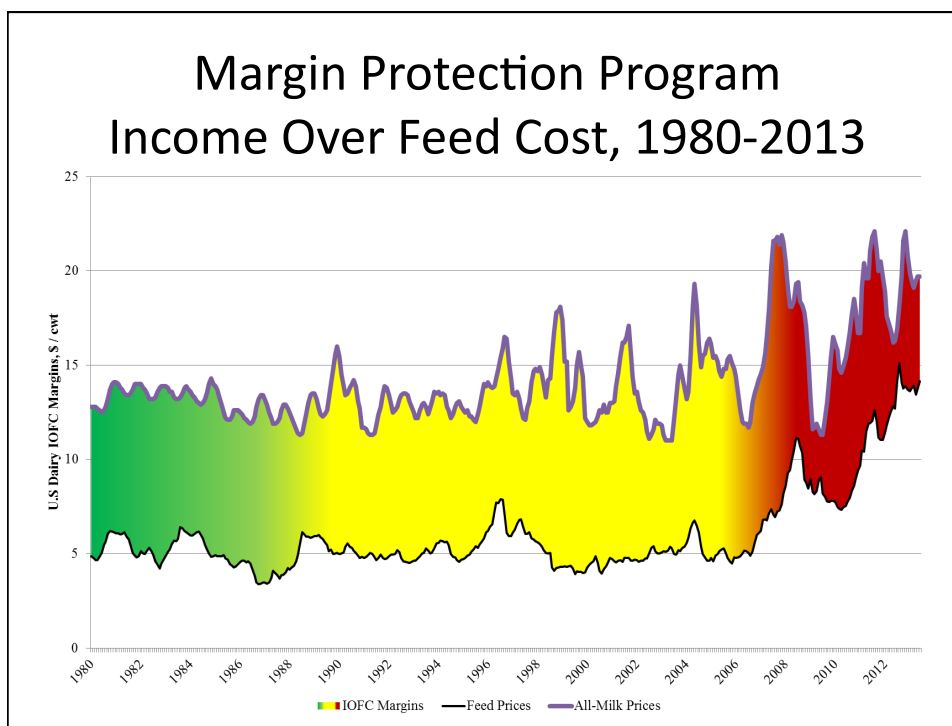


# Measuring Dairy Farm Financial Performance: Implications for Markets and Policy

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## Motivation

- For decades, dairy policy used milk price as a policy trigger
- Increased feed levels and volatility in milk and feed prices have made previous policy triggers less relevant



## Objectives

- Identify measures of farm performance
- Historical analysis of farm financial performance indicators
- Evaluate alternative indicators of farm performance
- Recommend an indicator as most appropriate for action trigger in dairy policy

## Measures of Farm Financial Performance

- Profitability: generating sufficient returns to all factors of production
  - Net farm income, Rate of Return on Assets
- Solvency: possessing sufficient assets to cover liabilities
  - Debt-to-asset ratio
- Liquidity: having liquid assets to pay bills as they come due
  - Current ratio, Working capital

## Relationship of Farm Financial Performance Measures

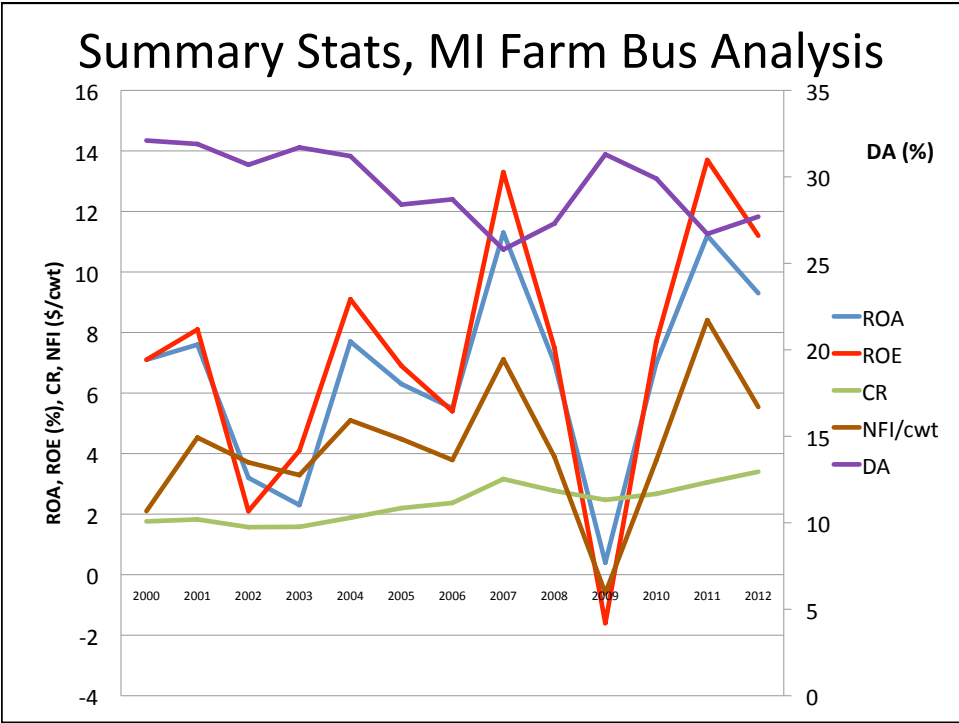
- We would expect over some length of run that these measures would be related
  - Profit is used to pay down debt (improve solvency) and unprofitable firms may need to acquire debt so DA would be negatively correlated with profit
  - Profits can be saved to improve liquidity and solvent (and profitable) firms can receive short-term loans to help liquidity so we would expect a positive correlation

## Michigan Data

- Balance sheets and income statement for 110-140 dairy farms 2001-2012
- Detailed monthly cash expenses for 55 dairy farms on Telfarm Level 2
- Herd sizes 20-2000 cows

