Price versus Stock Effect Policies for Reducing Excess Milk Production

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This article presents a comparative dynamic analysis of the market impact of alternative U.S. policies designed to reduce excess capacity in milk production. Two policy options are examined based on an econometric model of the dairy industry and a dynamic simulation of the system. The stock effect policy relies on voluntary reductions in cow numbers to reduce milk supplies, while the price effect policy makes use of reductions in the support price levels to achieve the same goal. The simulation results are used to evaluate equilibrium prices and quantities for the farm and retail markets, government costs, and consumer and producer surpluses from 1986 to 1995 for each policy alternative. The analysis shows that farmers are better off under a voluntary supply control program, while consumers are better off under a support price reduction policy.

Key words: dairy surplus, dynamic simulation, price effect, price support, stock effect, voluntary supply control.

Since 1949, the United States has maintained a dairy price support program designed to stabilize dairy farmers' income and to compensate for seasonal price fluctuations in milk prices. Prior to 1980, the program performed its function without resulting in huge government surpluses and costs. However, in the early 1980s, milk production began to outpace milk consumption by a substantial margin, resulting in the largest surpluses of government-owned dairy stocks and public expenditures since the program's inception. Increases in the supply of raw milk were primarily the result of increases in dairy support prices in the mid-to-late 1970s and relatively low feed prices in the mid-1980s.

Congress was confronted with the highly visible costs of dairy surplus removals during deliberations over the 1985 farm bill. Two opposing camps emerged during this debate. The position of the first group, reflected in the Senate draft of the farm bill, advocated reduction of excess supplies by gradually reducing the support price levels. The House version of the 1985 bill reflected the view of the opposing group, which proposed voluntary supply control measures without reductions in the support price as a means for reducing government stocks.

A compromise between the two bills was reached with the enactment of the Food Security Act of 1985. The 1985 act contains provisions for a voluntary supply control program (Dairy Termination Program) and adjustments in the dairy support price. Although the compromise bill is expected to help reduce excess supplies of raw milk, future dairy surpluses still are likely to occur, especially given the rapid changes in dairy production technology. Thus, the debate between the two camps will continue, with one side focusing on what can be called the price effect, or manipulating the support price to achieve desired supply level, and the other on the stock effect, or the use of direct removal of the stock of cows as a means of controlling excess supply, while holding the support price close to current levels.[1]

The purpose of this article is to analyze the price and stock effect policies in terms of their relative effectiveness in reducing milk sur-

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[1] For an analysis of other policy alternatives, such as mandatory supply control, see Kaiser, Streeter, and Liu (1988).

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pluses and to compare their economic impacts on various sectors of the industry. To facilitate the comparison between policies, a dynamic simulation model is used to simulate annual equilibrium prices and quantities for each scenario over a ten-year period, from 1986–95. Based on the simulation results, the welfare implications of each policy alternative for farmers and consumers are analyzed.

Two Policy Alternatives

Two policy alternatives are compared in this article. The first is a stock effect policy based on the provisions of the House bill, which include a voluntary supply control program and a fixed support price. Specifically, the simulation procedure incorporates a Dairy Termination Program identical to the actual 1986–87 program. The Dairy Termination Program, authorized under the 1985 Food Security Act, was designed to reduce milk production through voluntary whole herd liquidations in return for government payments. In order to isolate the stock effect associated with this policy, the support price is held constant at its 1985 level ($11.60 per hundredweight) for the entire simulation period.

The alternative approach considered in this article is a price effect policy, in which adjustments in the support price are the sole means of impacting dairy supplies and incomes. The policy is based on provisions of the Senate bill, which do not include a voluntary supply control program. Instead, reductions in excess milk production relative to commercial use are accomplished by decreasing the support price. In the simulation period, support prices are adjusted by decreasing the support price 50¢ per hundredweight whenever net government purchases of dairy products are projected to be above 5 billion pounds of raw milk equivalent for the forthcoming year. If government purchases are projected to be under 2.5 billion pounds, then the support price is raised by 50¢ per hundredweight.

The simulation of both the stock and price effect policy alternatives takes into account existing dairy legislation, including the dairy price support program and the federal milk marketing order program. Each federal program has an impact on the price of milk at the farmgate.

