Milk Price Volatility: What’s Old is New (but what’s new is different)

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What's Old is New  
(but what’s new is different)  

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U.S. All Milk Price

Jan-10  Jan-17  Jan-24  Jan-31  Jan-38  Jan-45  Jan-52  Jan-59  Jan-66  Jan-73  Jan-80  Jan-87  Jan-94  Jan-01  Jan-08

$0.00  $5.00  $10.00  $15.00  $20.00  $25.00

$0.00  $5.00  $10.00  $15.00  $20.00  $25.00
What Are We Looking For?

- Anticipated Variation
  - Seasons
  - Cycles
  - Trends

- Unanticipated Variation
  - Shocks
Relative Variability Over Time

% change month to month

Golden era of price forecasting?

Current variability of similar magnitude to early 20th century – but less predictable?
Is There Order Within the Chaos?

- The All Milk price series looks chaotic but is there order underlying the volatility?

- Let’s examine with “State-Space Methods” or “Spectral Decomposition”
Spectral Composition Example

Cycle 1

Frequency = 32
Amplitude = 1
Spectral Composition Example

Cycle 2

- Frequency = 8
- Amplitude = 0.5

Cycle 1

Cycle 1 and Cycle 2
Spectral Composition Example
Spectral Composition Example

Sum of Cycles & Trend

Legend:
- **Red**: Sum
- **Blue**: Cycle1
- **Green**: Cycle2
- **Cyan**: Trend
Spectral Composition Example

Sum of Cycles & Trend

-2 -1 0 1 2 3 4 5 6 7
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60

Sum
Look At Two Time Periods


$0.00 $5.00 $10.00 $15.00 $20.00 $25.00

1948-67

1988-07
A Closer View of the Two Series
Components 1948 to 1967

Seasonal is by far the largest

$0.80/cwt variation
Spectra 1948 to 1967

Most cycles about 12 months
One longer cycle of ~16 months
Components 1988 to 2007

Seasonal is same size, but other cycles dominate

$6.00/cwt variation

Amplitude of cycles increasing?
Spectra 1988 to 2007

Annual Cycle
Spectra 1988 to 2007

36-month Cycle
Spectra 1988 to 2007

9-month Cycle
Spectra 1988 to 2007

26-month Cycle
Two years ago, we knew the trough was coming.
Shocks

- A sudden surprise event that temporarily increases or decreases the supply or demand for goods or services
Supply Shocks

Price

Supply

Demand

Quantity

$P^*$

$Q^*$
Supply Shocks

Price

Supply

Demand

Quantity

$p_n$

$p_*$

$Q^n$

$Q^*$
Feed Costs Have Been Way Up

NASS Feed Ration Value
(per 100 lbs feed)

- Soybean Value
- Corn Value
- Alfalfa Value
Demand Shocks

Price

Quantity

\( P^* \)

\( Q^* \)

Supply

Demand
Demand Shocks

Demand

Supply

Price

Quantity

\( p_n \)

\( p^* \)

\( Q^* \)

\( Q^n \)
Supply & Demand Shocks

Price

Quantity

Supply

Demand

Q*

Q^n

P^n

P^*

P**

Q^n

Q**
A Series of Unfortunate Events

— with respect to Lemony Snicket’s

- Seasons, cycles and trends would have forecasted a major price trough in 2009
- On top of that we have experienced a huge demand shock
- Volatility was inevitable… or was it?
The Good Old Days?

- An active price support program did dampen the volatility that is endemic to the dairy industry.

- Producers are looking for ways to dampen it again.
Growth Management Plan (GMP)

- Objective: Manage milk supply growth for more stable prices
  - All producers must participate
  - Facilities are not restricted from production growth
How Would GMP Work?

- Set and allowable annual % growth
  - Same for all producers
  - Typically greater than zero
- Milk production in current quarter is compared against same quarter last year plus allowable growth
- If milk is more than allowable growth, then facility pays a “market access fee” on all milk produced.
How Would GMP Work?

- Pool all market access fees
- Pay refunds to all facilities that did not exceed allowable growth

Refund size depends on:
- Size of the market access fee
- Amounts of qualifying and non-qualifying milk
GMP and “Normal” Cyclical Variation

All-Milk Price, $/cwt, Baseline Scenarios

- Baseline
- GMP MAF 25 Cents
- GMP Optimal
- GMP Optimal Annual

Program Implemented
GMP with Feed and Demand Shocks

All-Milk Price, $/cwt, Scenarios with Shock

Program Implemented

Shocks  GMP Optimal  GMP Optimal Year
GMP with Shocks and Negative Growth

If accept reductions in allowable milk production, can mitigate shock better
Bottom Line…

- Volatility is endemic to the dairy industry
- Supply response to market signals seems stronger today causing cycles to be different and more pronounced than 40 years ago
- Policy could help to dampen price swings