The Potential Effects for a Supply-Management Marketing order for Southeastern Sweet Potatoes in U.S. : A Dynamic Control Approach

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Introduction

A marketing order is a tool which can be used to integrate industry with government and facilitate the regulation of quantity and/or quality of specified commodites entering the market channel (Knutson et al.). The biological nature of the agricultural production process requires that farm output reflect an adjustment period which is partly dependent upon uncertain events (Tomek and Robinson). Although modeling the impact of marketing orders is particularly difficult because of the time dimensions involved, failure to consider the dynamic adjustment path may lead to biased estimates of economic welfare via comparisons of competitive equilibrium and regulated equilibrium under an order (Berck and Perloff).

The intent of this study is to evaluate the potential of a marketing order which facilitates the regulation of intraseasonal market flows for sweet potatoes produced in the

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southeastern U.S. The paper is organized as follows. First, an optimal control model with specifications involving uncertainty is presented empirical results follow with respect to dynamic programming and two market scenarios the free market case and the marketing order case. The paper ends with conclusions and implications.

The Model

Commodity market problems are characterized by uncertainty in climate and supply-demand conditiions and by lagged reactions to price changes (Pindyck; Just 1975; Newbery and Stiglitz). These attributes of uncertainty and dynamics point to stochastic control theory as a useful tool for analyzing problems involving the determination of optimal weekly shipments which maximize producers' surplus.

In order to solve the optimization problem, an appropriately specified econometric model is required. The linear reduced-form model may be expressed as (Chow, 1970, 1972, 1973, 1975, 1981):

$$(1)\quad Y_t = A_1 y_{t-1} + \ldots + A_m y_{t-m} + C^0 x_t + \ldots + C_n x_{t-n} + Bw_t + u_t$$

where $A_1, \ldots, Am$, $C_0 \ldots, C_n$, and B are random parameters with respect to a joint density function, y_t is a vector of P endogenous variables, x_t is a vector of q control variables or instruments, w_t is a vector of r exogenous variables not subject to control, and u_t is a p-variate random vector, normally distributed with mean 0 and covariance matrix Σ. The values of u_t are assumed to be serially uncorrelated and uncorrelated with random parameters $A_1, \ldots, C_n$, and B. In matrix notation.

(2) $Y_t = AT_{t-1} + Cx_t + b_t + \widetilde{U}_t$

where $b_t = Bw_t$,

$E\,\widetilde{U}_t = 0$,

$E\,\widetilde{U}_t\,\widetilde{U}_t' = \phi$, and

$E\,\widetilde{U}_t\,\widetilde{U}_v' = 0$ for $t \neq v$.

For optimization a welfare cost function, assumed to be quadratic (Abel), is required such that

$$(3)\quad W = E_{t-1} \sum_{t=1} (Y_t - a_t)'\, K_t\, (Y_t - a_t)$$

$$= E_{t-1} \sum_{t=1} (Y_t' K_t Y_t - 2Y_t' K_t a_t + c_t)$$

where T is the length of the planning horizon, a_t represent the target values of Y_t, K_t is a weighting matrix which is usually diagonal, symmetric, and positive semi-definite, $c_t = a_t' K_t a_t$, and E_{t-1} represents expectations conditional on all the information available at the end of period t-1. The optimal control problem is to choose $X_1, X_2, \ldots, X_T$ so as to minimize the expected welfare loss (3), given the econometric model (2) and initial conditions, Y_0.

The optimal sequences expressed in optimal control feedback equations which Chow derived for the problem are

$$(4)\quad \hat{x}_t = \hat{G}_t Y_{t-1} + \hat{g}_t \qquad t = 1, \ldots, T,$$

with feedback matrix, $\hat{G}_t$, and forcing vecotr, $\hat{g}_t$, (Garbade) given by

(5a) $\hat{G}_t = -(E_{t-1}C'H_tC)^{-1}_{-1}(E_{t-1}\, C'H_tA) \qquad t = 1, 2, \ldots, T,$

(5b) $\hat{g}_t = -(E_{t-1}C'H_tC)^{-1}_{-1}[(E_{t-1}C'H_tbt) + (E_{t-1}C')h_t] \quad t = 1, \ldots, T,$

and matrix/vector Ricatti equations

(6a) $H_{t-1} = K_{t-1} + E_{t-1}(A'H_tA) + \hat{G}_t'(E_{t-1}C'H_tA) \qquad t = 2, 3, \ldots, T,$

(6a′) $H_t = K_t \qquad t = T,$

(6b) $h_{t-1} = K_{t-1}a_{t-1} + E_{t-1}(A + C\hat{G}_t)'(h_t - H_tb_t) \qquad t = 2, 3, \ldots, T,$

and

(6b′) $h_t = K_ta_t \qquad t = T.$

The $(\hat{G}_t, \hat{g}_t)$ and (H_t, h_t) pairs are computed alternatively and recursively from t = T to t = 1 by (5) and (6). The optimal policies and states are then computed from t = 1 to t = T by (4).