For example, through provisions of the price support program, the Commodity Credit Corporation (CCC) maintains the market price for raw milk at or near the support price. The CCC achieves this goal by purchasing unlimited quantities of cheese, butter, and nonfat dry milk at announced purchase prices, thereby increasing the farm-level demand for raw milk.

On the other hand, the federal milk marketing order program has a direct impact on the price for raw milk used for fluid products. The program regulates handlers of milk eligible for fluid consumption (Grade A milk). Prices received by handlers are calculated in accordance with a classified pricing scheme, which takes advantage of the relatively more inelastic demand for fluid products. While handlers pay different raw milk prices within a marketing area, all farmers in the area receive the same "blend" price for their milk. The blend price is an average of the price paid for fluid (Class I) purposes and the price paid for manufacturing (Class II) purposes, weighted by the corresponding fluid and nonfluid marketwide utilization rates. The Class II price is equal to the market-determined (Grade B) Minnesota-Wisconsin price and the Class I price is equal to the Minnesota-Wisconsin price plus a Class I differential.

The Model

The simulation of the price and stock effect policy alternatives are based on an econometric model of the dairy sector developed in Kaiser, Streeter, and Liu (1988). The results of the econometric model, estimated using annual data from 1949 to 1985, are summarized in table 1, with the variable names listed in table 2. To facilitate discussion of the results, brief explanatory comments regarding the model are included below.

The model consists of a farm market, a fluid retail market, and a nonfluid retail market. All post-farmgate marketing functions, such as milk assembly, processing, distribution, and retailing, are aggregated into the retail markets. In the farm market, farmers produce Grade A raw milk and sell to retailer as an input used in producing/marketing fluid milk and manufactured dairy products. It is assumed that all fluid and nonfluid sales occur in commercial markets and that any excess supplies of raw milk beyond commercial demand are acquired

Table 1. The Econometric Model of the U.S. Dairy Market

Farm (Raw Milk) Market

(1.1) $S^{rm} = CN * PPC.$

(1.2) $\ln CN = [.0287/(1 - 1.7264\, L + .7281\, L^2)]\ln(AMP/FC)_{-1} - .0378 \ln SCP_{-1} + u$

(1.3) $\ln PPC = 8.5198 + .0871 \ln(AMP/FC)_{-1} + .0253\, TREND + [1/(1 - .9106\, L)]u$

Retail (Fluid Milk) Market

(2.1) $\ln D^f = -.0454 \ln(RFP/BPI) + .1801 \ln INCOME + 1.5149\, AGE_{U19} - 3.8389\, AGE_{45\text{–}64} + .5323 \ln D^f_{-1}$
$- .3209 \ln D^f_{-2} - .0103\, TREND + .0177\, DUMMY_1 + u$

(2.2) $\ln S^f = -.6369 + .1062 \ln(RFP/P1) + .6953 \ln S^f_{-1} - .0035\, TREND - .0124\, DUMMY_2 + u$

(2.3) $D^r = S^f = [Q^f]$

Retail (Manufactured Product) Market

(3.1) $\ln D^m = -.4255 \ln(RMP/FPI) + .3153 \ln INCOME + 2.0370\, AGE_{25\text{–}64} + .6551 \ln D^m_{-1}$
$- .0110\, TREND + .0576\, DUMMY_3 + u$

(3.2) $\ln S^m = -2.9515 + .2312 \ln(RMP/P2) + .5647 \ln S^m_{-1} - .4927 \ln HWM - .0669\, DUMMY_4 + u$

(3.3) $S^m = D^m = [Q^m]$

Linkages between Farm and Retail Markets

(4) $S^{rm} = Q^f + Q^m + CCC$

(5) $AMP = P1*(Q^f/S^{rm}) + P2*(Q^m + CCC)/S^{rm}$

Note: Estimation procedures and detailed results are presented in Kaiser, Streeter, and Liu (1988). For brevity, t-values and the coefficient of variation measures have been omitted here. However, all variables had expected signs and were significant at least at the 10% level, and adjusted R^2 terms ranged from 95% to 99%.

