Price Risk
Price Risk Management
Today’s Agenda

- Historical Price Behavior
  - Announced prices
  - Pricing opportunities
  - Variability
    - (what is it, has it increased over time)
  - Seasonality
  - Cyclical
- Fundamentals (S & O)
- Price Risk Management
- Strategies
- Game
Price risk exists if there is a chance for more than one price outcome.
Price Risk is Not Knowing All The Potential Outcomes - Variability
November Announced versus Pricing Opportunities

(1) Two-Week Max. means that settle prices were at the indicated price or higher for at least two weeks (10 trading days)
Is There Price Risk In Milk?

Is There Variability in The Outcomes of Milk Prices?

Is The Variability Growing?

Is There Skewness?
Based On Announced Prices

Is There Variability in The Outcomes of Milk Prices?

Is The Variability Growing?
C-III Announced Prices, 1988-Dec 04

Probability Distribution

Is there variability?  
Is there skewness?

25 Cent Range, Midpoints Are Shown
Announced Prices, 1988-2004

January

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
Announced Prices, 1988-2004

March

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
Announced Prices, 1988-2004

May

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
Announced Prices, 1988-2004

July

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
Announced Prices, 1988-2004

September

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
Announced Prices, 1988-2004

November

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
Kurtosis

<table>
<thead>
<tr>
<th>Month</th>
<th>Kurtosis 88-04</th>
<th>Kurtosis 96-04</th>
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<tbody>
<tr>
<td>Jan</td>
<td>2.27</td>
<td>1.68</td>
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<tr>
<td>Feb</td>
<td>-1.04</td>
<td>-1.67</td>
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<tr>
<td>Mar</td>
<td>.20</td>
<td>.39</td>
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<tr>
<td>Apr</td>
<td>8.98</td>
<td>5.38</td>
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<tr>
<td>May</td>
<td>8.34</td>
<td>4.30</td>
</tr>
<tr>
<td>Jun</td>
<td>2.04</td>
<td>-.09</td>
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<tr>
<td>Jul</td>
<td>-.99</td>
<td>-1.59</td>
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<tr>
<td>Aug</td>
<td>-.97</td>
<td>-.77</td>
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<td>Sep</td>
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<td>-.43</td>
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<td>Oct</td>
<td>-.38</td>
<td>-1.05</td>
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<tr>
<td>Nov</td>
<td>.42</td>
<td>-.46</td>
</tr>
<tr>
<td>Dec</td>
<td>.65</td>
<td>-.31</td>
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88-04: sek = 1.19
96-04: sek = 1.63
Based On
Announced Prices

For Buyers, Is There Skewness to the High Side?
# Skewness

<table>
<thead>
<tr>
<th>Month</th>
<th>Skewness 88-04</th>
<th>Skewness 96-04</th>
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<tr>
<td>Jan</td>
<td>1.23</td>
<td>1.13</td>
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<td>Feb</td>
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<tr>
<td>Apr</td>
<td>2.60</td>
<td>2.09</td>
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<tr>
<td>May</td>
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<td>1.98</td>
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<tr>
<td>Jun</td>
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<td>Jul</td>
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<td>Aug</td>
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<td>Sep</td>
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<td>-.96</td>
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<td>Oct</td>
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<td>Nov</td>
<td>.36</td>
<td>.48</td>
</tr>
<tr>
<td>Dec</td>
<td>.94</td>
<td>.89</td>
</tr>
</tbody>
</table>

88-04: $\text{ses} = .59$

96-04: $\text{ses} = .82$
Based On Opportunities To Secure a Price

CME Settle Prices
February
Settle Prices, 1998-2004

Probability Distribution

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
January Settle Prices, 1998-2004

Probability Distribution

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
March
Settle Prices, 1998-2004

Probability Distribution

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
April
Settle Prices, 1998-2004

Probability Distribution

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
May Settle Prices, 1998-2004

Probability Distribution

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
June
Settle Prices, 1998-2004

Probability Distribution

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
July
Settle Prices, 1998-2004

Probability Distribution

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
August
Settle Prices, 1998-2004

Probability Distribution

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
September Settle Prices, 1998-2004

Probability Distribution

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
October
Settle Prices, 1998-2004

Probability Distribution

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
November Settle Prices, 1998-2004

Probability Distribution

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
December Settle Prices, 1998-2004