Empirical Estimation

The goal of the dynamic optimization procedure is to choose a sequence of actions that will achieve the optimal result subject to a set of constraints. The sequence of actions for this study is the shipment of weekly quantities, where such shipments represent the control variable. The objective is to maximize producers' surplus with respect to sweet potatoes subject to a set of constraints for the system which is encompassed in the econometric model, equation

(2). The estimated model is presented in table 1.

The dynamic analysis employs two different criterion functions for purposes of comparison. The criterion functions encompass southeastern producers' surplus from intraseasonal marketing in a competitive environment for the free market scheme (FMS) and southeastern producers' surplus from intraseasonal marketing in a monopolistic environment, to the extent that such market structure is possible, for the market order scheme (MOS).

The control variable, x_t, for the MOS problem is the quantity shipped in each period, SQ_t^s. The initial conditions for the desired state-space path were the values which were obtained for the point of unitary price elasticity of demand on the linear demand function for the price and quantity of southeastern sweet onions. Maximizing producers' surplus results in maximizing producers' total revenue given that total variable costs tend not to vary to any great extent over the course of the shipping season.

Estimation of supply and demand functions in table 1 was based on weekly quantities and prices for sweet potatoes from early Jan. to mid Dec. for 1978 through 1988. The number of weeks and the initial week chosen for each season were empirically based. The starting shipping week in each year is called the first week in that time series. As a result, the data series for sweet onions encompassed 489 observations. Weekly shipment and f.o.b. price data were obtained from U.S. Department of Agriculture (a).

In order to estimate the aggregate supply and demand functions, total quantities were obtained by transforming weekly shipment data into weekly production data since

Table 1. Coefficient Estimates and Asymptotic t-Values ( ) for the Simultaneous Model for Sweet Potatoes

Variable	Two-Step Two-Stage Least Squares (2S2SLS)				Two-Stage Least Squares (2SLS)			
	Southeast		Aggregate		Southeast		Aggregate	
	Supply	Demand	Supply	Demand	Supply	Demand	Supply	Demand
Constant	−776.8192	345.3564	−1397.0485	447.3445	−370.36	319.0314	−1168.1429	620.7310
	(−29198)*	(1.2164)*	(−4.0375)*	(1.2384)	(−1.1283)	(1.1007)	(−3.1465)*	(1.7081)**
SQ_t		−0.8266	3.6874			−0.6930	3.9211	
		(−1.3302)****	(19.4253)*			(−1.0183)	(17.9844)*	
SQ_{t-1}	1.3467	0.3622			0.5820	0.2915		
	(4.0056)*	(1.2319)			(1.3693)****	(0.9009)		
SQ_{t-2}	0.8993				0.5394			
	(2.4889)*				(1.3327)****			
SP_t	0.0770				0.0299			
	(1.3568)****				(0.4466)			
SP_{t-1}		0.7954				0.8095		
		(17.4007)*				(15.8943)*		
UQ_t	0.0869			−0.1073	0.1695			−0.1166
	(1.9457)***			(−2.0243)**	(3.4063)*			(−2.1777)**
UQ_{t-1}			0.3177	0.0576			0.1877	0.0651
			(2.7638)*	(1.9734)**			(1.4230)****	(2.1408)**
UQ_{t-2}			0.3094				0.2134	
			(2.3608)**				(1.5601)****	
UP_t			0.1647				0.2151	
			(2.1255)**				(2.7505)*	
UP_{t-1}				0.8045				0.8108
				(26.3745)*				(26.0644)*
QT_t	−0.3196		0.2589		−0.2883		0.4561	
	(−1.8145)***		(1.2356)		(−1.5267)****		(1.9716)**	
SRI_t		0.1226				0.0099		
		(0.4777)				(0.3797)		
URI_t				0.0044				0.0147
				(0.1513)				(0.7648)
PB_t		0.03913		0.0258		0.0374		0.0089
		(2.0968)**		(1.3956)****		(1.9985)**		(0.3062)
b	0.8736	−0.5672	0.6939	−0.8367	0.8879	−0.5726	0.7104	−0.8472

