



## **Spatial and Vertical Price Transmission in Fresh Produce Markets**

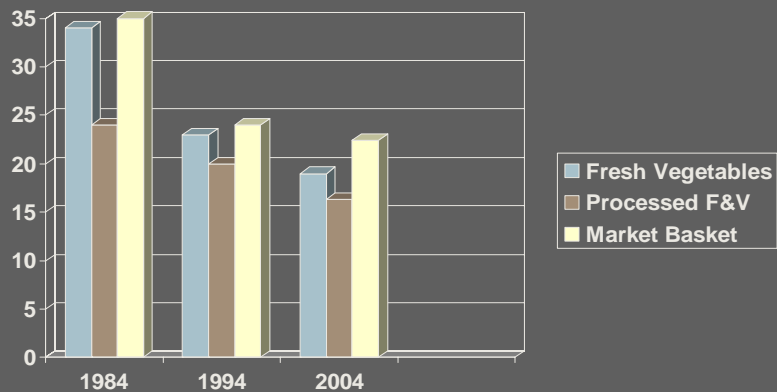
John J. VanSickle, Professor  
Food & Resource Economics Dept.  
UF/IFAS



## **Why Pricing Issues Are Viewed as Critical in Produce?**

- ⇒ Farmers' share of retail dollar shrunk from 35% in 1984 to 22.4% in 2004, without any increase in added value from the marketing chain.
- ⇒ Increased competition has eroded market share. Import market share in fresh vegetables has increased from 8.1% in 1980 to 15.8% in 2004.
- ⇒ Consolidation at retail and with shippers has brought fears of market power eroding farmers returns
- ⇒ No government programs to support the incomes of fresh produce growers when they suffer from low prices.

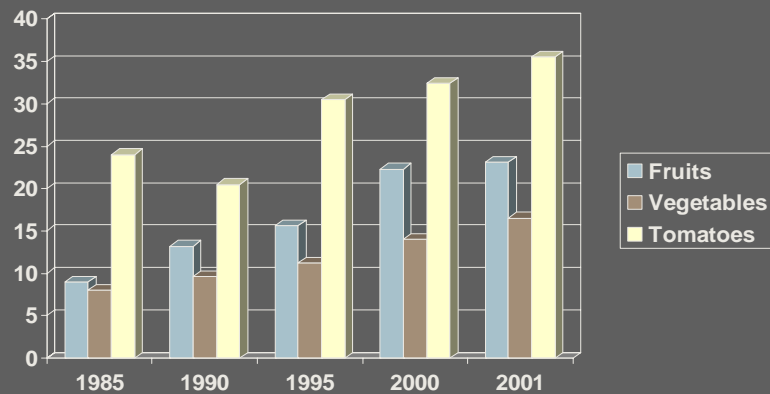
## Farm Value as Share of Retail Value



## Why Pricing Issues Are Viewed as Critical in Produce?

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## Import Share of U.S. Fruit and Vegetable Consumption



## Why Pricing Issues Are Viewed as Critical in Produce?

- ⇒ Consolidation at retail and with shippers has brought fears of market power eroding farmers returns

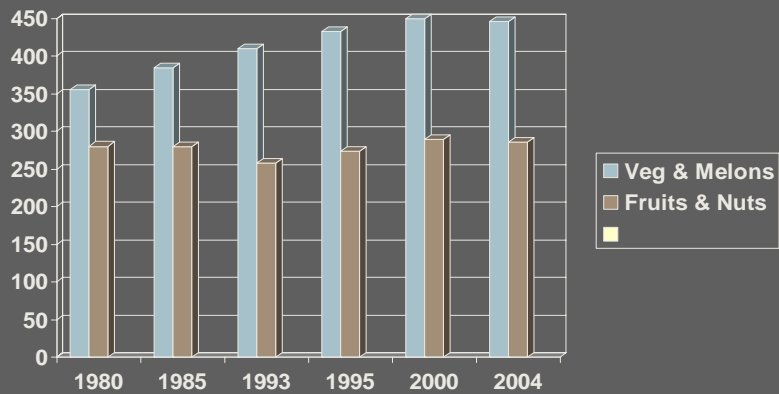
## Why Pricing Issues Are Viewed as Critical in Produce?

- ⇒ No government programs to support the incomes of fresh produce growers when they suffer from low prices.

## Demand is the positive

- ⇒ Increasing consumption, from 356 pounds per capita in 1980 to 445.6 pounds in 2004.

## U.S. Consumption



## Pricing Issues

- Price leadership and pricing asymmetry
- Integration and Behavior in the Fresh Produce Market

## Ward's work (1982) in price leadership and asymmetry

- Established foundation on testing pricing relationships.
- Tested market leadership using Granger Causality tests to determine where the price was set.
- Asymmetry tests derived from models suggested by Tweeten and Quance (1971) and modified by Wolfram (1971) and Houck (1977).

