Futures & Options for Farm Risk Management
Forward contracts are not a recent invention

Confirmation on a forward contract on Barley

Delivery point: Mesopotamia, Anum-pisha and Namran-sharur’s warehouse.

Delivery date: Month of Ulul, 19th day, the year when King Abieshuh finished a statue of Entemena as god (1700 BC)

Ulul = August/September.

Income Variation

\[ \text{Income} = \text{price} \times \text{volume} + \text{support} \]

Risk Risk
Variability of yield and of price in Southern Sweden

- Price volatility: 74%
- Yield / ha volatility: 26% average

Graph showing yield/ha volatility and price volatility from 1975 to 2008.

Pie chart showing:
- Yield / ha volatility 10 yr average: 26%
- Price volatility: 74%
Market Risk is the worst, Irish Farmers say

<table>
<thead>
<tr>
<th>Average Ranking Position</th>
<th>Risk Factor</th>
<th>Average Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt;</td>
<td>Market Risk (e.g. Price Volatility)</td>
<td>1.74</td>
</tr>
<tr>
<td>2&lt;sup&gt;nd&lt;/sup&gt;</td>
<td>Production Risk (e.g. Weather variability and animal disease)</td>
<td>2.43</td>
</tr>
<tr>
<td>3&lt;sup&gt;rd&lt;/sup&gt;</td>
<td>Personal Risk (e.g. Health, Accidents, Lifestyle and succession)</td>
<td>3.07</td>
</tr>
<tr>
<td>4&lt;sup&gt;th&lt;/sup&gt;</td>
<td>Institutional Risk (e.g. change in environmental standard or subsidies)</td>
<td>3.40</td>
</tr>
<tr>
<td>5&lt;sup&gt;th&lt;/sup&gt;</td>
<td>Financial Risk (e.g. change in interest rates)</td>
<td>4.33</td>
</tr>
</tbody>
</table>

Source: Teagasc National Farm Survey (Autumn Survey 2011)
Hedged and unhedged farm

- **Hedging** reduces risk & makes it **more attractive to farm**
- **More** food is produced
- **Food price becomes lower**
Rolling correlations between Swedish farmgate prices and Matif EBM / CBOT SRWW futures prices

Correlations increase with hedging horizon

<table>
<thead>
<tr>
<th></th>
<th>Matif</th>
<th>Chicago</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>0.23</td>
<td>0.18</td>
</tr>
<tr>
<td>1 month</td>
<td>0.72</td>
<td>0.57</td>
</tr>
<tr>
<td>3 month</td>
<td>0.87</td>
<td>0.82</td>
</tr>
<tr>
<td>6 month</td>
<td>0.94</td>
<td>0.94</td>
</tr>
</tbody>
</table>
You can hedge any Swedish grain with Matif Milling Wheat
Risk management methods in the US ’Corn Belt’

US Grain Farmers use the following methods:

- 40% forward contracts
- 25% futures contracts
- 70% saved cash
- 37% diversified business

Additional insights can be drawn from Harwoods’ study regarding exchange-traded forward contracts, futures:

• The size of farm and education are positively correlated with the use of futures.
• The farmer’s (subjective) perception of risk reduction by futures is positively correlated with the use of futures.
• Farmers with high debt levels use futures more often than those with lower debt.
A study of Swedish Grain Growers’s hedging attitudes

- I did a survey of hedging attitudes on members of the Swedish Growers Association at New Year 2011/12.
- 94 responses (from 200 surveys sent out).
- 28 questions with 75 response alternatives.

<table>
<thead>
<tr>
<th></th>
<th>Grain</th>
<th>Rape seed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Before harvest</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hedged via forwards</td>
<td>74%</td>
<td>60%</td>
</tr>
<tr>
<td>Hedged via (OTC) futures</td>
<td>23%</td>
<td>13%</td>
</tr>
<tr>
<td><strong>Average hedged overall</strong></td>
<td>29%</td>
<td></td>
</tr>
</tbody>
</table>

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<tr>
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</tr>
</thead>
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<tr>
<td><strong>After harvest</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hedged via forwards</td>
<td>65%</td>
<td>44%</td>
</tr>
<tr>
<td>Hedged via (OTC) futures</td>
<td>17%</td>
<td>11%</td>
</tr>
</tbody>
</table>
Making sense of the answers

- The **first** factor had **all** the explanatory power.
- The chairman of the Grain Growers’ Association called it “businessmanship”.
- You can think of it as ”the force” from Star Wars. For some individuals this force of ”businessmanship” runs strong.