Note: Supply equations are quantity-dependent specifications, while demand equations are price-dependent specifications. SQ_t is shipment of sweet potatoes from the southeastern U.S. in week t (100 cwt.), SP_t is real f.o.b. price of sweet potatoes for the southeastern U.S. in week t ($/100 cwt.), UQ_t is total U.S. production of sweet potatoes in week t (100 cwt.), UP_t is average real f.o.b. price of sweet potatoes for the U.S. in week t ($/100 cwt.), QT_t is production of sweet potatoes in competing regions in week t (100 cwt.), SRI_t is real southeastern per capita income in week t ($), URI_t is real U.S. per capita income in week t ($), and PB_t is real f.o.b. price of fresh irish potatoes in week t ($/100 cwt.).

[a]Numbers in parentheses signify t-values. The *, **, ***, and **** symbols designate significant values at 0.01, 0.05, 0.10, and 0.20 levels, respectively, using two-tailed tests.

[b]p is the sample correlation coefficient, ? , where e is the residual.

the former data reported in U.S. Department of Agriculture (a) do not account for total production. Ratios of annual U.S. production (U.S. Department of Agriculture (b)) to annual shipments were used to transform weekly shipments into weekly production. Per capita income data were obtained from Survey of Current Business, which were adjusted by the consumer price index (CPI) (1982-84=100).

The optimal control results for the MOS for a ten-week planning horizon are depicted in table 2. The form of the results is in terms of the vector, $\hat{G}_t$, and the scalars, $\hat{g}_t$, $\hat{x}_t$, and $\hat{W}$, where $\hat{G}_t$ is the feedback vector of coefficients for the state vector, Y_t, $\hat{g}_t$ is the forcing intercept for the control equation (4), $\hat{x}_t$ is the optimal value of the control variable (weekly shipments, SQ_t^s, from the Southeast), and $\hat{W}$ is the value of the welfare cost function, equation (3), associated with the optimal solution.

The values of $\hat{G}$, $\hat{g}$, and $\hat{x}$ are presented for selected weeks over the course of the planning horizon in table 2. The results for the last year of the planning horizon are presented first as the dynamic programming algorithm optimizes sequentially in a backward fashion.

Relative values of the feedback vector, $\hat{G}$, over time provide an indication of the responsiveness of the optimal solution to changes in the values of the variables in the state vector, Y_t, that is, changes in the values of the variables which are relevant to the optimal control problem.

It can be observed, table 2, that the feedback vector, $\hat{G}_t$, reached a steady state as evidenced by the unchanging coefficients from the twenty-fifth week to the first week. When the $\hat{G}_t$ vector reaches a steady state, the intercept of the control equation, $\hat{g}_t$, also reaches a steady state (Chow

Table 2. Stability Indicators of the optimal campal Solution for the I Marketing Oredr Scheme (MOS) for Sweet Potatoes