Table 2. Definitions of Variables

$AGE_{25\text{–}64}$	Percent of population between 25 and 64 years old
$AGE_{45\text{–}64}$	Percent of population between 45 and 64 years old
AGE_{U19}	Percent of population under 19 years old
AMP	All-milk price (\$/cwt.)
BPI	Nondairy beverage price index (1967 = 100)
CCC	Net government purchases (bill. lbs.)
CN	Number of cows (thousand heads)
D^f	Fluid demand (bill. lbs./mill. persons)
D^m	Manufactured demand (bill. lbs./mill. persons)
$DUMMY_1$	Binary variable, equal to 1 for 1949—65, zero otherwise
$DUMMY_2$	Binary variable, equal to 1 for 1973–74 and 1978–80, zero otherwise
$DUMMY_3$	Binary variable, equal to 1 for 1981–85, zero otherwise
$DUMMY_4$	Binary variable, equal to 1 for 1949–70, zero otherwise
FC	16% protein dairy ration costs (\$/cwt.)
FPI	All food retail price index (1967 = 100)
HWM	Deflated wage rate of manufacturing sector (\$/hour)
$INCOME$	Deflated disposable per capita income (\$/person)
L	Lag operator with a property that $L\, x_t = x_{t-1}$
ln	Natural logarithm operator
$P1$	Estimated Class I price (\$/cwt.)
$P2$	Estimated Class II price (\$/cwt.)
PPC	Production per cow (lbs.)
Q^f	Equilibrium fluid quantity (bill. lbs./mill. persons)
Q^m	Equilibrium mfg quantity (bill. lbs./mill. persons)
RFP	Retail fluid milk price index (1967 = 100)
RMP	Retail manufactured dairy price index (1967 = 100)
S^f	Fluid supply (bill. lbs./mill. persons)
S^m	Manufactured supply (bill. lbs./mill. persons)
SP	Raw milk support price (\$/cwt. for 3.67% butterfat content)
S^{rm}	Farm raw milk supply (bill. lbs.)
SCP	Deflated slaughter cow price (\$/cwt.)
$TREND$	Linear trend with 1949 = 1
u	White noise (error term)

Note: Data sources can be found in Kaiser, Streeter, and Liu (1987).

by the government through the price support program.

Equations (1.1) to (1.3) represent the farm market. The supply of raw milk (S^{rm}) is decomposed into cow numbers (CN) and production per cow (PPC). Based on a naive price expectation scheme, the cow numbers equation is specified as a function of a distributed lagged milk-feed price ratio (AMP/FC), and the deflated slaughter cow price (SCP) from the previous period. Production per cow is specified as a function of the lagged milk-feed price ratio, and a linear trend (T). The lag-polynomial associated with the error term of (1.3) is a correction for autocorrelation (Beach and Mackinnon).

Equations (2.1) to (2.3) represent the retail fluid milk market, which were estimated using two-stage least squares. Fluid demand (D^f) is specified as a function of the ratio of retail fluid milk price index (RFP) to the nondairy beverage price index (BPI) and other explanatory variables including income, age composition, lagged demand, a time trend, and a dummy variable. Fluid supply (S^f) is specified as a function of the ratio of retail fluid milk price index to an estimated Class I price ($P1$) and other explanatory variables including lagged supply, a time trend, and a dummy variable.[2]

The retail manufacturing sector is represented by equations (3.1)–(3.3), which were estimated by two-stage least squares. Demand (D^m) is specified as a function of the ratio of the retail manufactured dairy price index (RMP) to the all-food price index (FPI) and other explanatory variables including income, age composition, lagged demand, a time trend, and a dummy variable. Supply (S^m) is specified as a function of the ratio of the retail manufactured dairy price index to an estimated Class II price ($P2$), lagged supply, deflated average hourly wages, and a dummy variable.

The linkages between the farm and the retail sectors are specified in (4) and (5). Equation (4) reflects the assumption that at equilibrium the quantity of raw milk supply must equal the sum of fluid and manufactured products (expressed on a raw milk equivalence basis) plus net government removals (CCC). Equation (5) specifies the formula for the all-milk price that farmers receive.

