Retail Pricing and Farmer Welfare

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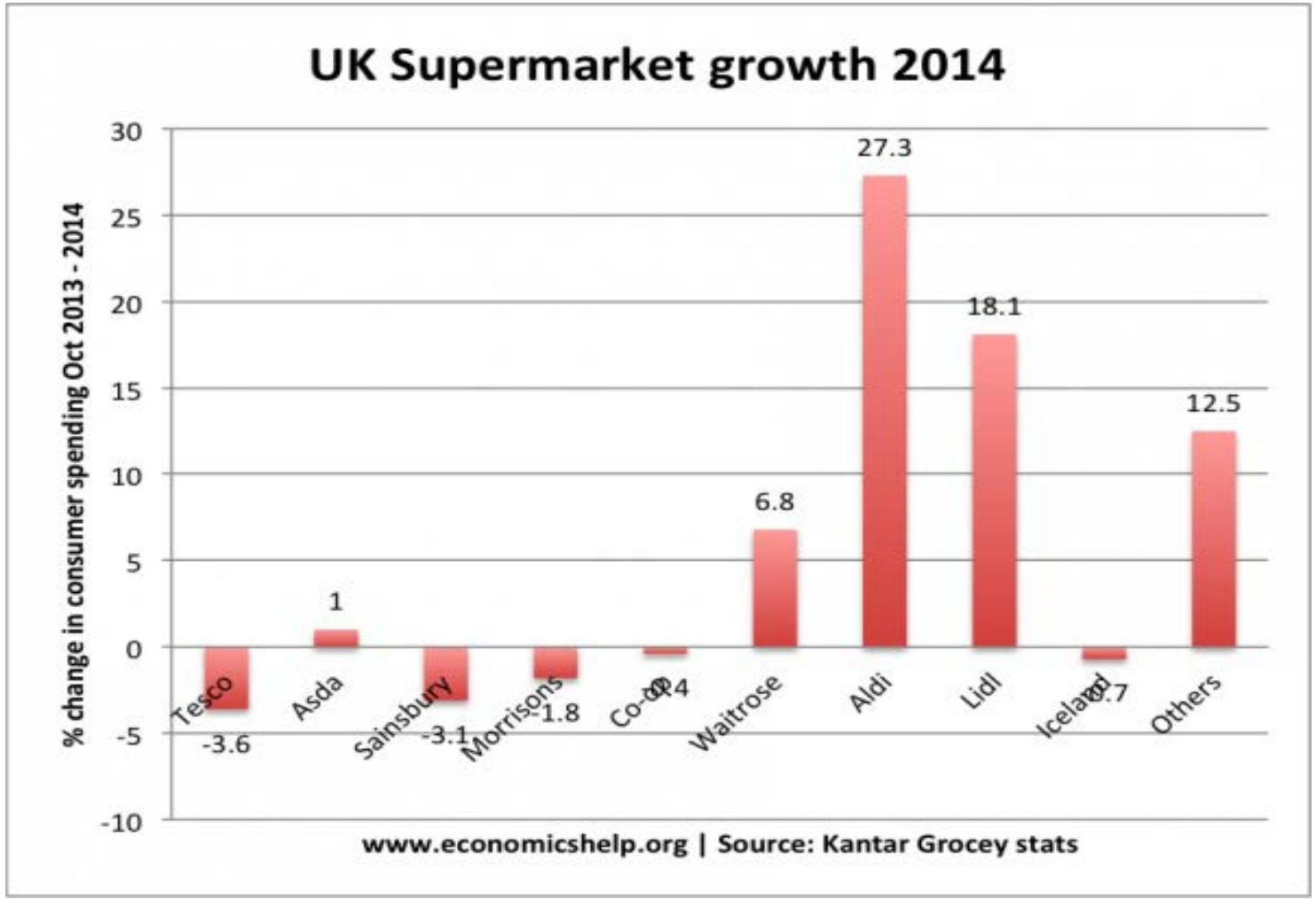
Objectives