Symbol	I. Certainty Equivalence	II. Unknown Parameters without Learning	III. Unknown Parameters with Learning
G50	(0 .2265 .0351 -.1076 0 .0257 0 0 0 0 0 0 0 .0621 0 0 0 0 0 0 0 0 0 0 0 0 0)	(0 .1962 .0540 -.0949 0 .0100 0 0 0 0 0 0 0 .1160 0 0 0 0 0 0 0 0 0 0 0 0 0)	(0 .2265 .0354 -.1076 0 .0257 0 0 0 0 0 0 0 .0621 0 0 0 0 0 0
g50	467.2596	423.2945	469.9160
x50	820.1486	796.0491	821.0915
G40	(-.0437 .3826 .0535 -.1141 0 .0385 0 0 0 0 0 0 0 .0591 0 0 0 0 0 0 0 0 0 0 0 0 0)	(-.0508 0.3219 .0856 -0.945 0 .163 0 0 0 0 0 0 0 .1184 0 0 0 0 0 0 0 0 0 0 0 0 0)	(-.0437 .3826 .0535 -1441 0 .385 0 0 0 0 0 0 0 .0511 0 0 0 0 0 0 0 0 0 0 0 0)
g40	-40.5288	-48.7260	-34.5866
x40	748.1796	759.7635	732.2617
G25	(-.0441 .3832 0.537 -.1138 0 .0385 0 0 0 0 0 0 0 .589 0 0 0 0 0 0 0 0 0 0 0 0 0)	(-.0513 0.3226 .0858 -0.942 0 .164 0 0 0 0 0 0 0 .1181 0 0 0 0 0 0 0 0 0 0 0 0 0)	(-.0440 .3831 .0536 -1138 0 .385 0 0 0 0 0 0 0 .0588 0 0 0 0 0 0 0 0 0 0 0 0)
g25	-62.5288	-69.2776	-56.83
x25	732.2881	734.9261	732.2617
G10	(-.0441 .3832 .0537 -.1138 0 .0385 0 0 0 0 0 0 0 .589 0 0 0 0 0 0 0 0 0 0 0 0 0)	(-.0513 0.3226 .0858 -0.942 0 .164 0 0 0 0 0 0 0 .1283 0 0 0 0 0 0 0 0 0 0 0 0 0)	(-.04340 .3831 .0536 -1138 0 .385 0 0 0 0 0 0 0 .0588 0 0 0 0 0 0 0 0 0 0 0 0)
g10	-76.8748	-81.7199	-71.1142
x10	721.4445	733.7517	721.4500
G1	(-.0441 .3831 .0536 -.1138 0 .0385 0 0 0 0 0 0 0 .589 0 0 0 0 0 0 0 0 0 0 0 0 0)	(-.0512 0.3225 .0858 -0.942 0 .163 0 0 0 0 0 0 0 .1181 0 0 0 0 0 0 0 0 0 0 0 0 0)	(-.0440 .3831 .0536 -1138 0 .385 0 0 0 0 0 0 0 .0588 0 0 0 0 0 0 0 0 0 0 0 0)
g1	-64.0200	-57.9941	-78.2859
x1	715.2047	728.7000	715.1830
W	0.5091605D-09	0.5295044D+09	0.5092899D+09

Note: Gt is the feedback vector of coefficients for the state vector, Yt = (SQt SPt UQt SPt-1 UQt-1 UPt-1 SQt-2 QTt FBt SRIt URt SQt-1), where the variables are defined in table / , gt is the forcing intercept for the control equation (4) xt = Gt Yt-1 + gt, xt is optimal value of the control variable (weekly shipments lagged one period from the Southeast), t represents week of the planning horizon, and W is the value of the Welfare cost function, equation (3) associated with the optimal solution.

Table 3. Weekly Dynamic Competitive Equilibria Shipments (FMS) and Optimal Weekly Shipments and Prices for the Marketing order Scheme (Mos) for Sweet Potatoes

Week	Market Scheme (FMS)		Marketing Order Scheme (MOS)	
	Shipments	Prices	Shipments	Prices
	(100 CWT)	($/100CWT)	(100 CWT)	($/100 CWT)
1	992.64	1705.49	744.95	1942.11
2	877.72	1704.01	745.82	1941.17
3	913.56	1703.39	745.84	1940.75
4	921.49	1699.32	746.32	1940.10
5	955.77	1684.14	746.70	1939.49
6	955.99	1687.06	747.13	1938.80
7	971.70	1693.65	747.55	1938.07
8	958.06	1692.32	747.89	1937.30
9	997.31	1689.07	748.40	1936.50
10	1023.33	1698.66	748.83	1935.68
11	996.35	1698.67	749.26	1934.83
12	1026.49	1917.32	749.69	1933.97
13	1158.73	1690.64	750.13	1933.08
14	1144.06	1708.82	750.58	1932.18
15	1060.40	1719.39	751.03	1931.27
16	999.60	1720.36	751.49	1930.34
17	963.19	1729.15	751.96	1929.39
18	884.18	1747.08	752.43	1928.43
19	928.94	1752.86	752.91	1927.45
20	862.80	1753.57	753.40	1926.46
21	842.30	1759.60	753.89	1925.45
22	801.72	1759.13	754.39	1924.43
23	803.65	1771.91	754.90	1923.39
24	767.38	1744.34	755.42	1922.33
25	771.88	1736.32	755.95	1921.26

Table 3 (Continued)