## Michigan 2002-2012

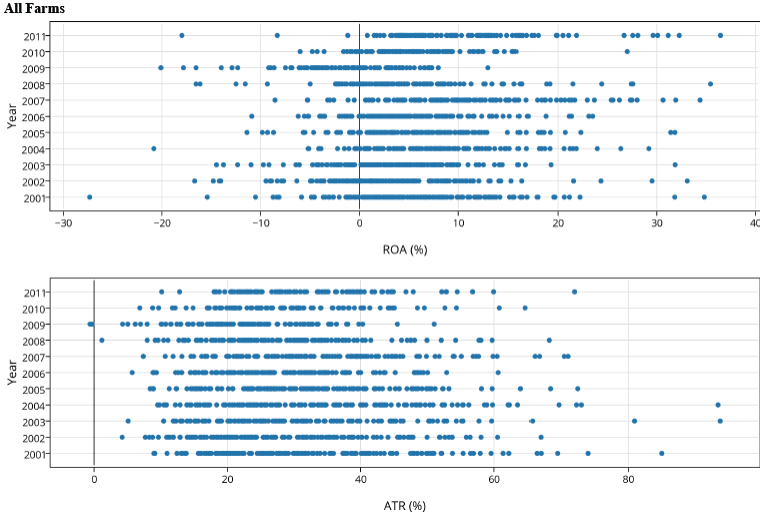
Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
<b>ROA (%)</b>	3.2	4.3	7.7	6.3	5.5	11.3	7.0	0.4	7.0	11.2	9.3
<b>Milk Price (\$/cwt)</b>	12.47	12.59	16.42	15.70	13.44	20.21	19.41	13.31	16.88	20.65	18.67
<b>Purch. Feed (\$/cwt)</b>	3.45	3.56	4.36	4.06	3.74	5.32	5.56	4.56	5.06	6.01	6.14
<b>Total Feed Cost (\$/cwt)</b>	7.01	7.18	7.47	8.14	8.29	9.55	12.54	11.35	10.14	12.56	13.02
<b>IOFC (\$/cwt)</b>	5.46	5.41	8.95	7.56	5.15	10.66	6.87	1.96	6.74	8.09	5.65



### MI Mean Financial Measure Contemporaneous Correlations

	ROA	CR	DA
ROA	1		
CR	0.59	1	
DA	-0.64	-0.84	1
NFI/cwt	0.86	0.46	-0.68

# Variation across farms



# Contemporaneous Correlations by Performance Measure Across Farms

	ROA	CR	CA
ROA	1		
CR	0.05	1	
DA	-0.26	-0.13	1
NFI/cwt	0.64	-0.18	-0.23

## Uses of Triggers in Dairy Policy

- Indicate general health of farms
- Indicator of dairy farm financial distress that triggers policy response (e.g., indemnity payments)
- Dairy policy actions with triggers
  - Price Support Program – parity price
  - MILC – benchmark price and feed adjuster
  - Margin Protection Program – income over feed
  - Dairy Product Donation Program – income over feed

## Characteristics of Useful Indicators

- Accurate
- Representative
  - Capturing many dimensions or one? (e.g., profit or cash flow)
  - Regional issues
  - Herd size issues
  - Feed model issues (e.g., homegrown vs purchased)
- Timely
  - Easy and publicly available
- Transparent
  - Not just available but understandable

## Indicators of Dairy Farm Situation

- Milk-to-Feed Price Ratio
  - Milk is largest source of revenue and feed is largest cost
- Income over feed cost
  - All milk, Class III price
  - NASS corn, soybean, soy meal and hay prices
  - CME or CBOT prices
- Cost of production values
- Cost indices

## Milk-to-Feed Price Ratio

*US All milk price/US Feed price*

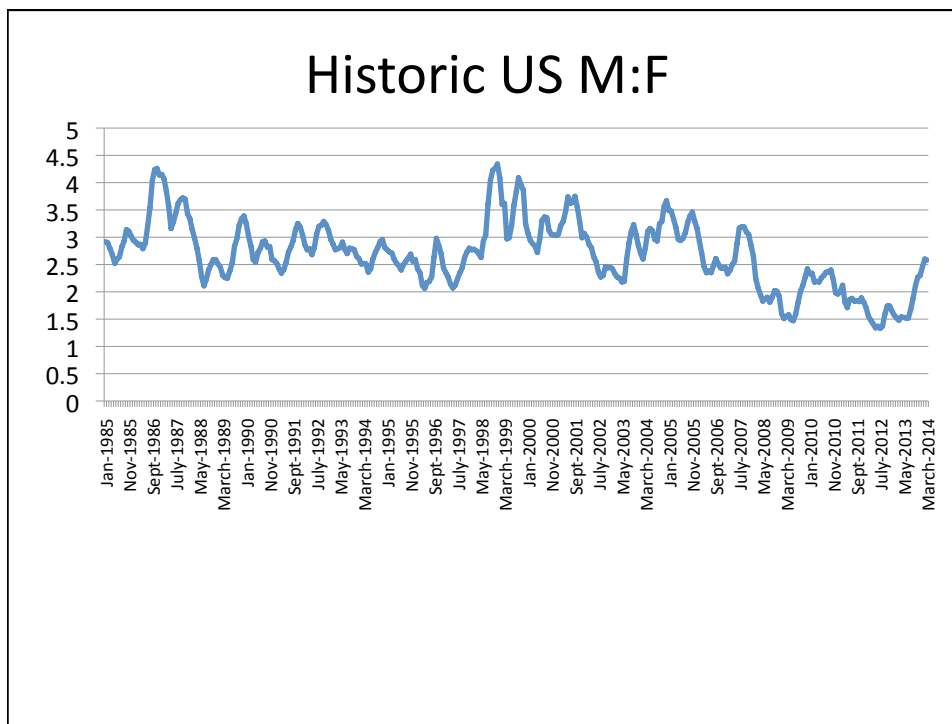
where the feed price is price of one hundred pounds of feed calculated as:

$[(\text{Price of corn}(\$/\text{bu})/56) \times 50] +$

$[(\text{Price of soybeans}(\$/\text{bu})/60) \times 8] +$

$[(\text{Price of hay}(\$/\text{ton})/2000 \times 41)]$

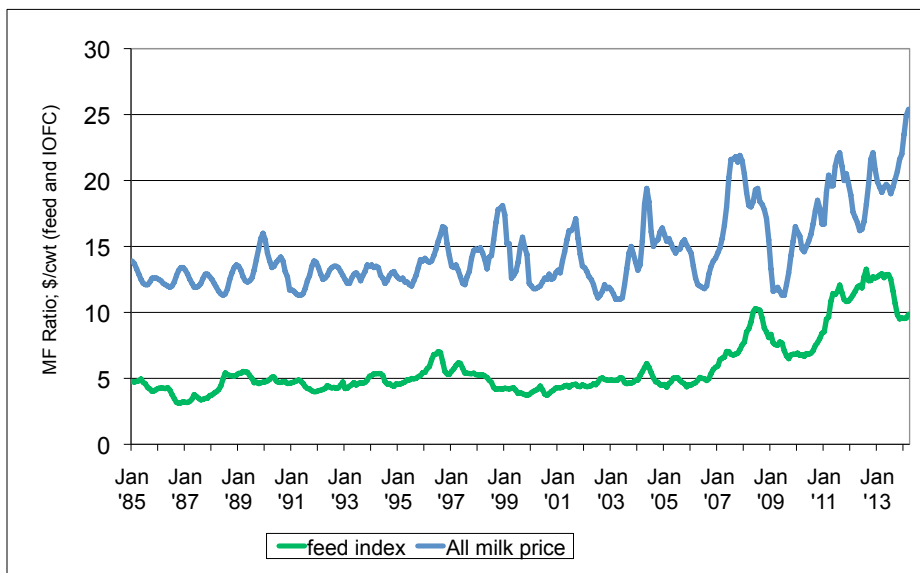




## Why a ratio?

- Scales the milk price using the largest input cost
- Similar ratios used in hog and broiler industries
- Advantages:
  - Easy to calculate, easy to understand
- Disadvantages:
  - When one series changes fundamentally, relationship to past benchmarks may not be relevant
  - Does not account for changes in feed efficiency from genetics and management

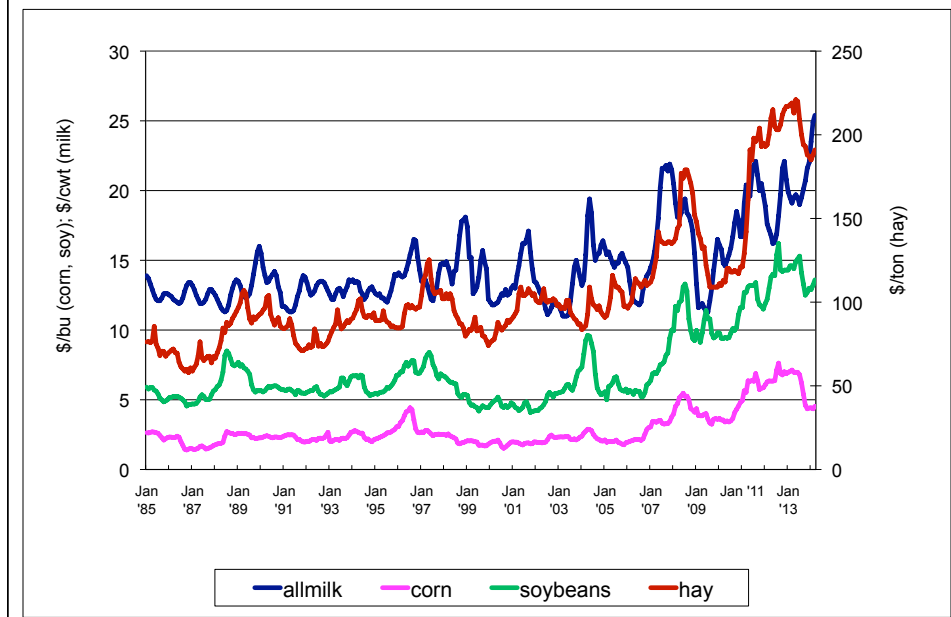
## All Milk Price and Feed Index, 1985-2014



## Issues with M:F

- Assumes that a proportionate relationship does (or should) exist
  - Rule of thumb was above 3.0 meant profitable
- May not appropriately reflect profitability
  - Feed costs increased in both level and variation
  - Exports made milk price less a function of domestic market fundamentals

## M:F Component Prices

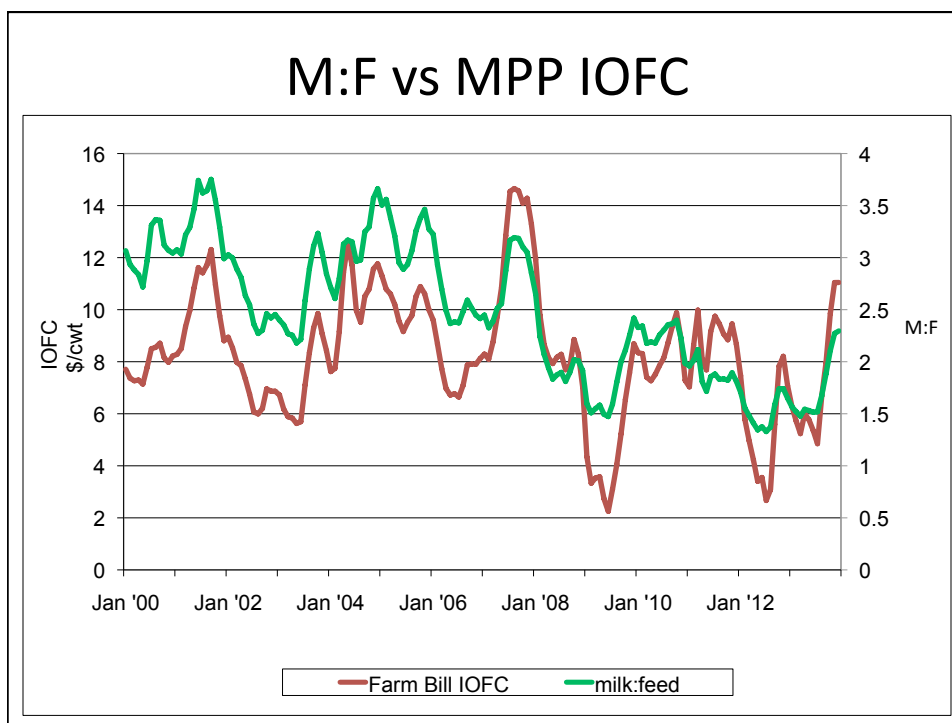


## Income Over Feed Cost Margins

- Analogous to M:F use All milk, corn, soybean and hay prices from NASS
- Farm Bill Margin Protection Program IOFC:

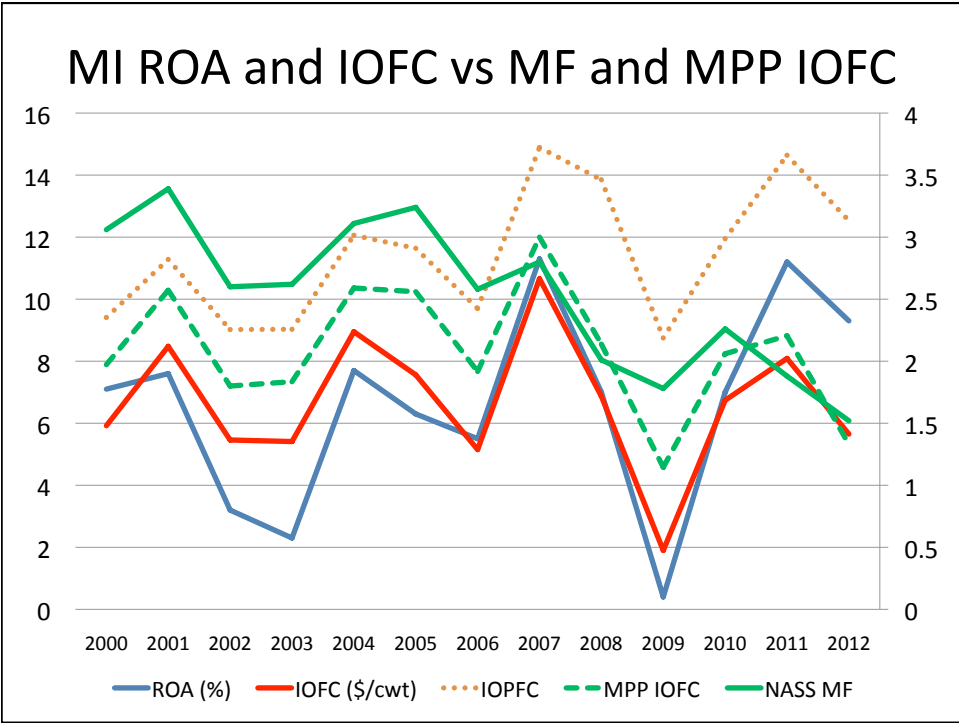
$$\text{IOFC} = \text{All milk Price} - (1.10728 \times \text{Corn Price} + 0.0735 \times \text{SBM Price} + 0.0137 \times \text{Hay Price})$$

where Soybean meal price is Central Illinois rail price.



### M:F vs. MPP IOFC, 2000-2013

- Correlation 0.88
- M:F
  - 2000-13: Ave = 2.47, StDev = 0.64
  - 2000-06: Ave = 2.94, StDev = 0.42
  - 2007-13: Ave = 2.00, StDev = 0.46
- MPP IOFC (\$/cwt)
  - 2000-13: Ave = 8.26, StDev = 2.44
  - 2000-06: Ave = 8.71, StDev = 1.79
  - 20007-13: Ave = 7.89, StDev = 2.89