To simulate Q^f for each year, (2.1) and (2.2) were set equal and solved to obtain the reduced-form equation for RFP as a function of all the predetermined variables (exogenous forecasts and lagged endogenous values).[3] In turn, the equilibrium RFP was substituted into either (2.1) or (2.2) to obtain the equilibrium quantity (Q^f). The equilibrium conditions for the manufacturing market (RMP and Q^m) were simulated in a parallel manner using (3.1) and (3.2). For the farm market, the variables CN and PPC were simulated using (1.2) and (1.3). Raw milk supply is the product of simulated values for CN and PPC, as indicated in (1.1).[4]

Given the simulated Q^f, Q^m, S^{rm}, $P1$, and $P2$, the simulated values for CCC and AMP were obtained from (4) and (5), respectively. The simulation was conducted iteratively for a ten-year period (1986–95), with the values for the lagged endogenous variables (i.e., Q^f, Q^m, CN, PPC, and AMP) taken from the previous year's simulation results.

Results

Using the results of the econometric model and the simulation procedure outlined above, the stock and price effect policy alternatives (SE and PE) were simulated for a ten-year period. Based on the simulated results, equilibrium prices and quantities were calculated and consumer and producer surplus measures were compared for each policy. The results of simulating the stock and price effect policies are presented in tables 3 and 4 and figures 1 and 2.

As shown in table 3, both policies result in similar production levels in the farm sector by 1995, but the stock effect policy creates a

[2] Following LaFrance and de Gorter's instrumental variable approach, the estimated Class I and Class II prices were obtained by regressing the actual Class II price on the support price. A first-order autoregressive error structure was imposed to correct for autocorrelation. The instrumental equation was used to obtain the predicted value of both prices. In the simulation, a similar procedure was used to forecast Class I and II prices.

[3] Values for the exogenous variables in all equations were forecasted by regressing each variable on its own lag values and in some cases a trend variable. All forecasting equations were initially made using ordinary least squares. First-order autoregressive error structures were then imposed for forecasting models which suffered from autocorrelation.

[4] An adjustment was also necessary for the cow number simulation in the House bill scenario to reflect the dairy herd liquidation that occurred because of the Dairy Termination Program. The simulated cow numbers variables were reduced by 318.1 thousand cows in 1986 and 141.3 thousand cows in 1987 to reflect the impact of the month of liquidation on annual average cow numbers. It should be noted that these numbers are based on weighted averages rather than actual cow numbers enrolled in the Dairy Termination Program. The procedure reflects the fact that a cow terminated in January has a greater impact on reducing milk production than a cow terminated in October of the year.

Table 3. Comparisons of the Stock and Price Effect Policies 1986-95, Farm Sector

Variable	Policy Sce-nario	Simulation 1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Milk production (bill lbs)	SE	145.0	144.4	144.6	145.3	146.1	147.0	147.7	148.3	148.5	148.5
	PE	149.3	153.2	156.2	158.1	158.9	158.5	156.9	154.1	151.9	150.1
Cow number (mill)	SE	10.78	10.46	10.22	10.03	9.85	9.68	9.51	9.32	9.12	8.90
	PE	11.10	11.14	11.12	11.04	10.88	10.64	10.34	9.96	9.55	9.13
Production per cow	SE	13.45	13.80	14.15	14.49	14.83	15.19	15.53	15.91	16.28	16.68
	PE	13.45	13.75	14.05	14.32	14.60	14.90	15.17	15.47	15.91	16.44
All-milk price ($/cwt)	SE	12.22	12.24	12.24	12.25	12.25	12.25	12.25	12.25	12.25	12.25
	PE	11.72	11.23	10.74	10.26	9.78	9.31	8.84	9.34	10.31	12.07
Support price, 3.67% butterfat ($/cwt)	SE	11.60	11.60	11.60	11.60	11.60	11.60	11.60	11.60	11.60	11.60
	PE	11.10	10.60	10.10	9.60	9.10	8.60	8.10	8.60	9.10	9.60

Table 4. Comparisons of the Stock and Price Effect Policies 1986-95, Retail Sector

