The CWT Program Effects:
An Analysis of Retail Fluid Milk Pricing in Selected U.S. Cities

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CWT program

A supply management program implemented by the ***Cooperatives Working Together (CWT)***
Originally developed in 2003 to address
- Milk oversupply problem
- Increasing volatility of milk prices received by dairy farmers
- A substantial decrease in government intervention in dairy industry pricing

CWT include dairy cooperatives and individual dairy producers throughout the country
- Participating dairy farmers have marketed approximately 70% of national milk supply

CWT program has included
Herd retirement program (2003-2009)
- Was used to remove from production the entire milking herds of selected dairy farmers

Export assistance program (2003-present)

Research objective

To analyze possible effects of the CWT herd retirement program at the retail level
Focus on fluid whole milk markets in six cities
- Atlanta, GA; Cincinnati, OH; Louisville, KY
- Miami, FL; Philadelphia, PA; St. Louis, MO

Hypothesis

- The retail fluid whole milk price is higher and price variance is lower during the period of the CWT herd retirement program implementation
  - As compared to the periods prior and after the program implementation

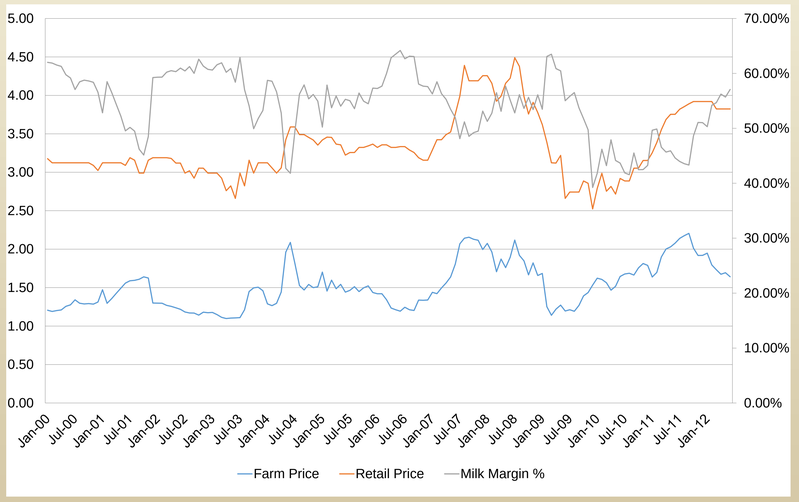
Methodology

An econometric analysis of the ***retail fluid whole milk price level and volatility*** during three periods
- ***Pre-HR period*** (01/2000 – 06/2003): the period prior to the herd retirement program implementation
- ***HR-period*** (07/2003 – 12/2009): the period of the herd retirement program implementation
- ***Post-HR period*** (01/2010 – 06/2012): the period following the herd retirement program implementation
- A set of binary variables is used to represent three periods: HR-period observations are reference group

Data

Retail prices of fluid whole milk sold in gallon containers
Class I milk prices ("farm-level" prices)
Source: USDA Agricultural Marketing Service
Milk Marketing Order Statistics Public Database
Prices are expressed in $/gallon

Atlanta, GA: Retail fluid whole milk price, Class I milk price and farm-to-retail margin



Econometric model: ARCH(1) model

Conditional mean equation

$RP_t = \beta_0 + \beta_{1*}FP_t + \beta_{2*}\text{Pre-HR}_t + \beta_{3*}\text{Post-HR}_t + u_t$

- β_1 is cost pass-through
- β_2 and β_3 capture changes in retail milk price in pre-HR and post-HR periods, relative to HR period

Conditional variance equation

$u_t^2 = \alpha_0 + \alpha_{1*}u_{t-1}^2 + \alpha_{2*}\text{Pre-HR}_t + \alpha_{3*}\text{Post-HR}_t + v_t$

- α_2 and α_3 capture changes in price variance in pre-HR and post-HR periods, relative to HR period

Selected estimation results: ARCH(1) models

Variable	Estimated Coefficient (T-ratio)		
Mean equation: **Dependent variable is retail milk price ($/gallon)**			
	Atlanta, GA	**Louisville, KY**	**Philadelphia, PA**
FP (the coefficient is cost pass-through)	1.24* (10.62)	0.82* (7.20)	0.99* (16.76)
Pre-HR period	-0.07 (-1.06)	-0.27* (-4.52)	-0.32* (-9.21)
Post-HR period	-0.32* (-5.68)	-0.27* (-3.78)	0.35* (9.68)
R^2	0.66	0.58	0.92
Durbin-Watson Statistic[1]	0.36	0.32	0.53
ARCH test p-value	0.0000	0.0000	0.0000
T-test: H_0: Pre-HR–Post-HR = 0	2.15*	-0.10	-16.04*
Perfect Competition: H_0: β_1=1, H_A: $\beta_1 \neq 1$	2.04*	-1.61#	-0.22
Variance equation: **Dependent variable is conditional price variance**			
u_{t-1}^2	0.52* (6.80)	0.63* (9.81)	0.40* (5.28)
Pre-HR period	-0.02 (-1.16)	-0.02# (-1.60)	-0.01* (-2.28)
Post-HR period	0.008 (0.42)	-0.02 (-1.18)	-0.01* (-1.80)
R^2	0.29	0.45	0.24
T-test: H_0: Pre-HR–Post-HR = 0	-1.26	-0.25	-0.26

[1]Newey-West method was used to calculate autocorrelation-robust standard errors.
* Statistically significant at 10% level using two-tailed test.
# Statistically significant at 10% level using one-tailed test.
T-statistic cut-off value is /1.64/ for a two-tailed test, and it is /1.28/ for a one-tailed test.

Conclusion

HR-period, as compared to pre-HR period
- Retail fluid *milk price is higher* in Atlanta, Miami, Louisville and Philadelphia

HR-period, as compare to post-HR period
- Retail fluid *milk price is higher* in Atlanta, Miami, Louisville, Cincinnati and St. Louis

Empirical *evidence on* changes in *price variance is mixed* (including statistical significance)

Research limitations
A number of economic and policy forces affecting dairy industry might have contributed to the observed effects: structural changes in fluid milk processing and retailing; state milk price controls: Philadelphia, PA; local fluid milk pricing strategies used by retailers