The Potential for Supply Management of Southeastern Sweet Onions Revisited

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A study completed in 1994 showed substantial potential to increase revenue through supply management of Southeastern sweet onions. We revisit the potential for supply management of Southeastern sweet onions in a recent study covering the period 1998–2008. We find that the industry has grown dramatically. On average, weekly shipments have grown from a range of 14 to 400 100 cwt in the earlier study to a range of 193 to 1,713 100 cwt in this study. Moreover, because of technological advances and consumer demand, the shipping season has increased from ten weeks in the 1980s to as many as 25 weeks in recent times, depending on the season. Results show that market planning has improved greatly since the earlier study. The potential for increased seasonal revenue has declined from just over a 76 percent increase in the previous study to almost 24 percent in this study.

This study revisits previous research on the potential for supply management of southeastern sweet onions which examined data for the decade of the 1980s, an era prior to the advent of controlled-atmosphere (CA) storage of sweet onions (Epperson and Huang 1994; Hancock and Epperson 1990). Thus in the previous study the shipping season was about ten weeks in the spring. In this study the shipping season has been extended via the new technology to as many as 25 weeks. On average, weekly shipments have grown from a range of 14 to 400 100 cwt in the earlier study to a range of 193 to 1,713 100 cwt in this study.

A federal marketing order continues to be used by the Southeastern sweet onion industry.

A marketing order, one of several marketing policy tools utilized in U.S. agriculture, is a program that integrates industry with government and may facilitate the regulation of quantity and/or quality of specified commodities entering the market channel (Neff and Plato 1995; Knutson et al. 1986).

To review, three broad categories of activities encompassing quality control, market support, and quantity control are managed via federal marketing orders for fruits and vegetables (Jesse and Johnson 1981; Jesse 1982; USDA-ERS 1981; U.S. General Accounting Office 1985; Zepp and Powers 1988). See the original study (Epperson and Huang 1994) for greater details on the uses of marketing orders.

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For our purposes here we focus on market support activities. Such activities include research, promotion, and the coordination of shipping container/pack standards in order to enhance marketing efficiency. Both quality control and market support activities contribute to the indirect change of supply (Price 1967; Knutson et al. 1986; U.S. Department of Agriculture 1981; Jesse 1979).

The Southeastern sweet onion federal marketing order was established specifically for onions grown in southeastern Georgia (Federal Register 1989, 1990). The initial order restricts use of the name "Vidalia Onions," to onions produced within the specified territory and provides for a check-off mechanism to support advertising and research.

This study reevaluates the potential for the regulation of intraseasonal market flows directly or indirectly for sweet onions produced in the southeastern United States. As with the previous study, this study is carried out in two steps. First, the intraseasonal weekly shipping pattern that maximizes total revenue collectively for Southeastern sweet onion producers and the actual intraseasonal shipping pattern are ascertained. Second, the effectiveness of the controlled shipping pattern is measured relative to the actual case in terms of shipments, prices, and total revenue.

The paper is organized as follows. The dynamic econometric model used in the analysis is depicted. Empirical results are presented for the two market scenarios—the actual case and the marketing order case. Conclusions and implications regarding implementation follow.

Empirical Formulation, Estimation, and Solution

Estimation of the Southeastern supply and demand model is based on weekly shipments and prices for sweet onions from mid-April to the end of September for 1998 through 2008. Variables used in the empirical estimation are described in Table 1.