<table>
<thead>
<tr>
<th>Loading to factor..</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>......</th>
<th>Factor 74</th>
</tr>
</thead>
<tbody>
<tr>
<td>Answer 1</td>
<td>nn</td>
<td>nn</td>
<td>...</td>
<td>nn</td>
</tr>
<tr>
<td>Answer 2</td>
<td>nn</td>
<td>nn</td>
<td>...</td>
<td>nn</td>
</tr>
<tr>
<td>....</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Answer 74</td>
<td>nn</td>
<td>nn</td>
<td>...</td>
<td>nn</td>
</tr>
</tbody>
</table>

Correlation Matrix, 74x74

PCA
The factor loadings

- Share hedged
- I think Matif protects well
- I understand forward contracts
- I sell a lot of grain
- I think CBOT protects well
- Price variation is an exciting opportunity
- I am always able to sell in the upper third of the price range
- I read a bank's newsletter as my primary source of information
- I am good at timing the market
- My farm is large
- I have a University degree
- I take advice from consultants
- I have a custody account (for securities)
- I use my own analysis
- I mainly read Agronomics for market information
- I read mainly sites on the Web for market information
- I hedge before harvest
- I have hedged rape seed through a bank, but not this year
- I rent land
- I live in Southern Sweden
- I am a member of a Futures Club
- Age
- I live in Western Sweden
- I mainly read research from grain traders
- Farm Debt / Equity ratio
- Use grain on the farm
- Live in the middle of Sweden
- Live in Eastern Sweden
- I do not rent land
- Upper secondary education
- I manage to sell in the top third of the price range
- I mainly read ATL for market information
- I manage to sell at the lower third of the price range
- I do not use own analysis
- I have 9 years of education only.
- I do not think CBOT futures protects well
- I do not have a custody account
- I do not take advice from consultants
- Price variation is a source of worry
- I am not good at timing the market
- I do not think Matif futures is a good hedge
- I do not understand forwards

The factor loadings
Differences

Unlike the US study

- Age does not matter (but education matters)
- Financial leverage does not matter
- It seems that poor farmers do not hedge, but rich farmers do. This is contrary to the US study and to who buys ordinary insurance.

- Perhaps the use of futures is not seen as "insurance" or "risk management"…. But as a marketing tool…
Use of derivatives…
…is not only about removing risk.
It is a marketing and farm optimization decision
Premium or discount for future delivery

\[ F = \text{spot price} + \text{interest} + \text{storage cost} - \text{convenience yield} \]

<table>
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<tr>
<th>Price</th>
<th>Time to delivery</th>
</tr>
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<tr>
<td>Spot price</td>
<td>&quot;Contango&quot;</td>
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<tr>
<td>Spot price</td>
<td>&quot;Backwardation&quot;</td>
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</table>
Forward curves for Matif European Milling Wheat
What if you sold December each November?
If we ’rolled’ a short futures position in Dec contracts…

- Start, end-November 2006: Spot price = 500 cents / bu
- Sell December 2007, Last day of November 2007, buy it back and sell December 2008. We get:
  - Dec 2007 : -322.5 cents
  - Dec 2008 : +186 cents
  - Dec 2009 : +72 cents
  - Dec 2010 : -18.75 cents
  - Dec 2011 : +185.5 cents
  - Dec 2012 : -190.75 cents
  - Dec 2013 : +219.25 cents
  - Total = +131.25 cents = +26% return from a short hedge!
  - Spot price = 649.5 = +30% higher price!
Owning futures and owning physical wheat does not have the same return over time.
A summary of historical returns from being long