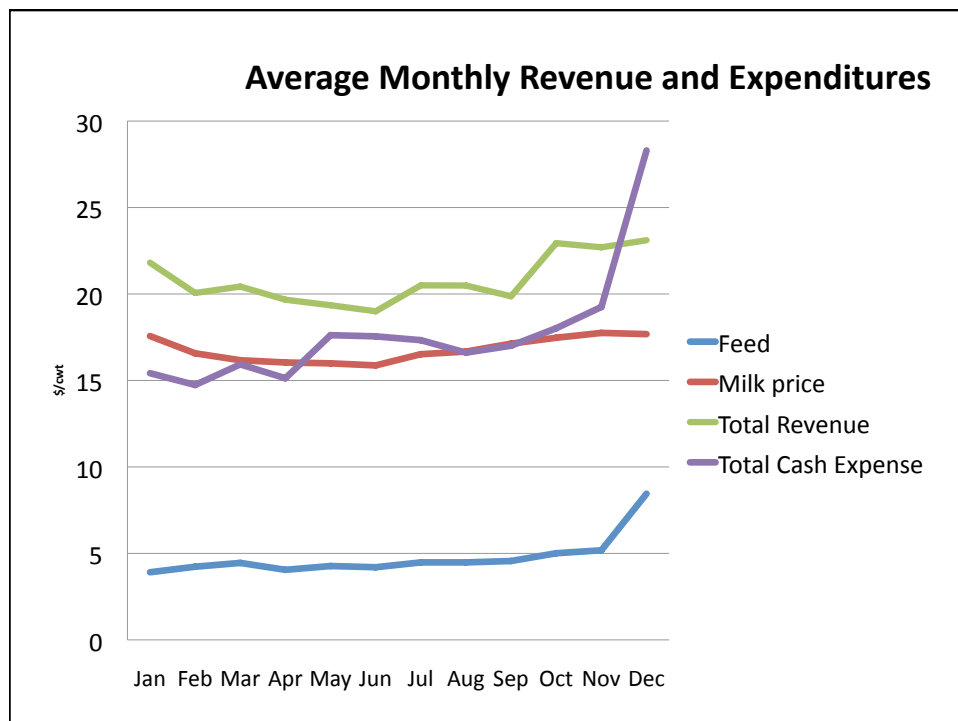


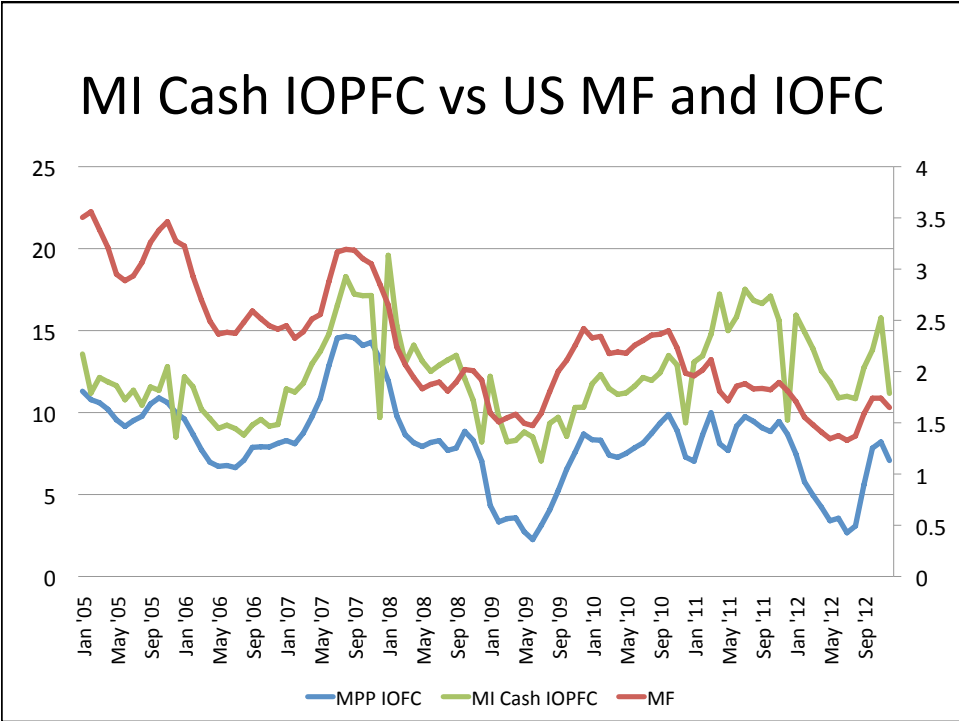
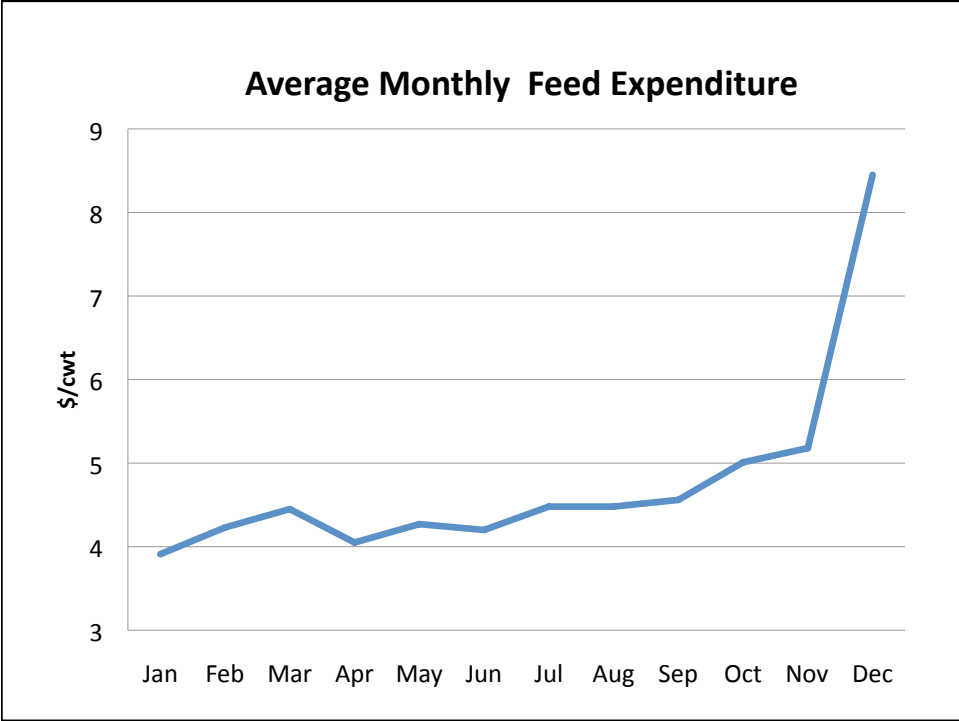
### Correlations, Annual Values 2000-2012

	MI ROA	MI IOFC	MI IOPFC	US NASS MF
MI ROA	1			
MI IOFC	0.80	1		
MI IOPFC	0.86	0.74	1	
US NASS MF	0.03	0.48	-0.18	1
US MPP IOFC	0.59	0.93	0.56	0.69

## Annual vs Monthly

- Monthly cash flows a function of:
  - Milk and feed price
  - Farm feed production and stocks situation
  - Market opportunities
  - Debt structure
  - Weather
  - Herd health
  - Tax incentives





## Correlations and Summary Statistics, Monthly 2005-2012

	MF	MPP IOFC	MI Cash IOPFC
MPP IOFC	0.77		
MI Cash IOPFC	0.08	0.56	
Mean	2.26	8.18	12.24
St Dev	0.59	2.72	2.72
CV	0.26	0.33	0.22