Variable	Policy Sce-nario	Simulation 1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Fluid sector Quantity (bill lbs)	SE	51.77	51.46	51.50	51.76	52.04	52.30	52.52	52.72	52.91	53.10
	PE	51.83	51.61	51.77	52.12	52.52	52.89	53.23	53.40	53.40	53.25
Price ($/cwt. of raw milk equivalent)	SE	20.44	20.00	21.10	22.11	22.70	23.07	23.40	23.78	24.18	24.58
	PE	19.94	18.98	19.41	19.66	19.48	19.08	18.63	19.40	20.85	23.48
Manufacturing sector Quantity (bill lbs)	SE	79.82	80.95	82.04	83.19	84.41	85.71	87.09	88.54	90.05	91.61
	PE	80.33	82.33	84.58	87.08	89.87	92.95	96.31	98.21	98.48	96.85
Price ($/cwt. of raw milk equivalent)	SE	19.97	19.93	19.94	20.00	20.10	20.23	20.39	20.56	20.75	20.95
	PE	19.67	19.33	19.06	18.83	18.62	18.42	18.23	18.82	19.73	21.09
Total commercial disappearance	SE	131.59	132.41	133.54	134.95	136.45	138.01	139.61	141.26	142.96	144.71
	PE	132.16	133.94	136.35	139.20	142.39	145.84	149.54	151.61	151.88	150.10

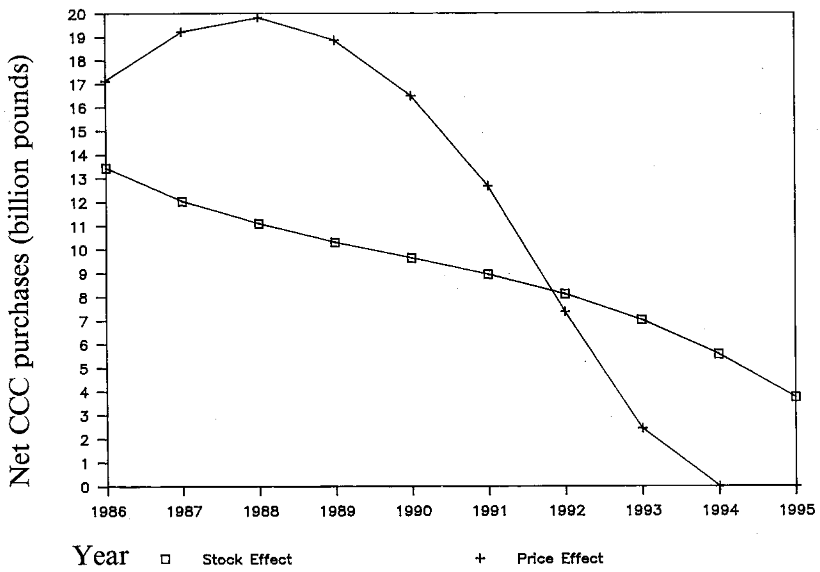

Figure 1. Net CCC purchases under the stock and price effect policies, 1986–95

smooth and steady increase in the milk supply over ten years. Under the price effect policy, an initial five-year increase in raw milk production is followed by a decline over the remainder of the simulation period. A discussion of the effect of each policy on cow numbers and milk prices sheds some light on why production follows a different pattern under each policy.

The principal mechanism of the stock effect policy is the Dairy Termination Program, which produces a decrease in cow numbers during the first two years of the simulation. Successive declines in cow numbers beyond that point occur mainly in response to decreases in the milk-feed price ratio. Decreases in this ratio occur because the all-milk price remains relatively unchanged while feed costs increase over time (not shown). The all-milk price changes very little because the fixed support price maintains stability in classified prices ($P1$ and $P2$).[5] However, once the immediate effects of the Dairy Termination Program have passed, the negative effect of decreased cow numbers on production is overshadowed by increases in the production per cow, which is dominated by technology (trend). As a result, there is a steady increase in the quantity of raw milk produced in all but the initial two years of the stock effect policy.