Week	Market Scheme (FMS)		(Marketing Order Scheme (MOS)	
	Shipments	Prices	Shipments	Prices
	(100 CWT)	($/100 CWT)	(100 CWT)	($/100 CWT)
26	751.52	1765.31	756.48	1920.18
27	780.15	1695.83	757.03	1919.07
28	816.17	1747.85	757.58	1917.95
29	854.57	1749.05	758.15	1916.80
30	881.06	1754.52	758.73	1915.64
31	816.30	1747.21	759.32	1914.32
32	792.88	1754.76	759.93	1913.24
33	895.67	1760.56	760.57	1912.00
34	978.47	1763.58	761.23	1910.72
35	1085.90	1709.75	761.92	1909.41
36	1173.02	1666.29	76.265	1908.05
37	1169.05	1670.06	763.44	1906.63
38	947.32	1727.48	764.30	1905.13
39	975.39	1752.65	765.27	1903.54
40	1011.54	1746.71	766.36	1901.82
41	1067.95	1580.13	767.63	1899.93
42	954.46	1618.43	769.15	1897.81
43	979.05	1620.07	771.01	1895.38
44	867.62	1732.93	773.28	1892.55
45	840.52	1726.11	776.20	1889.15
46	863.10	1720.27	779.39	1885.16
47	818.87	1692.76	783.57	1880.32
48	865.83	1704.26	792.57	1873.29
49	850.85	1702.04	830.15	1855.60
50	927.51	1726.50	852.40	1833.37

1975).

For purposes of comparison weekly dynamic competitive equilibria (FMS) shipments and prices of southeastern sweet potatoes are presented in table 3 along with the weekly MOS shipments and prices. As can be seen, the MOS solutions call for marked restrictions on weekly shipments resulting in substantially higher prices. Dynamic competitive equilibria shipments and prices were obtained following Kmenta, Harvey, LaFrance and de Gorter, and Brorsen, Chavas, and Grant.

Producers' surplus and social welfare for the FMS and MOS are presented in table 4. As expected, producers' surplus was substantially greater for the MOS. However, aggregate social welfare is noticeably greater with the FMS, yielding marked deadweight losses for the MOS. The enhancement in producers' surplsu in relative terms was, over 25 percent, while the corresponding relative loss in social welfare was about 8.4 percent.

Table 4. Comparison of Intraseasonal Economic Welfare Measures for Two Market Schemes.

Welfare Measure	Free Market Scheme (FMS)	Marketing Order Scheme (MOS)
	———— (10^6 dollars) ————	
Producer's surplus	340.32	426.40
Coeff. of var.[a]	13.62	4.97
Social welfare	3657.06	3351.85
Coeff. of var.	2.51	2.51
Deadweight loss	—	305.21

* Coefficient of variation.

Conclusions and Implications

The effectiveness of the marketing order scheme was ascertained by comparing corresponding welfare measures with those of the benchmark, i.e., the welfare measures associated with the free market scheme. The results of the study suggest that a supply control marekting order scheme would be beneficial to southeastern sweet potatoes producers.

Though the supply control marketing order scheme resulted in noticeable relative reductions in social welfare, such reductions can be mitigated through enforcement of quality standards which permit only the shipment of consistent, high quality packs and through research which leads to lower costs of producing, harvesting, and marketing (Jesse; Zepp and Powers). Such actions under the auspices of a marketing order should cause increases in demand and supply, thus, improving social welfare (Jesse; Zepp and Powers). The demand effect of a consistent, high quality pack can be enhanced through strategic promotion and advertising under the purview of a marketing order, making use of labels where possible to reinforce the demand effect (Jesse).

Several implications can be drawn from this study. Perhaps the greatest implication is that the establishment of a supply control marketing order in the southeastern U.S likely will change the structure of the aggregate market. Therefore, it would be wise to temper the results of the analysis in this light. The goal should be to move toward the desired levles of producers' surplus in strategic steps. As a starting point, it would be prudent to set a strict and unwavering quality control standard, one which will stimulate an increase in demand. Next, let the quality standard determine the volume limits. In other words, do not restrict shipments beyond that which would occur based on the quality standard without further insulation from possibly induced competition resulting from price enhancement. Shipping holidays during periods of market glut would not violate the caution regarding excessive price enhancement.

Once a consistent quality pack has been established, demand may be heightened by associating the pack with a unique, culturally, inoffensive lable. The consistent quality of the pack in time should become manifested in the label, making it easier for handlers and retailers to make selections accordingly. The use of labels, however, requires tenacious caution. Should the expected quality associated with a label become compromised, the producers' surplus premium attributed to the label likely will be destroyed.