The number of weeks for the sweet onion season—up to about 25 weeks—was determined empirically. The starting shipping week of the season in each year is identified as the first week in that time series. Because of biology and weather, the number of shipping weeks for each year of the study period varies, ranging from 9 to 25 weeks. The data series for sweet onions encompasses 219 observations. Weekly shipment (SQ_t) and f.o.b. price (SP_t and PYO_t) data were obtained from the U.S. Department of Agricultural Agricultural Marketing Service (1998–2008). Total weekly shipments for competing regions (RQ_t) encompass shipments for Arizona, California, Texas, and Washington. Regional production and total sweet onion production were used in the previous study instead of shipments. Previously, production coincided with the shipping season. Now the season is greatly extended beyond the production period through CA storage. Thus in order to incorporate the effects of competing regions in this study, shipment data are used. U.S. per capita personal income (PI_t) data were obtained from the U.S. Department of Commerce Bureau of Economic Analysis (1998–2008). Price and per capita income data are deflated by the consumer price index (CPI) (2005 = 100). The CPI was obtained from the U.S. Department of Labor Bureau of Labor Statistics (1998–2008). Real per capita income in the t^{th} week of the year corresponds to reported quarterly per capita personal income.

As in the previous study, dynamic adjustment is introduced through the assumption that shipments cannot change immediately in response to new economic conditions. Thus the actual change in shipments in week t is a fraction of the planned change in shipments. Similarly, price changes are also assumed to reflect the partial adjustment process. The supply and demand model is estimated encompassing an inverse demand equation (Tomek and Robinson 2003).

The structural model depicted in Table 2 is estimated using the generalized method of moments (GMM) with HAC (heteroskedasticity-autocorrelation) robust standard errors to obtain structural coefficients and weekly price flexibilities in order to select weekly shipment targets (Hayashi 2000; Baum 2006). All of the coefficients in the model are significant at the 0.05 level or better and have signs consistent with economic theory and biology except for the PI_t (income) coefficient, which is negative. Over the study period southeastern sweet onion prices on an annual basis are relatively flat while real per capita personal income trends up, thus the negative sign for the PI_t coefficient. Southeastern per capita income was used in the previous study because of the regional nature of consumption in the 1980s. As in the previous study, lag length for the dynamic variables is limited to one week because of the highly perishable nature of sweet onions. Given the short time frame for supply response, activities in one week have a strong relationship to activities in the subsequent week. In other words,

Table 1. Definition of Variables for the Empirical Model.

Variable	Definition
SQ_t	Shipments of sweet onions from Georgia in week t (100 cwt)
SP_t	Real f.o.b. price of sweet onions for Georgia in week t ($/100 cwt)
RQ_t	Total weekly shipments of sweet onions in competing regions in week t (100 cwt)
PYO_t	Real f.o.b. price of pungent yellow onions in week t ($/100 cwt)
PI_t	Real U.S. per capita personal income in week t ($)

Table 2. GMM Coefficient Estimates and Z-Values for Southeastern Sweet Onions.

	Equation	
Variable	Supply (SQ_t)[a]	Demand (SP_t)[b]
Constant	–144.8381 (–2.50)	7126.2330 (2.78)
SQ_t		–0.6505 (–4.27)
SQ_{t-1}	0.7204 (53.56)	
SP_t	0.0136 (2.39)	
SP_{t-1}		0.6997 (12.75)
RQ_t	0.0770 (8.61)	
PI_t		–0.6642 (–2.61)
PYO_t		0.3924 (8.99)

Z-values are shown in parentheses.
[a] The instrumented variable is SP_t and the instruments are SQ_{t-1}, RQ_t, SP_t, SP_{t-1}, PI_t, and PYO_t. $R^2 = 0.7182$.
[b] The instrumented variable is SQ_t and the instruments are SP_{t-1}, PI_t, PYO_t, SQ_{t-1}, and RQ_t. $R^2 = 0.8586$.

supply and demand can shift from week to week within limits dictated by the coefficients of lagged and other exogenous variables.

Sweet onion shipments (RQ_t) in competing regions are included as an indicator of Southeastern shipping opportunities. As the sign of the coefficient for RQ_t is positive, it appears that U.S. sweet onion shippers in general are responding to similar price signals from week to week. This is contrary to the situation found before the start of CA storage in the previous study. The price of pungent yellow onions (PYO_t) is included to reflect the substitution effect. Interestingly, in the previous study, when sweet onions were relatively novel, the substitution effect was not found to be important.