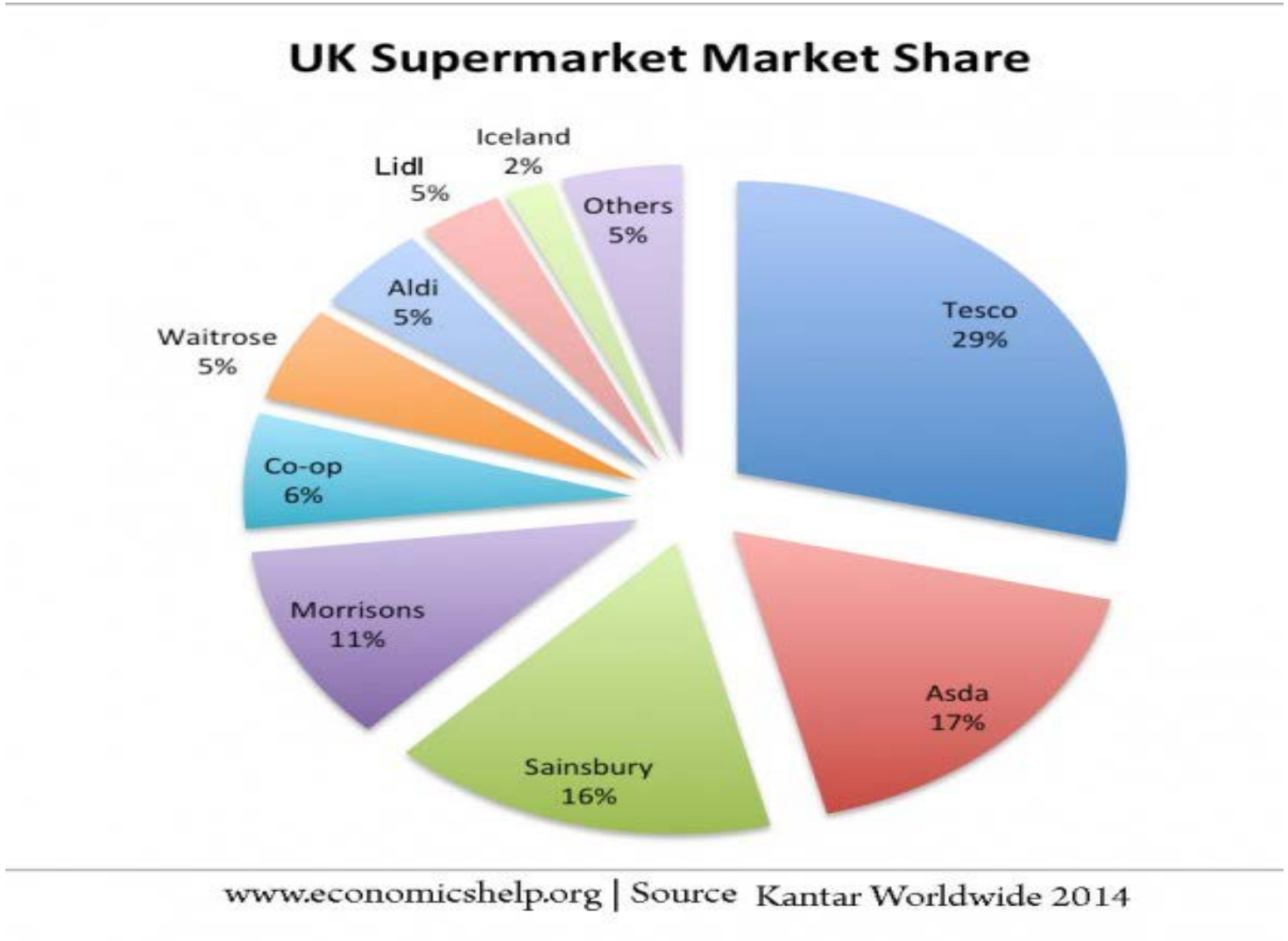
When completing this lecture, you are expected to

- Recognize the retail price dispersion
- Discuss the categorization of retail pricing behaviors
- Explore the driving factors of retail price change
- Analyze the potential impact of retail pricing strategies to farmer welfare

Heightened Supermarket Competition



Still a Highly Concentrated Industry



Research on Retail Pricing Strategies

Fassnacht and Husseini (2013) offers a thorough review of related literatures

- “pricing, strategy, retailing” in ABI Inform Global, EBSCO/EPNET, JSTOR, Science Direct +references
- Different definitions of pricing strategies
- Determinants and outcomes of pricing strategy

Pricing strategies

- *The majority of the definitions comprise two retailer pricing strategies—Hi-Lo and EDLP.*
- *However, many authors point out, Hi-Lo and EDLP are not just two options of a bipolar classification scheme, but are best seen as the poles of a continuum with hybrid strategies in between*
- *Store level vs. brand-level; long-term vs. short term*