In contrast, the milk production pattern under the price effect policy is characterized by a five-year increase followed by a five-year decline. During the first half of the simulation, the increases in milk production are explained primarily by increases in production per cow because cow numbers are fairly stable in the absence of the Dairy Termination Program. However, the increases in milk production during the initial period trigger a downward adjustment of the support price, which depresses class prices and impacts the all-milk price. In turn, decreases in the milk-feed price ratio eventually cause a steep decline in cow numbers in the last five years of the simulation. Further, the negative effect of decreasing cow numbers outweighs the continued positive influence of increases in production per cow. The net effect is a decline in milk production for the balance of the simulation.[6]

[5] As indicated in (4), all-milk price is also a function of the utilization rates. However, any reduction in the supply of raw milk is taken from CCC stocks, which is a relatively small portion of total usages, so utilization rates do not change enough to have a significant impact on the all-milk price.

[6] It is interesting to note that the farm price under the Senate bill becomes competitive in 1994 and 1995, i.e., the support price is not binding. For these two years, CCC purchases in the initial solutions were negative, even with the two 50¢ increases in the support price. In order to estimate what the competitive farm price would be, the following procedures were used. Recall that the Class I and II prices are estimated as a function of the support price (SP). In order to determine the competitive prices, the support price in the class price equations was increased and the model was solved iteratively until CCC purchases approached zero. By doing this, the new class prices and the new farm price can be thought of as competitive since the real support price is lower than the instrument used to derive the class prices.

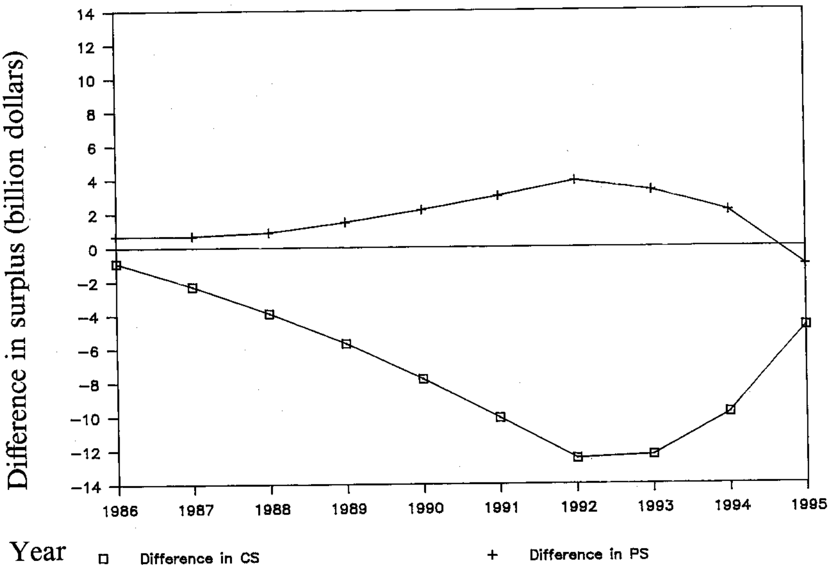

Figure 2. Difference in producer surplus (PS) and consumer surplus (CS) between the stock and price effect policies, 1986-95

The simulation results for the retail sector are contained in table 4. Under the stock effect policy, the fixed support price level results in a constant input price (Class I price) to the retailer. Therefore, the steady increase in retail fluid quantity after 1987 is primarily explained by changes in demand shifters such as population. As a consequence, retailer fluid prices also experience a slight upward trend.

Under the price effect scenario, the increase in fluid quantity in response to population growth is reinforced by decreases in the Class I price, which result from cuts in the support price. While population growth exerts a positive influence on retail fluid prices, this effect is outweighed by the impact of reductions in the Class I price. The result is a general decline in retail fluid milk price during the first seven years of the simulation. However, as soon as the support price begins to adjust upward in the last three years of the simulation, both the effects of population growth and changes in the Class I price work in the same direction, resulting in an increase in the retail fluid price. By the end of the simulation period, the retail fluid price for both policy scenarios is nearly the same.

As in the fluid sector, demand shifters cause the manufacturing quantity to increase under the stock effect policy, even though the input price (Class II price) remains constant. Likewise, manufacturing prices increase gradually in this policy scenario.