## Granger Causality Test

$$P_t = \sum_{i=1}^m \alpha_i P_{t-i} + \sum_{i=1}^m \beta_i W_{t-i} \varepsilon_t$$

$$P_t = \sum_{i=1}^m \alpha_i P_{t-i}$$

---

F-test used to test whether prices ( $P_t$ ) are dependent on lagged prices in the other market ( $W_{t-i}$ )

## Ward's Price Linkage Model

$$R_{it} = \lambda_{0t} + \lambda_0^1 H_{it} + \lambda_1^1 H_{2t} + \lambda_0'' H_{3t} + \lambda_1'' H_{4t} + \varepsilon_t$$

where

$$H_{1t} = \sum_{j=0}^3 (W_{t-j} - W_0)$$

$$H_{2t} = \sum_{j=0}^3 (W_{t-j} - W_0) \phi_j$$

$$H_{3t} = \sum_{j=0}^3 W_{t-j}''$$

$$H_{4t} = \sum_{j=0}^3 W_{t-j}'' \phi_j$$

## Granger Causality results

- ➔ Lead linkage from wholesale to retail and producer levels

Producer ← Wholesale → Retail

## Pricing Asymmetry Results

- Retail prices reflect more wholesale price decreases than wholesale price increases
- Why? – Perishability concerns

## Renwick and VanSickle, 1998

- Reduced perishability likely altered the pricing relationships because of better post-harvest handling procedures, direct procurement and extended shelf-life.

## Girapunthong, VanSickle and Renwick, 1998

⇒ Updated Ward's analysis for fresh market tomatoes

- Pricing point pushed back to the grower level

Producer → Wholesale → Retail

- Wholesale prices respond more to falling producer prices than to increasing prices
- Retail asymmetric in the other direction – respond more to increasing wholesale prices than to price declines
- Retail response symmetric to producer prices

## Sexton, Zhang & Chalfant, 2003

⇒ Examined price spreads in a flexible model of an integrated food marketing sector that accommodates oligopoly power in selling the finished product to consumers and oligopsony power in procuring product from producers.

## **Sexton, Zhang & Chalfant, 2003**

- Supported the conclusion that pricing leadership rests at the producer level.
- Concluded that retailers had considerable 'independence' in setting prices for produce.
- Found that higher volumes led to larger price spreads.
- Retailers have been aggressive in using market power to establish prices paid to producers.

## **Integration and Behavior in the U.S. Market for Fresh Produce**

- Research problem – Test integration in spatially separated markets to determine the relationship of these suppliers in the pricing of product.
- Critical issue in settling trade disputes, especially fresh market tomatoes.

## Jordan & VanSickle, 1995

- ➔ Adapted the dynamic model of spatial price adjustment developed by Ravillion (1986) to test short run and long run integration in the market.

## Jordan & VanSickle Model

$$P_t^F = \delta + \sum_{i=1}^2 \beta_i P_{t-i}^F + \sum_{j=0}^2 \gamma_j P_{t-j}^M + \sum_{k=1}^2 \alpha_k Q_{t-k}^F + \varepsilon_t$$

$$P_t^M = \delta^1 + \sum_{i=1}^2 \beta_i^1 P_{t-i}^M + \sum_{j=0}^2 \gamma_j^1 P_{t-j}^F + \sum_{k=1}^2 \alpha_k^1 Q_{t-k}^M + \varepsilon_t^1$$

## Hypotheses

$$P_t^F = \delta + \sum_{i=1}^2 \beta_i P_{t-i}^F + \sum_{j=0}^2 \gamma_j P_{t-j}^M + \sum_{k=1}^2 \alpha_k Q_{t-k}^F + \varepsilon_t$$

$$P_t^M = \delta^1 + \sum_{i=1}^2 \beta_i^1 P_{t-i}^M + \sum_{j=0}^2 \gamma_j^1 P_{t-j}^F + \sum_{k=1}^2 \alpha_k^1 Q_{t-k}^M + \varepsilon_t^1$$

- Market segmentation

$$\text{Florida: } \gamma_j = 0; (j = 0, 1, 2)$$

$$\text{Mexico: } \gamma_j^1 = 0; (j = 0, 1, 2)$$

- Strong short-run market integration

$$\text{Florida: } \gamma_0 = 1; \beta_i = 0; \gamma_j = 0 \quad (i, j = 1, 2)$$

$$\text{Mexico: } \gamma_0^1 = 1; \beta_i^1 = 0; \gamma_j^1 = 0 \quad (i, j = 1, 2)$$

## Hypotheses

$$P_t^F = \delta + \sum_{i=1}^2 \beta_i P_{t-i}^F + \sum_{j=0}^2 \gamma_j P_{t-j}^M + \sum_{k=1}^2 \alpha_k Q_{t-k}^F + \varepsilon_t$$

$$P_t^M = \delta^1 + \sum_{i=1}^2 \beta_i^1 P_{t-i}^M + \sum_{j=0}^2 \gamma_j^1 P_{t-j}^F + \sum_{k=1}^2 \alpha_k^1 Q_{t-k}^M + \varepsilon_t^1$$