Probability Distribution

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
Jan, Mar, May, Jul, Sep, Nov Settle Price Dist., 1998-2004

Probability Distribution

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
Based On CME Settle Prices

For Buyers, Is There Skewness to the High Side?
## Skewness

<table>
<thead>
<tr>
<th>Month</th>
<th>Skewness 98-04</th>
<th>Significant</th>
<th>Skewness 98-03</th>
<th>Significant</th>
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<td>Jan</td>
<td>1.40</td>
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<td>Y</td>
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<tr>
<td>Feb</td>
<td>0.04</td>
<td>N</td>
<td>0.04</td>
<td>N</td>
</tr>
<tr>
<td>Mar</td>
<td>-0.18</td>
<td>Y</td>
<td>-0.53</td>
<td>Y</td>
</tr>
<tr>
<td>Apr</td>
<td>3.44</td>
<td>Y</td>
<td>-0.96</td>
<td>Y</td>
</tr>
<tr>
<td>May</td>
<td>3.54</td>
<td>Y</td>
<td>-0.35</td>
<td>Y</td>
</tr>
<tr>
<td>Jun</td>
<td>2.19</td>
<td>Y</td>
<td>0.51</td>
<td>Y</td>
</tr>
<tr>
<td>Jul</td>
<td>1.00</td>
<td>Y</td>
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<td>Y</td>
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<td>Aug</td>
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<td>Y</td>
</tr>
<tr>
<td>Sep</td>
<td>0.47</td>
<td>Y</td>
<td>0.57</td>
<td>Y</td>
</tr>
<tr>
<td>Oct</td>
<td>0.44</td>
<td>Y</td>
<td>0.56</td>
<td>Y</td>
</tr>
<tr>
<td>Nov</td>
<td>0.39</td>
<td>Y</td>
<td>0.45</td>
<td>Y</td>
</tr>
<tr>
<td>Dec</td>
<td>1.26</td>
<td>Y</td>
<td>1.07</td>
<td>Y</td>
</tr>
</tbody>
</table>
Settle Prices, 1998-2004

February

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
Announced Prices, 1998-2004

February

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
Announced vs. Settle Prices, 1998-2004

February

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
Announced vs. Settle Prices, 1998-2004

April

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
Announced vs. Settle Prices, 1998-2004

June

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
Announced vs. Settle Prices, 1998-2004

August

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
Announced vs. Settle Prices, 1998-2004

October

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
Announced vs. Settle Prices, 1998-2004

December

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
January
Settle Prices, 1998-2004

Probability Distribution

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
January 1998
Settle Prices

Probability Distribution

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
January 1999
Settle Prices

Probability Distribution

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
January 2000
Settle Prices

Probability Distribution

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
January 2001 Settle Prices

Probability Distribution

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
January 2002
Settle Prices

Probability Distribution

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
January 2003
Settle Prices

Probability Distribution

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
January 2004
Settle Prices

Probability Distribution

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
April
Settle Prices, 1998-2004

Probability Distribution

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
April 1998
Settle Prices

Probability Distribution

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
April 1999
Settle Prices

Probability Distribution

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
April 2000
Settle Prices

Probability Distribution

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
April 2001
Settle Prices

Probability Distribution

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
April 2002
Settle Prices

Probability Distribution

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
April 2003
Settle Prices

Probability Distribution

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
April 2004
Settle Prices

Probability Distribution

20 Cent Range, Midpoints Are Shown
(prices less than $9.00 and greater than 18 are grouped)
March Settle Prices

C-III Futures

Days Back From Last Day of Trading

- 2006
- 2005
- 2004
- 2003
- 2002
- 2001
- 2000
May Settle Prices

C-III Futures

Days Back From Last Day of Trading
July Settle Prices

C-III Futures

Days Back From Last Day of Trading

2006
2005
2004
2003
2002
2001
2000
September Settle Prices

C-III Futures

Days Back From Last Day of Trading

2006
2005
2004
2003
2002
2001
2000
November Settle Prices

C-III Futures

Days Back From Last Day of Trading
Has Variability Increased Over Time
Cash vs. Support Price
1962-May 2005

C-III/BFP
Support Price
Within Year Standard Deviation of Announced Prices
(Statistical Measure of Dispersion)