<table>
<thead>
<tr>
<th>Since 1980</th>
<th>Wheat</th>
<th>Corn</th>
<th>Soybeans</th>
<th>Lean Hogs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spot price change</td>
<td>44%</td>
<td>142%</td>
<td>102%</td>
<td>71%</td>
</tr>
<tr>
<td>Forward price return</td>
<td>-94%</td>
<td>-91%</td>
<td>-20%</td>
<td>-84%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Per annum</th>
<th>Wheat</th>
<th>Corn</th>
<th>Soybeans</th>
<th>Lean Hogs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spot price change</td>
<td>1.2%</td>
<td>2.8%</td>
<td>2.3%</td>
<td>1.7%</td>
</tr>
<tr>
<td>Forward price return</td>
<td>-8.6%</td>
<td>-7.2%</td>
<td>-0.7%</td>
<td>-5.6%</td>
</tr>
</tbody>
</table>

Of course, a farmer would be short, so +8.6% p.a. on average for wheat.
If futures are a MARKETING TOOL to farmers, Commercials (farmers) sell when the price is high.
Commercial net position and the wheat price
Hedging the Milk Price
The correlation between the Swedish price and SMP+Butter futures is too low for outright hedging.

But, since they are related, intelligent hedges are possible, at the right moments

(Error correction models = speculation hedge).
Forwards (bid side) in February and the development of Arla’s price and the Eurex (now EEX) index (which forwards settle against)
Pionjären Per-Fredrik är nöjd

Per-Fredrik Petén prisnäckrade en del av sin mjölkproduktion på hon- sen i februari när priserna stod som högsta. I dag gör han mycket bra affärs.

När priset för ett kilo mjölk lag på över 4 kronor på börserna i februari var det liggant riktigt, hävdade Per-Fredrik Petén.

– Jag förstod ju att det skulle sjunka och däremot att det var dags att pröva något nytt. Per-Fredrik är Sveriges första och hittills enda lantbrukare som prisnäckrade mjölk. Han ville inte uppge hur mycket rösten han skänkte men han lämnad priset på 4,10 kronor per kilo.

Sedan februari har priset på mjölk börjat falla med 25 procent, från 4,10 till 3,07 kronor. Under samma period har Åkars avräkning priset med 17 procent – från 3,84 kronor (huvud- ningsandel mjölk) till 5,14 kronor per kilo.

Hedged – made a huge profit

Prissäkrade – gör storvinst

Terminkurvan för mjölk på råvarubörsen Eurex

Sugen på att säkra mjölkpriset? Rösta med

Source: Land Lantbruk, 26 September 2014
Farmers who sell futures on butter to hedge, seem to be paying an insurance premium.

The insurance (or risk) premium is about 12% per year. Futures return is constructed by rolling the last day of the month before expiry.
Risk averse farmers are willing to accept a lower price in return for certainty


A price of 0.30 Euro / Kg, means that 2 cents is about 6.5%.

Source: Teagasc National Farm Survey Data (2011)
Milk futures development

- To hedge 100 kg of raw milk, sell 5 kg butter futures and 9 kg of SMP futures.

Open Interest (number of contracts) has increased very much since the exchange started 5 years ago.
Conclusion

• The arrival of price volatility and futures has been an exciting opportunity to excel to some, and the opposite for others.
• Futures and price discovery integrate geographical markets very effectively.
• Hedging is risk reduction, marketing and investment.
  – Long-term hedging returns can be positive or negative.
• It takes time. Learning is year by year, trial and error.
• In order to learn, some entrepreneur must educate the market and be willing to take some risk.
• Many will trade forwards which are futures wrapped as bilateral contracts, but the pricing goes back to exchanges.
• You cannot have a market without ”Non-commercials”.
Policy Advice

• Article 57 and 58 in MiFID2: Delete all of it, not just the previously stated purpose.
• Exempt commodity derivatives from EMIR.
• If you want to help farmers, encourage natural insurers, like pension funds, to carry their risk.

• Do not try to find and exploit loopholes, or create government-funded initiatives as compensation, to improve the position of the farmer, when you have the power to create good, and destroy bad laws for a free market solution.