Computed price flexibilities at mean values of weekly demand based on coefficients from Table 2 range from –0.02 to –0.34, generally moving closer to zero as price becomes less responsive to shipments over the course of the southeastern season. As with the previous study, prices are not very responsive to changes in shipments for a given week. This is indicative of partial adjustment from week to week.

Computed own-price supply elasticities for Southeastern sweet onions at mean values of weekly shipments range from 0.03 to 0.44, increasing in the last part of the season when prices are relatively high. This is markedly different from the previous study, which found much higher own-price supply elasticities at the beginning of the season. It seems that with the new CA storage capability, growers are finding it more beneficial to more evenly spread shipments over the course of the season.

Results and Implications

The results of the study are summarized in Table 3. Shipments, corresponding prices, and total revenue by week of the season are provided for the two market scenarios examined—the actual case and the marketing order case. The values for the marketing order case are obtained via solution to maximize total revenue with target values that yield unitary own-price flexibilities of demand.

Comparison of the values for the actual case and the marketing order case reveal noticeable differences. Shipments are more evenly spread, with less price variability and almost 24 percent higher total revenue over the course of the season for the marketing order case. Though such potential improvement is not trivial, the results in this analysis compared with those of the previous study demonstrate tremendous learning of how to improve revenues

Table 3. Actual Average and Marketing Order Shipments and F.O.B. Prices for Southeastern Sweet Onions by Week of the Season and Total Revenue.

	Actual average marketing order			
Week	Shipments (SQ) (100 cwt)	FOB price (SP) ($/100 cwt)	Shipments (SQ) (100 cwt)	FOB price (SP) ($/100 cwt)
1	1008.182	4552.755	978.2776	4519.781
2	1713.091	4070.434	978.2776	4241.367
3	1689.273	3585.794	985.1292	4009.789
4	1695.909	3236.180	981.5153	3839.358
5	1611.818	3029.263	968.7865	3910.913
6	1480.364	2967.431	946.9347	4059.227
7	1348.818	3039.537	954.2665	4363.661
8	1190.818	3229.488	961.6003	4311.621
9	1055.545	3481.789	961.6003	4368.865
10	1006.600	3728.346	965.2673	4407.895
11	913.800	3899.026	968.9342	4441.721
12	804.100	4180.185	978.5634	4428.711
13	683.500	4403.679	982.1707	4488.557
14	659.300	4536.162	983.9744	4522.383
15	562.800	4690.545	944.5848	4242.668
16	525.400	4724.805	985.9398	4626.463
17	440.100	4843.096	985.9398	4618.657
18	413.778	5380.328	989.5536	4649.881
19	388.571	5181.702	1005.767	4540.597
20	277.167	5532.864	1011.350	4595.239
21	263.000	6095.299	1019.618	4600.443
22	193.000	6314.438	1023.752	4639.473
Total revenue	7.65[a]		9.46[a]	

[a] 10^7 dollars.

over the course of a shipping season. In the previous study the potential for increased seasonal revenue was found to be just over 76 percent, substantially higher potential than in the present study. Furthermore, the quality/small-onion problems evident in the previous study with weeks of lower shipments coupled with lower prices are not apparent in the present study.

Conclusions

This study uses recent data (1998–2008) to revisit previous research on the potential for supply management of Southeastern sweet onions in the 1980s, prior to the advent of controlled-atmosphere (CA) storage of sweet onions. The degree of effectiveness of weekly shipment controls was examined through

a comparison of price, shipment, and total revenue measures with those of the actual case. The results of the study suggest that supply management continues to be highly beneficial to Southeastern sweet onion producers.

We found that the industry has grown dramatically. On average, weekly shipments have grown from a range of 14 to 400 100 cwt in the earlier study to a range of 193 to 1,713 100 cwt in this study. Moreover, because of technological advances and consumer demand, the shipping season has increased from 10 weeks in the 1980s to as many as 25 weeks in recent times, depending on the season. Results show that market planning has improved greatly since the earlier study. The potential for increased seasonal revenue has declined from just over a 76% increase in the previous study to almost 24 percent in this study.

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