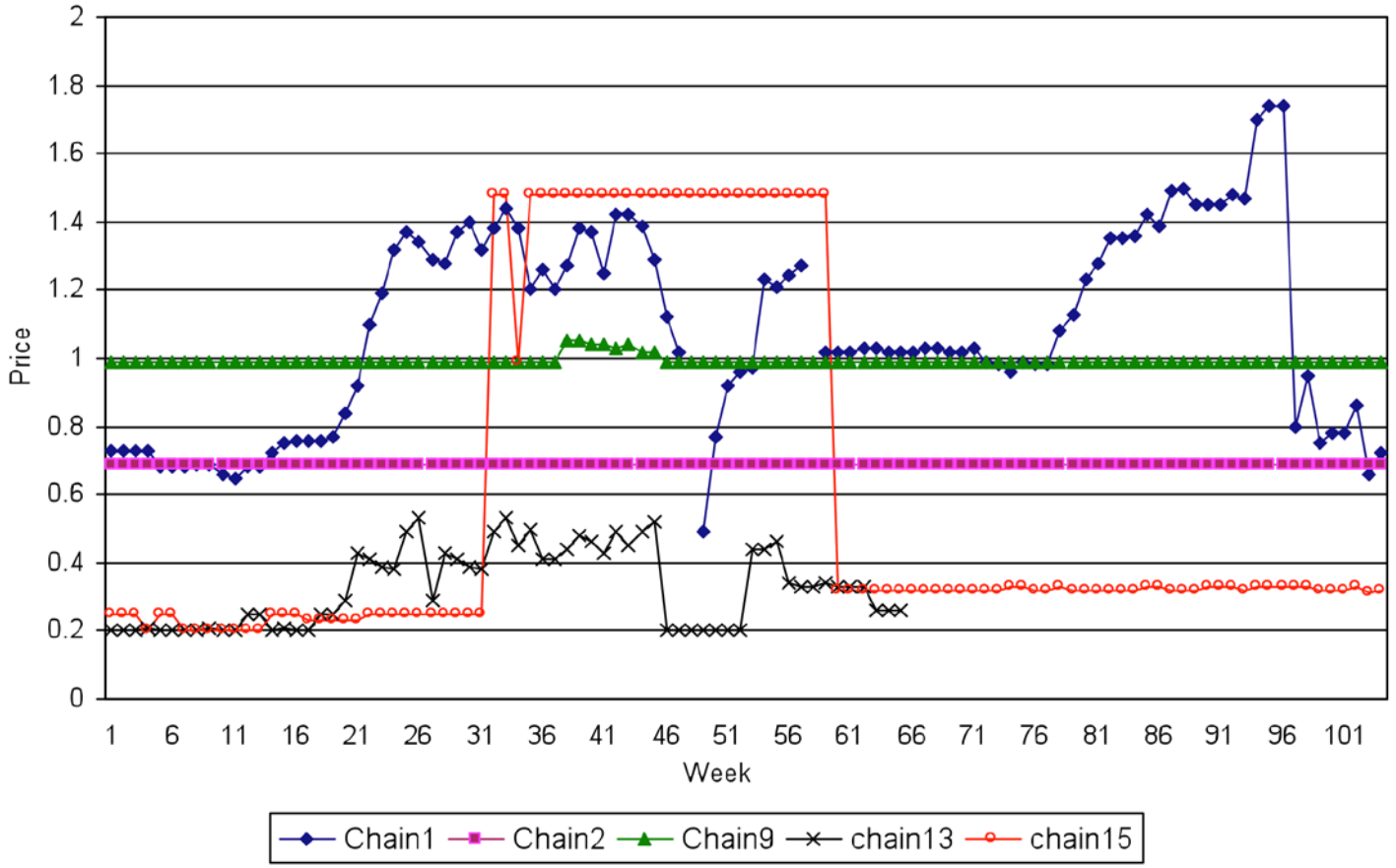
Case Study with Retail Data

- Scanner data by Information Resources Inc. (IRI).
  - Two year weekly retail prices, volume and dollar sales
  - 15 retail chains (Albertsons, Brookshire, Lucky, Dominick's, Eagle, Grand, Jewel, Publix, Ralph's, etc.)
  - 6 major U.S. cities (Albany NY, Atlanta, Chicago, Dallas, Los Angeles and Miami)
  - 6 products: apples, grapes, grapefruit, iceberg lettuce, oranges, and tomatoes.