Under the price effect policy, changes in both the support price and demand shifters cause greater increases in the manufacturing quantity than under the stock effect scenario. Manufacturing prices decrease in the price effect scenario during the first seven years and then increase for the balance of the simulation. As in the case of the fluid sector, the pattern reflects the interaction of two influences: adjustments in the Class II price and changes in demand shifters. By the end of the simulation, retail manufacturing prices are similar under both policies.

Regardless of the scenario, most of the adjustments to policy measures occur in the manufacturing sector. The asymmetric response reflects the relative elasticity of the manufacturing sector in responding to either price changes or adjustments in demand shifters.

Figure 1 reveals substantial differences in the effect of each policy on government stocks. The stock effect policy leads to a gradual reduction in government stocks, but at the end of the simulation period, CCC purchases still account for 3.75 billion pounds of total raw milk supply. In the first few years of the simulation, the price effect scenario produces a gradual increase in government stocks, but the trend reverses in 1988 and by 1994 CCC purchases fall to zero. Thus, while the price effect policy leads to relatively high CCC purchases at first, it eventually becomes quite effective at reducing government purchases.

The difference in welfare impacts of the two policies is shown in figure 2. The graph shows the difference between consumer/producer surplus in the two scenarios. When the differences are plotted, points which fall above zero on the graph indicate the corresponding group is better off under the stock effect scenario, while points below zero show the price effect policy is more desirable. Thus it is clear that producers fare better under the stock effect scenario in all but the final year of the simulation, while consumers are better off under price effect scenario. The differences in welfare between the two policies start to diminish after 1992 when the support price begins to increase under the price effect scenario; and by the end of the simulation period, the differences for both groups are substantially less than preceding years.

Summary and Policy Implications

The focus of this study was to investigate the differential impacts of stock and price effect policies on farm and retail milk markets. The analysis was based on a dynamic annual simulation of the dairy sector from 1986 to 1995.

The results of the simulation show that voluntary supply control programs without support price reductions can be an effective policy in reducing excess milk production. It also appears that a triggered mechanism to set support prices can accomplish the same goal. The main difference is that the voluntary supply control approach accomplishes this objective gradually and consistently, while there is a lagged effect when employing cuts in support prices.

When comparing the policies with regard to impacts on prices and government purchases, a similar pattern is noted. The stock effect policy, relying initially on cuts in the stock of cows, produces gradual changes in prices and CCC stocks, while the price effect policy, which relies on a trigger mechanism for setting support prices, does not result in dramatic changes until the later part of the simulation. By the end of the simulation, the price effect alternative proves the most effective in completely eliminating government purchases.

In terms of welfare, dairy farmers were found in general to benefit more from the stock effect policy than the price effect policy. This is because farm prices were higher under the stock effect policy than the price effect policy. Consumers were found better off under the price effect policy because raw milk costs and retail prices were lower.

The study provides insights for policy makers, who are likely to continue to face the issue of dairy surpluses, particularly if new technologies like bovine somatotropin are approved and adopted by farmers. In particular, the study results imply that policy makers will have to weigh the welfare tradeoffs between producers and consumers implied by various strategies for dealing with continued large supplies. The results of this study will be useful in weighing the costs and benefits of each policy alternative on different segments of society and during different years of the policy. Furthermore, the model used in this study can serve as a valuable tool to policy makers interested in exploring other alternatives to existing dairy policy.

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References

Beach, C. M., and J. G. Mackinnon. "A Maximum Likelihood Procedure for Regression With Auto-Correlated Errors." *Econometrica* 46(1978):51–58.

Kaiser, H. M., D. H. Streeter, and D. J. Liu. "A Dynamic Analysis of the Food Security Act and the Harkin-Gephardt Bill: The Dairy Sector." Dep. Agr. Econ. A.E. Res. No. 87-22, Cornell University, Sep. 1987.

———. "Welfare Comparisons of U.S. Dairy Policies with and without Mandatory Supply Control." *Amer. J. Agr. Econ.* 70(1988):848–58.

LaFrance, J. T., and H. de Gorter. "Regulation in a Dynamic Market: The U.S. Dairy Industry." *Amer. J. Agr. Econ.* 67(1985):821–32.