quad R^2 = .71\#$$

With respect to the relative influence of any of the food products upon the demand for tablestock potatoes, only the coefficient for potato chips was statistically significant. However, both potato chips and french fries appeared to be substitutes for fresh potatoes as originally hypothesized. French fries have been relatively important as both a meal and snack food for some time. Potato chips may be being purchased as a meal-time food, in addition to their traditional role as a snack food. A substantial portion of the variation in tablestock sales was accounted for by the third and fourth quarter dummy variables, again pointing out the influence of the seasonality of supplies upon consumption. The sign of the tablestock price variable was negative, as hypothesized, but was not statistically significant.

The analyses for french fries and potato chips were considerably different than that for tablestock potatoes. In both instances the coefficient for the own price variable was the only statistically significant parameter. Neither the prices of other potato products nor the price of ground beef appeared to have any influence upon their sales. None of the coefficients for the seasonal dummy variables were significant, reflecting the absence of seasonality in the demand for both french fries and potato chips.

A surprising result was the finding that ground beef entered all three equations as a food complement rather than the hypothesized substitute. This might not have been so surprising had it occurred for just french fries and/or potato chips, as hamburg and french fries or potato chips are frequently served together. However, there are so many meal combinations with either tablestock potatoes or hamburg that this result does not appear reasonable for the tablestock analysis. The fact that the coefficient for ground beef was not statistically different from zero in any of the equations might raise suspicion about the complementarity of ground beef to potato products.

Implications For Potato Utilization

Potato utilization may be most affected by marketing strategies for the general product categories, i.e., tablestock, french fries, and potato chips. This is not to say that changes in pricing or packaging methods

within any of the general product categories are unimportant. However, the ultimate impact is upon the volume of sales in the general product category. This section focuses on marketing strategies for the general product categories and their impact upon potato utilization as suggested by the relationships in equations (8'), (9'), and (10').

The own price elasticities of demand, at the retail level, were calculated for each product group. The resulting price elasticities, computed at the means, were: tablestock -1.38, frozen french fries -1.71, and potato chips -2.07. The magnitude of the elasticities indicates that the retail demand for each of these product groups is relatively elastic. This suggests that these products may very well be substitutes for each other. Demand being relatively elastic, a decrease in price and the associated increase in quantity sold would result in increased total returns, at the retail level, as more potatoes are used in any individual product group.

The analysis, however, should not be stopped at this point because of the cross-price relationships. If individual price action is taken by each sector in the potato industry, the end result could be detrimental to growers, in terms of utilization of potatoes in individual product groups, and in total.

The procedure for determining the impact upon potato utilization resulting from independent pricing decisions was as follows. Equations (8'), (9'), and (10') were solved using the mean value for each of the independent variables. The results were then converted to the farm weight equivalent, using the conversion factors shown in Table 3. These values, the farm weight equivalents, were termed the benchmark utilization values.

Table 3
Potato Conversion Factors*

Product	Retail Product Weight	Pounds	Farm Weight Equivalent
	-----		-----
Tablestock	100.0		100
French Fries	40.0		100
Potato Chips	24.5		100

*Source for french fries and potato chips: Conversion Factors and Weights and Measures for Agricultural Commodities and Their Products. [3]

The next step involved decreasing the potato product price variables by ten percent. The price decreases were made first singly, then in pairs, and finally for all three potato price variables. All other variables were held constant at their mean values. The results of this analysis, as shown by

percentage change from the benchmark value, are presented in Table 4. It should be remembered that this study represents but a small portion of the total potato market and its results may be applicable to only the Central Maine area. The study does point out, in a controlled experiment sort of way, the potential effect that independent pricing decisions could have in the selected market and which may pertain to the entire potato industry. Even if the percentage changes for national utilization were somewhat less than those calculated in this study, the impact upon growers could still be substantial.