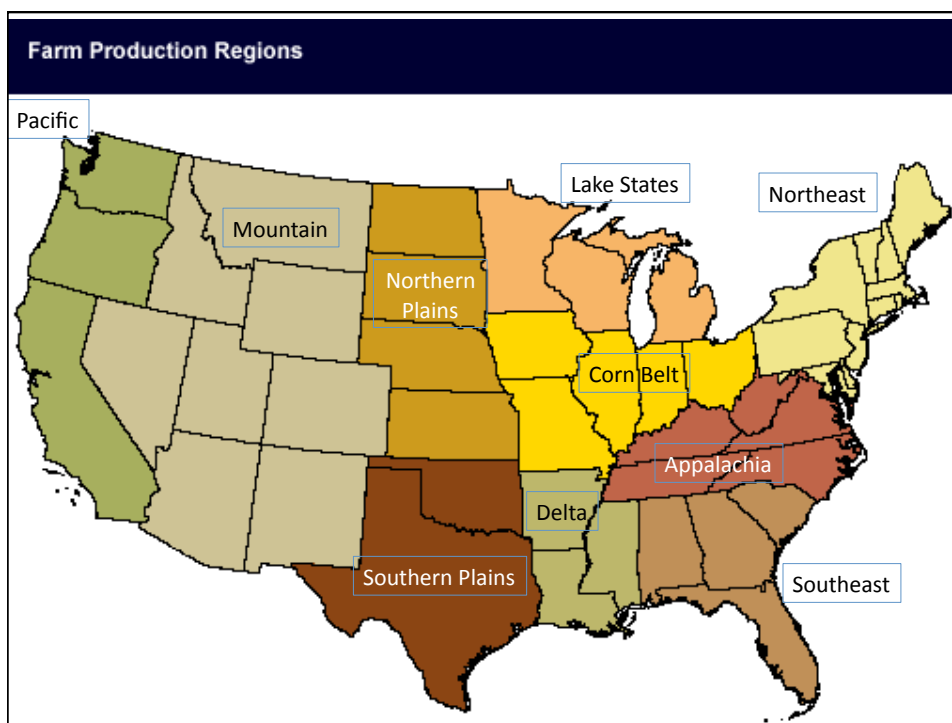
## Other State and Farm Financial Data

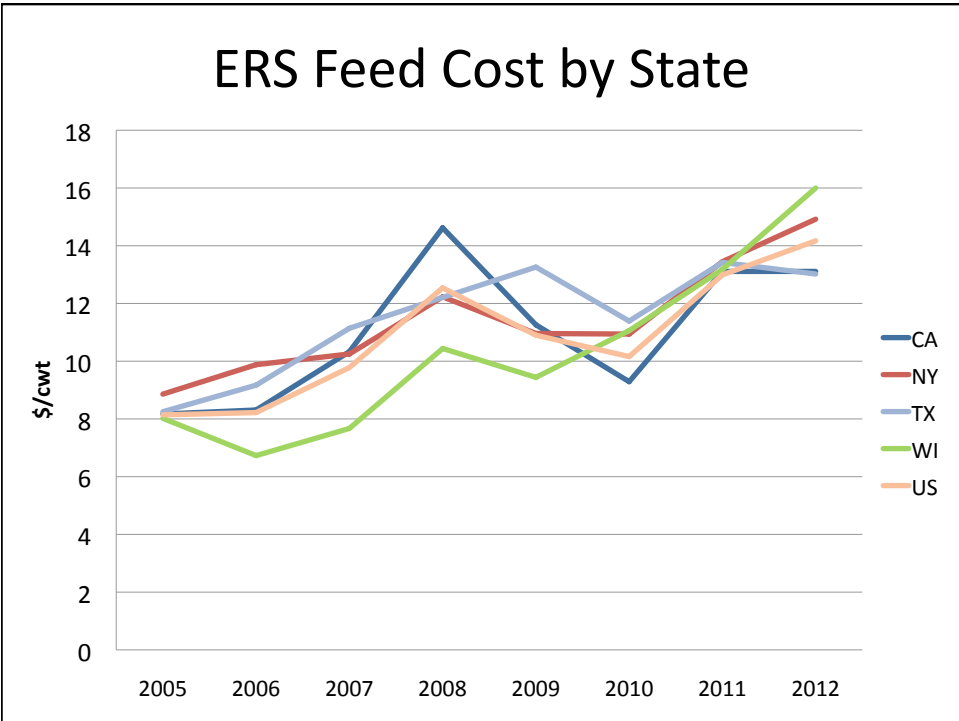
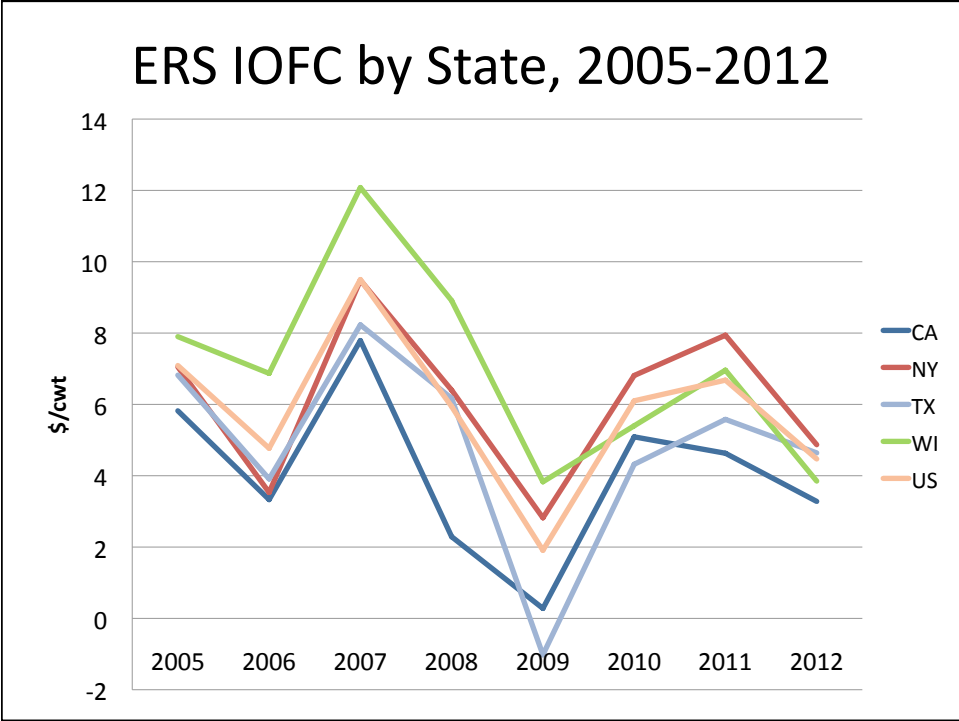
- Cornell Dairy Farm Business Analysis
- University of Wisconsin Dairy Farm Analysis
  