[Graph showing the annual standard deviation over the years from 1962 to 2002 with a steadily increasing trend.]
Class III Prices - 1962-Dec 2004
Table 2: Standard Error
Statistical Measure of Variability

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Standard Error (based on monthly data)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1962 - 1981</td>
<td>.88</td>
</tr>
<tr>
<td>1981 - 1988</td>
<td>.34</td>
</tr>
<tr>
<td>1988 – 1996</td>
<td>1.01</td>
</tr>
<tr>
<td>1996 – 2000</td>
<td>1.92</td>
</tr>
<tr>
<td>2000-2004</td>
<td>2.35</td>
</tr>
</tbody>
</table>

The higher the standard error values the more variability.
Is There More Milk Price Risk Today?

C-III Price Distributions (Announced, through Dec 04)

25 Cent Range, Midpoints Are Shown

Percent Occurrence

1980-Dec 87 1988-Dec 95 1996-Dec 04
Is There More Milk Price Risk Today?

C-III Price Distributions (Announced through Dec 04)

January

25 Cent Range, Midpoints Are Shown

1980-Dec 87  1988-Dec 95  1996-Dec 04
Is There More Milk Price Risk Today?

C-III Price Distributions (Announced through Dec 04)

March

25 Cent Range, Midpoints Are Shown

1980-Dec 87  1988-Dec 95  1996-Dec 04
Is There More Milk Price Risk Today?

C-III Price Distributions (Announced through Dec 04)

May

25 Cent Range, Midpoints Are Shown

1980-Dec 87  1988-Dec 95  1996-Dec 04
Is There More Milk Price Risk Today?

C-III Price Distributions (Announced through Dec 04)

July

25 Cent Range, Midpoints Are Shown

Percent Occurrence

1980-Dec 87 1988-Dec 95 1996-Dec 04
Is There More Milk Price Risk Today?

C-III Price Distributions (Announced through Dec 04)

September

25 Cent Range, Midpoints Are Shown

1980-Dec 87  1988-Dec 95  1996-Dec 04
Is There More Milk Price Risk Today?

C-III Price Distributions (Announced through Dec 04)

November

25 Cent Range, Midpoints Are Shown

- 1980-Dec 87
- 1988-Dec 95
- 1996-Dec 04
Seasonality
Seasonality

Note, that the large zone of volatility in April and May is largely due to the phenomenally high prices in 2004.
Zones of Volatility (1996-04)
Average +- 1 St. Dev (Top/Low 16th Percentile)

Announced Prices

Note, that the large zone of volatility in April and May is largely due to the phenomenally high prices in 2004.
Zones of Volatility
84th and 16th Percentile Prices, 1996-04

Announced Prices

As of Dec 2004
Seasonality Expressed As A Percent of Season Average Price

Announced Prices

Percent of Season Avg. Pric

Jan  Feb  Mar  Apr  May  Jun  Jul  Aug  Sep  Oct  Nov  Dec

Average
High 10%
Low 10%
Seasonality
(Announced Prices)
Zones of Volatility  (Announced Prices)
Average +- 1 St. Dev. (80-87, 88-95, & 96-04)

Note, that the large zone of volatility in April and May is largely due to the phenomenally high prices in 2004.
Monthly Cycle Behavior
(Announced Prices)
Monthly Cycle Behavior
(Announced Prices)
Monthly Cycle Behavior
(Announced Prices)

![Graph showing monthly cycle behavior with data points from 1988 to 2006.]
Monthly Cycle Behavior
(Announced Prices)
Monthly Cycle Behavior
(Announced Prices)
Monthly Cycle Behavior
(Announced Prices)
Monthly Cycle Behavior
(Announced Prices)
Monthly Cycle Behavior (Announced Prices)
Monthly Cycle Behavior
(Announced Prices)
Monthly Cycle Behavior
(Announced Prices)
Historical Behavior for last half of year is pessimistic and looks like 2002.
Fundamentals
Production has been significantly down over past two years, but significantly up very recently. Have we turned a corner on Production?
American Cheese Production

Mill. Lbs.

© 2003, University of Wisconsin (UW Dairy Market Website: www.aae.wisc.edu/future/)
Total Italian Cheese Production

UP Lbs.
End-of-Month Total Cheese Stocks

© 2003, University of Wisconsin (UW Dairy Market Website: www.aae.wisc.edu/future/)
Commercial Disappearance of Milk

Note: These values are milk equivalent, milkfat basis.