The positive impact of a label may be magnified through promotion and advertising via the umbrella of the marketing order. In this way as the intertwined effects of a consistent quality pack, the label, and promotion and advertising spur increased demand, corresponding movements toward producers' surplus goals may also occur without prompting a loss of market share.

References

Berck, P. and J.M. Perloff. "A Dynamic Analysis of Marketing Orders, Voting, and Welfare." Amer. J. Agr. Econ. 67 (1985): 485-496.

Brorsen, B. W., Jean-Paul Chavas, and W. T. Grant. "A Market Equilibrium Analysis of the Impact of Risk on the U.S. Rice Industry." Amer. J. Agr. Econ. 69 (1987): 733-739.

Chow, G. C. Analysis and Control of Dynamic Economic Systems. John Wiley & Sons, 1975.

Chow, G.C. Econometric Analysis by Control Methods. John Wiley & Sons, 1981.

Chow, G. C. "Effect of Uncertainty on Optimal Control Policies." Int'l. Econ. Rev. 14 (1973): 632-645.

Chow, G. C. "Optimal Control of Linear Econometric Systems with Finite Time Horizon." Int'l. Econ. Rev. 13 (1972): 16-25.

Chow, G. C. "Optimal Stochastic Control of Linear Economic Systems." J. Money, Credit and Banking II (1970): 291-302.

Garbade, K. D. "On the Existence and Uniqueness of Solutions to Multi-Period Linear/Quadratic Optimal Control Problems." Int'l. Econ. Rev. 17 (1976): 719-731.

Harvey, A. C. The Econometric Analysis of Time Series. Allan, Oxford, 1981.

Jesse, E. V. "What Are Marketing Orders." Fruit Outlook and Situation. U.S. Department of Agriculture, July 1981.

Just, R. E. A Generalizatin of Some Issues in Stochastic Welfare Economics: Implications for Agricultural Price Stabilization. Oklahoma Agr. Exp. Station. Research Report P-712, April 1975.

Kmenta, J. Elements of Econometrics, Second Edition, MacMillian Publishing Company, 1986.

Knutson, R. D., J. M. Richardson, D. A. Klinefelter, M. S. Paggi, and E. G. Smith. Policy Tools for U.S. Agriculture. Texas Agr. Ext. Service, Texas A & M Univ., B-1548, August 1986.

LaFrance, T. J. and H. de Gorter. "Regulation in a Dynamic Market: The U.S. Dairy Industry." Amer. J. Agr. Econ. 67 (1985): 821-832.

Newbery, D. M. G. and J. E. Stiglitz. The Theory of Commodity Price Stabilization: A Study in the Economics of Risk. Clarendon Press Oxford, 1981.

Pindyck, R. S. Optimal Planning for Economic Stabilization: The Application of Control Theory to Stabilization. North-Holland Publishing Company, 1973.

Tomek, W. G. and K. L. Robinson. Agricultural Product Prices, Second Edition. Cornell Univ. Press, Ithaca, 1981.

U.S. Department of Agriculture (a). A Review of Federal Marketing Orders for Fruits, Vegetables, and Specialty Crops: Economic Efficiency and Welfare Implications. Agr. Econ. Report No. 477, 1981.

U.S. Department of Agriculture (b). Agricultural Marketing Service. Fresh Fruit and Vegetable National Shipping Point Trends. Federal and State Market News (Weekly), 1978-1988.

U.S. Department of Commerce. Survey of Current Business. Bureau of Economic Analysis, 1978-1988.

Zepp, G. and N. Powers. "Fruit and Vegetable Marketing Orders." National Food Review 11 (1988): 18-24.

Journal of Agricultural Economics, No. 47, June 1990.

美國東南區甘藷供給管理式運銷秩序策略可行性之研究：動態控制之應用

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摘要

運銷秩序策略係結合產業和政府共同規範進入運銷通路商品數量和品質之一項運銷工具。本文旨在評估美國東南亞甘藷設立規範季節內市場流量之運銷秩序策略之可行性，係應用Chow型態之最適控制理論測計甘藷每週最適供給量，進而計算最大氏之生產者剩餘。

實際驗證結果顯示，供給管理式之運銷秩序策略是有利於研究地區甘藷生產者；申言之，該策略可提升該地區之生產者剩餘約25 %，然卻導致整體社會福利約略下降8 %。若同時輔以推行品質管理，則可透過增加借需量而改善社會福利。

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