- California Department of Food and Agriculture
- Texas A&M representative farms
- IFCN

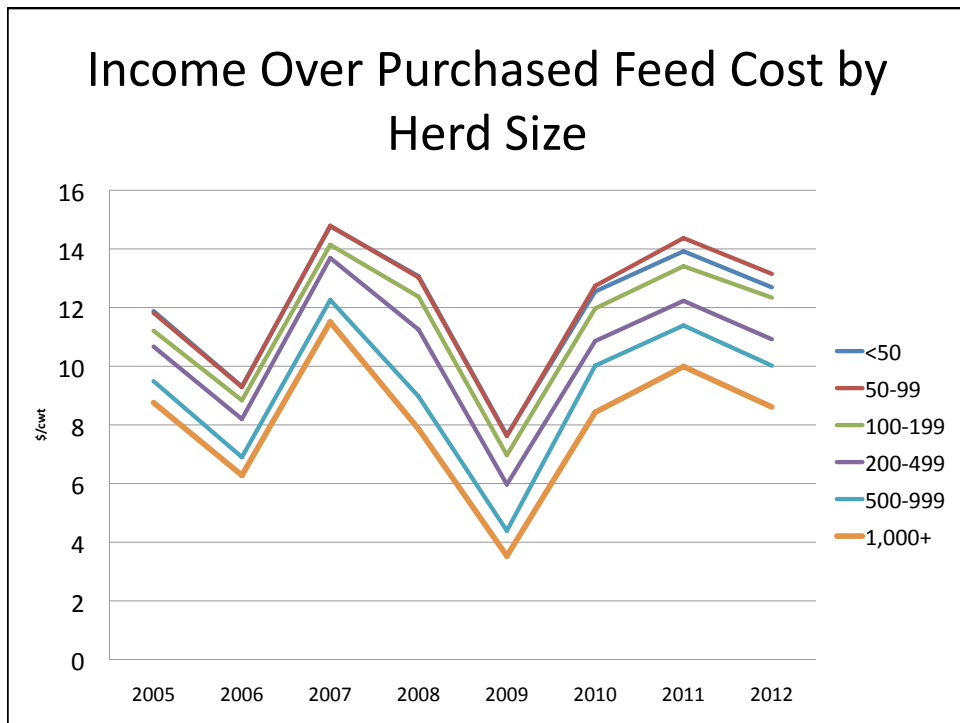
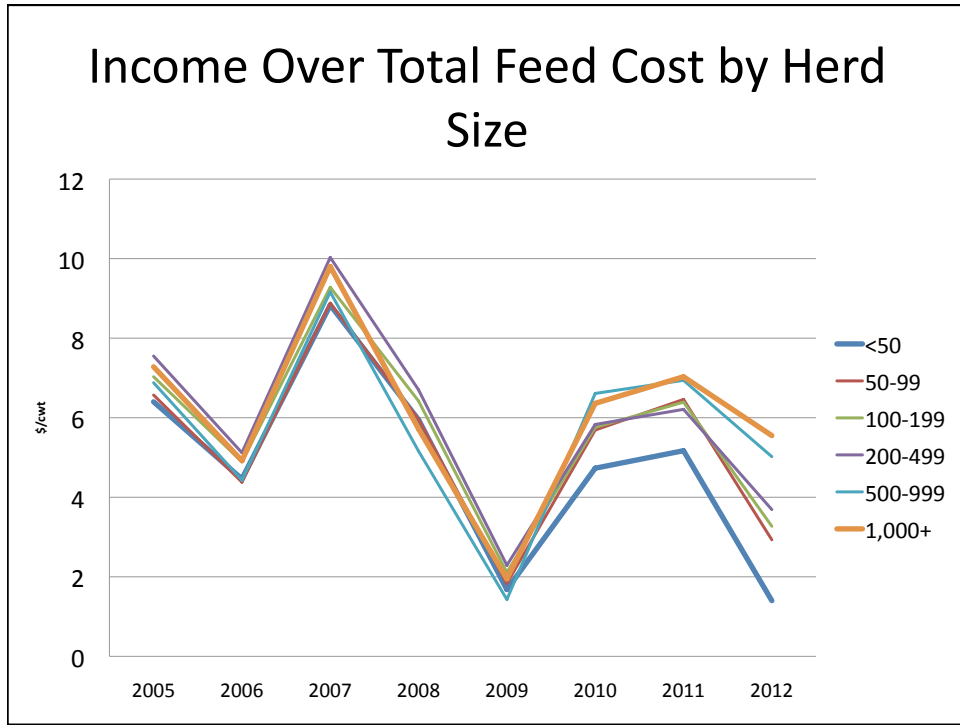


## USDA ARMS Data

- Only nationally representative dairy financial data
- Updated every 5 years (e.g., 2000, 2005, 2010)
- Used to calculate US cost of production by regions on a monthly basis