© 2003, University of Wisconsin (CW Dairy Market Website: www.ane.wisc.edu/future/)
DOWN, but still historically high
Commercial Disappearance of American Cheese

Mill. Lbs.

© 2005, University of Wisconsin (UW Dairy Market Website: www.aae.wisc.edu/future)
Still attractive, but trending down

Milk-Feed Price Ratio: 2000-Present

© 2003, University of Wisconsin (UW Dairy Market Website: www.aae.wisc.edu/future/)
So, the Price Will Be?
<table>
<thead>
<tr>
<th>Fundamental</th>
<th>Impact on Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production is trending up</td>
<td>down</td>
</tr>
<tr>
<td>Cheese stocks are up</td>
<td>down</td>
</tr>
<tr>
<td>Commercial Disappearance sideways to down</td>
<td>down</td>
</tr>
<tr>
<td>Milk:Feed ratio trending down but still attractive for production</td>
<td>Sideways to down</td>
</tr>
<tr>
<td>Replacement Prices high</td>
<td>up</td>
</tr>
</tbody>
</table>
Don’t Rush To Conclusions

- CWT
- Imports & Exports
- Canadian Cattle
- Farm Bill
- Production up now, but was low for the past two years
  - Refrigerators are empty
  - Processors don’t want to get caught buying expensive milk
So, the Price Will Be?
What is Price Risk Management?
Price Risk = Fire Risk?

- Do you earn a profit from paying your fire insurance?
  - No, but you do assure your asset base if a wreck happens!

Assuring a Price Outcome
What is Price Risk Management

Assuring an Outcome
What is Price Risk Management?

Better Yet:
Assure an Attractive Price!
What Happens to the Distribution When You Have a Floor Price at $11.70?
MARKETING PLAN – WHY?

1. Instills discipline into a normally emotionally driven decision

2. Provides a means to evaluate, benchmark, and learn the science and art of marketing
Parts of a Marketing Plan

1. Inventory of marketing resources, risk tolerance, and non-price marketing objectives
2. Costs of production
3. Financial objectives
4. **Personal Price Targets**
5. Basis
6. Historical benchmark prices
7. **Price Triggers for Marketing Action**
8. Market information sources, situation, & outlook
9. **Marketing Protocols (what do you do when your trigger has been hit!)**
10. Evaluation, control, and record-keeping
What is a Good Price Based on What I Uniquely Need

• Establish Price Targets Based On:
  - cost of production
  - other farm business and family goals that you want the dairy to pay for
Financial Objectives - Example

17,000 (family living draw)
3,000 (college fund)
15,000 (equity for future expansion)
5,000 (misc.)

40,000
Price Target – Example
(not including costs of production)

Recall Financial Objective: 40,000 net profit

83 cows @ 18,500 lb. average = 15,355 cwt. of milk

\[
\frac{40,000}{15,355 \text{ cwt}} = \$2.60/\text{cwt}
\]

Note: Family living draw only = $1.11/cwt
Price Target – Example
(including costs of production)

$40,000 price target costs $2.60/cwt

Costs of production = $10.96

Total price needed to pay costs of production and farm business and family goal needs:

$10.96+$2.60 =$13.56

Family living draw only = $12.07 (10.96+$1.11)
Purple Ribbon: the “life is really good” price

Blue Ribbon: primary price requirement ($13.56)

Red Ribbon: minimum price requirement ($12.07)
Price Triggers

- Gun is loaded
- Duck is in my sights
- It’s duck season
- It’s a big duck

A Pricing opportunity:
- Exceeds my purple ribbon price target
- Is top 15% historically

PULL THE TRIGGER!

PULL THE TRIGGER!
Marketing Tools and Strategies
What are they?
When is it best to use them?

Call  Forward  Sale
Put   Hedge   Short Fence
Hedge
Do Nothing
Make It Simple
(User Friendly)
It’s April 9, 2004
- November 2004 Forward Contract is available at $13.68
- December 2004 F.C. is available for $12.90

That is a top 25th percentile price for both months and well above blue ribbon price.

Pull the trigger!!
Piece of Cake – Right?

- As of December 8th,
  - November announced at $14.89
    - “LOSS” OF $1.21/cwt.
  - December settled at $16.55
    - “LOSS” OF $3.65