Table 4
Summary of Percentage Changes in Potato Utilization From
the Benchmark Utilization Resulting from a Ten Percent
Decrease in the Selected Potato Price Variables

Ten Percent Decrease in Price of:	Change in Utilization From Benchmark			
	Tablestock	French Fries	Potato Chips	All Potatoes
	- - - - - Percent - - - - -			
Tablestock (PT)	13.7	- 3.4	- 6.1	6.8
French Fries (PF)	- 7.8	17.2	1.2	- 1.8
Potato Chips (PC)	-30.5	0.0	20.7	-14.8
PT and PF	5.9	13.8	- 4.9	4.9
PT and PC	-16.8	- 3.4	14.6	- 8.0
PF and PC	-38.3	17.2	21.9	-16.6
PT, PF, and PC	-24.6	13.8	15.8	- 9.9

Table 4 indicates that if the price of potato chips were reduced by ten percent from its mean value, sales of potatoes used for this product would rise by 21 percent. However, sales of tablestock potatoes are shown to decrease by 30 percent, resulting in an overall decline of 15 percent in total potato utilization. Even with a simultaneous ten percent decrease in the price of tablestock potatoes, the reduction in the price of potato chips was sufficient to cause total utilization to drop eight percent from the benchmark utilization. Lowering the price of french fries had a similar effect, but of a lesser magnitude.

The impact upon potato utilization, for both the individual product categories and in total, arising from independent pricing decisions, could be quite substantial. Even though gains may accrue to growers supplying individual sectors of the potato industry, total gains to growers in the entire industry may decline as a result of independent price reductions. This may be all the more detrimental when it is remembered that potatoes sold as tablestock generally command a higher price than potatoes sold for

the processed products. Growers, even though they might be able to maintain sales volumes at the original level, would be forced to receive a lower price for those potatoes transferred from the tablestock to the processing market.

While consumption of fresh potatoes (tablestock) has been declining over the years it still remains an important segment of the industry. Processed products such as french fries, potato chips, and more recently dehydrated products are increasing in importance. Potential effects of independent price action upon potato utilization has been demonstrated above. It is suggested here that a coordinated marketing system be developed for the potato industry to guide it through this apparent product transition phase. A major task of such a system would be to prevent suppliers of potatoes for one market from realizing economic gains at the expense of suppliers of another market. It is recognized that some growers will be hurt as the transition takes place, but every effort should be made to prevent widespread and long lasting disturbances in the potato industry.

It should be remembered that market coordination involves far more than attempting to increase price. Other equally important facets of a coordinated marketing system include orderly marketing, price stability, and achieving efficiencies in the physical handling of the products. A coordinated marketing system could contribute to the economic health of the potato industry, locally, regionally, and nationally.

Summary

This study focused on determining the demand relationships, at the retail level, between package sizes, varieties, and brands for tablestock potatoes, frozen french fries, and potato chips. The relationships between the three general product categories and the impact upon potato utilization resulting from independent pricing decisions were also analyzed. In the latter analyses ground beef was included as a non-potato food substitute and dummy variables were included to capture seasonal influences. Bi-weekly data were obtained from five Central Maine grocery stores and analyzed using multiple linear regression.

Conclusions of the study were:

1. Sales of round white tablestock potatoes were highly correlated with sales of the long russet potato, due in large part to the seasonal marketing of these potatoes.
2. Availability of medium sized packages showed a significant positive effect on sales of smaller package sizes for both tablestock potatoes and potato chips. The association between package sizes for tablestock potatoes may have been attributed to seasonal characteristics.
3. There did not appear to be any significant relationships between the store and nonstore brand products.

4. Sales of tablestock potatoes appeared to be influenced more by the prices of potato chips than by its own price. The reverse was true for both french fries and potato chips, as their own prices had a greater effect on sales than did prices of other products.
5. The inter-product relationships indicate that independent pricing decisions could be detrimental to potato growers. While utilization would increase for that market with a reduced price, utilization of potatoes in other markets might be reduced, and possibly to the extent that total utilization was reduced from the original level.
6. To reduce or prevent widespread economic injury to the potato industry, it is recommended that a coordinated marketing system be developed to guide the industry through the transition from a predominately fresh potato market to a market dominated by processed potato products.

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