## ARMS data

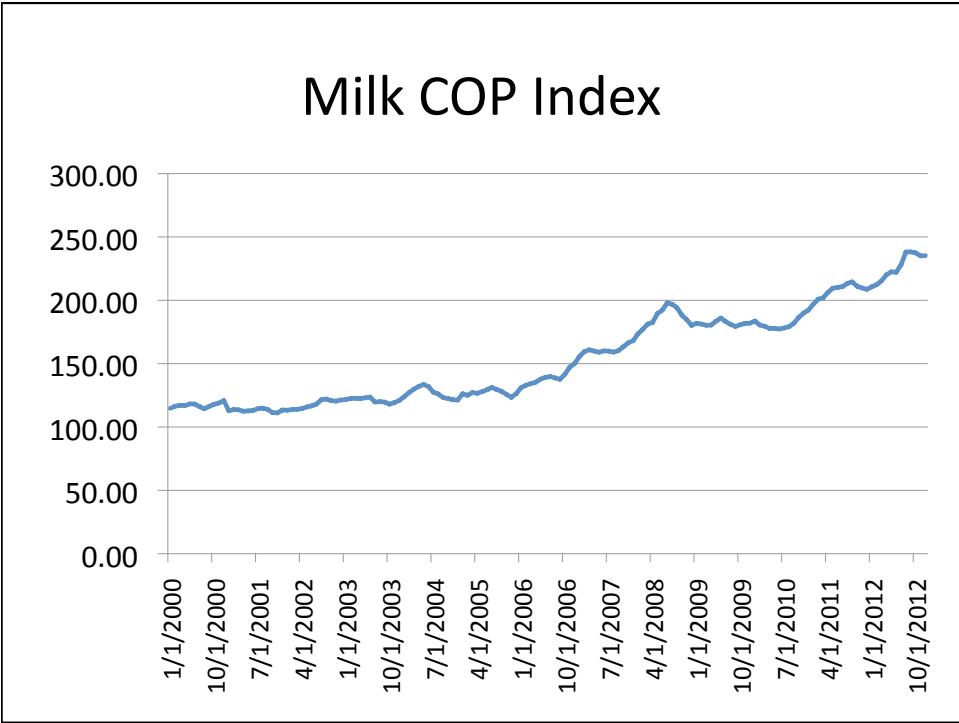
- Serves an important purpose as a national data set
- Collects quantities and assigns state prices
  - Does not account for homegrown feed production advantages or timing and management aspects of purchases/sales
- Only adjusts quantities every 5 years

## Economic or Cost Indices

- USDA Index of Prices Paid
  - Feed
  - Fuel and Energy
  - Interest rates
  - Wage rates
  - Machinery
  - Supplies

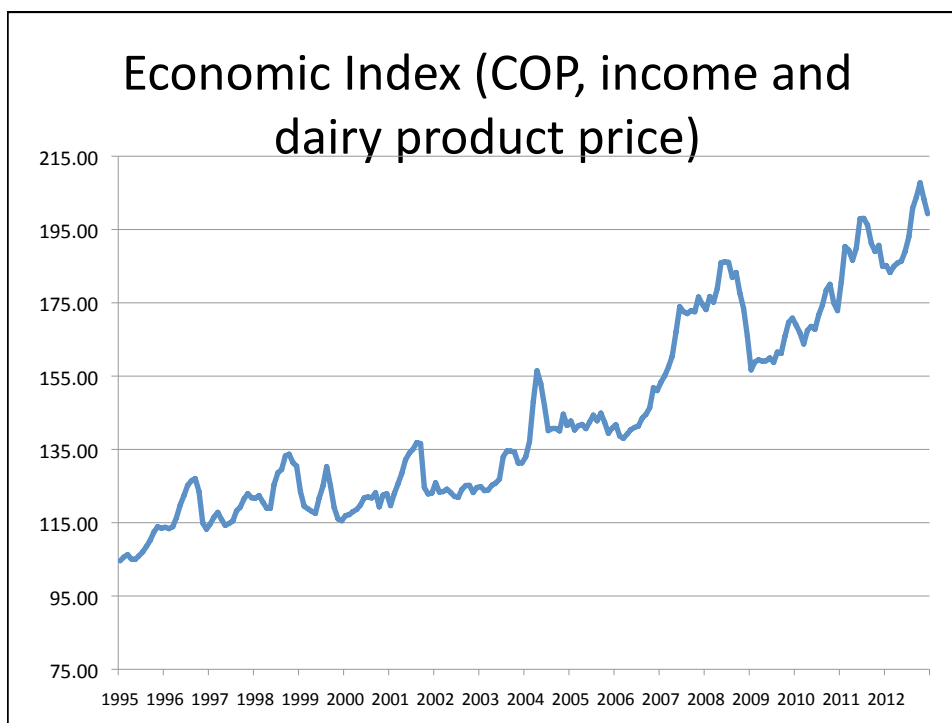
From Jan 2000-Dec 2012 COP Index increased 105%

For CPI rose 34% and disposable income increased 51% over the same period.



### What drove increase in COP?

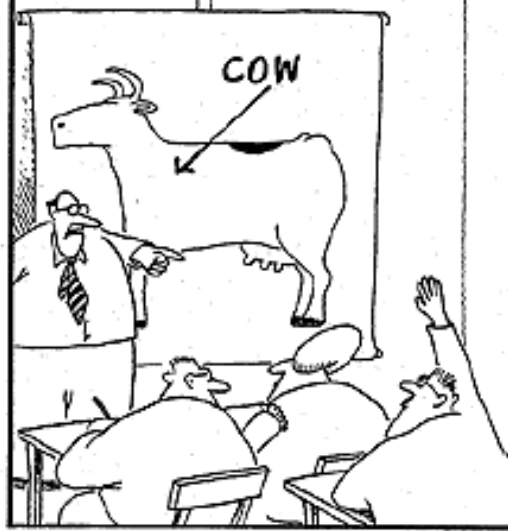
Factor	% increase since 2000
Feed	187
Fuel	204
Supplies	39
Machinery	89
Services	43
Interest	30
Taxes	85
Wages	45



## Conclusions

- Homegrown feed increasing on farms to the extent possible
- M:F benchmarks are not relevant in recent years
- IOFC correlates with profitability on average
  - Factors such as region, herd size, and feed model matter
- Need to consider levels and turning points in these indicators as triggers

# QUESTIONS?



"Yes ... I believe there's a question there in the back."