- Weak short-run market integration

$$\text{Florida: } \gamma_0 = 1; \sum_{i=1}^2 \beta_i + \sum_{j=1}^2 \gamma_j = 0$$

$$\text{Mexico: } \gamma_0^1 = 1; \sum_{i=1}^2 \beta_i^1 + \sum_{j=1}^2 \gamma_j^1 = 0$$

- Long-run integration

$$\text{Florida: } \sum_{i=1}^2 \beta_i + \sum_{j=0}^2 \gamma_j = 1$$

$$\text{Mexico: } \sum_{i=1}^2 \beta_i^1 + \sum_{j=0}^2 \gamma_j^1 = 1$$

## Jordan & VanSickle Conclusions

- ⇒ Granger causality tests suggested that Florida was the price leader in this market.
- ⇒ Spatial Price Adjustment Model suggested that Florida and Mexico were integrated in the same market in the long run, but only Mexico was integrated in the short run.

## Conclusions

- ⇒ Produce markets are evolving and changing. Change is likely more rapid today than at any time in the history of these markets. Wholesale market influence is declining and retail market power is increasing.
- ⇒ These studies need to be continually updated to evaluate the changes in market structure and the effect of those changes on pricing performance.



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- [Create New Account](#)

April 19, 2006

- [Data problem with NYMX](#)

April 19, 2006

- [Closing data problems](#)

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- [Loan Payment](#)
- [Account Summary](#)

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- [Group Standings](#)
- [Group News](#)
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Your last login was on **April 20, 2006** at  
**08:32 AM**.  
Rank: **39** of **996**

Account Status

<b>Cash on Hand:</b>	<b>\$40,432.50</b>
<b>Available Capital:</b>	<b>\$33,857.50</b>
<b>Total Fees:</b>	<b>\$2,520.00</b>
<b>Total Loans:</b>	<b>\$0.00</b>
<b>Total Loan Fees:</b>	<b>\$0.00</b>
<b>Total Loan Interest:</b>	<b>\$0.00</b>
<b>Maintenance Margins:</b>	<b>\$2,475.00</b>
<b>Initial Margins:</b>	<b>\$3,341.75</b>
<b>Open Transaction Profit:</b>	<b>-\$4,205.00</b>
<b>Total Profit to Date:</b>	<b>\$30,478.11</b>

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Title	News	Author	Date
<a href="#">Market Outlook</a>	Some users are experiencing...	VanSickle, John	03/02/06 04:01:15 PM

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Gold (GC)	Contract Price	Open	Settle	Previous Settle	Quantity	Position	Open
<a href="#">Apr 06</a>		640.00	640.00	N/A	632.6000		
<a href="#">May 06</a>		625.7000	N/A	N/A	633.5000		
<a href="#">Jun 06</a>		636.7000	642.1000	N/A	636.0000		
<a href="#">Aug 06</a>		643.1000	648.0000	N/A	642.1000		
<a href="#">Oct 06</a>		653.5000	653.0000	N/A	648.2000		
<a href="#">Dec 06</a>		655.7000	662.0000	N/A	654.3000		
<a href="#">Feb 07</a>		665.5000	668.5000	N/A	660.5000		
<a href="#">Apr 07</a>		653.5000	N/A	N/A	666.6000		
<a href="#">Jun 07</a>		662.2000	N/A	N/A	672.7000		
<a href="#">Aug 07</a>		665.5000	N/A	N/A	678.8000		
<a href="#">Oct 07</a>		671.5000	N/A	N/A	684.9000		
<a href="#">Dec 07</a>							
<a href="#">Feb 08</a>		697.4000	N/A	697.4000	683.7000		
<a href="#">Jun 08</a>		695.7000	N/A	N/A	709.7000		
<a href="#">Dec 08</a>		728.3000	717.0000	728.3000	713.9000		
<a href="#">Jun 09</a>		732.4000	N/A	N/A	747.2000		
<a href="#">Dec 09</a>		750.9000	N/A	N/A	766.1000		
<a href="#">Jun 10</a>		769.3000	N/A	N/A	784.9000		
<a href="#">Dec 10</a>		787.7000	N/A	N/A	803.7000		

Trading hours for this product are between 08:20 and 13:30 EST, except on the maturity date.

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Prices for this product are represented in Dollars per Troy Ounce.

Contract quantity is 100 Troy Ounces.

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- John Anderson, Mississippi State University – “There is no substitute. One thing I really like about FactSim is the realistic representation of market mechanics (margin accounts, order types, etc.)”
- Darrell Mark, University of Nebraska – “Overall, FactSim is almost perfect for my class.”
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[News](#)

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April 19, 2006

[Data problem with NYMX](#)

April 19, 2006

[Closing data problems](#)

March 28, 2006

[Trading Options](#)

February 21, 2006

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