- Farm-level price from USDA Federal-State Market News Service (F-SMNS).

Evidence of Price dispersion

---Price Variations for Seedless Grapes in Dallas



Prices Relative to Mode Price

Chain	<mode by 20%	<mode by 10%	% at mode	>mode by 10%	>mode by 20%
1	16.76	24.06	17.87	24.71	17.41
2	0	0	100	0	0
3	13.33	18.44	49.08	16.24	11.7
4	2.72	3.42	95.32	0	0
5	0	0	100	0	0
6	0	0	100	0	0
7	5.11	11.38	26.28	18.89	11.26
8	18.39	26.86	23.26	20.25	15.2
9	5.81	13.79	31.46	21.23	14.82
10	19.61	23.65	53.59	13.92	13.02
11	0	0	100	0	0
12	34.31	36.27	25.49	29.41	29.41
13	8.7	18.53	26.1	25.65	22.71
14	24.8	32.44	22.5	13.46	9.76
15	20.24	27.4	44.02	16.42	12.03

Statistical Characteristics of Retail Prices

	Mean	Min	Max
Standard deviation	0.20	0	0.79
Frequency of price change	7%	0	22%
Frequency of sale (price <mode by 10%)	4%	0	39%
Frequency of sale (price <mode by 20%)	2%	0	28%
(High-low)/median	.58	0	2.49
Correlation between retail and farm price	0.22	-0.63	0.87
Percentage retail margin	73%	-51%	215%

Documented Leading pricing patterns

- ***Markup pricing***: Retailers who utilize markup pricing strategy set the markup fixed or fixed proportional to the acquisition costs.

- ***Fixed pricing***: The retail price is fixed at a certain level regardless the fluctuation of farm price.
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- ***Periodic sale***: The retail price stays at a certain level for extended periods, interrupted by temporary price discounts, after which the price returns to its original level.
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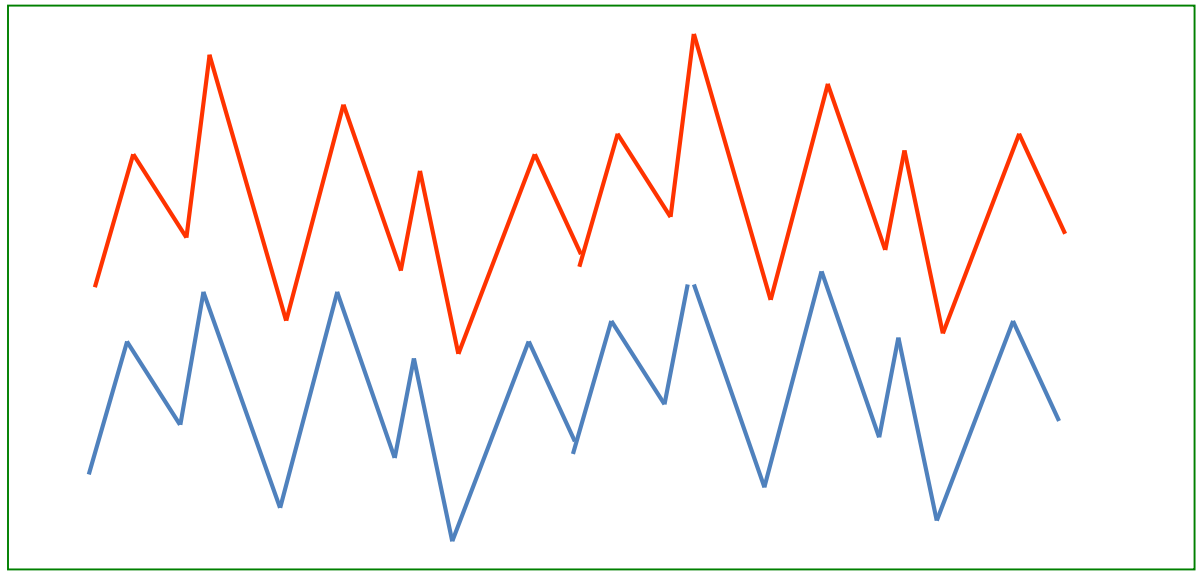
- ***High-low pricing***: Price fluctuates frequently among different high and low levels. The mean of the prices may be relatively higher than fixed price, but the actual price varies constantly.

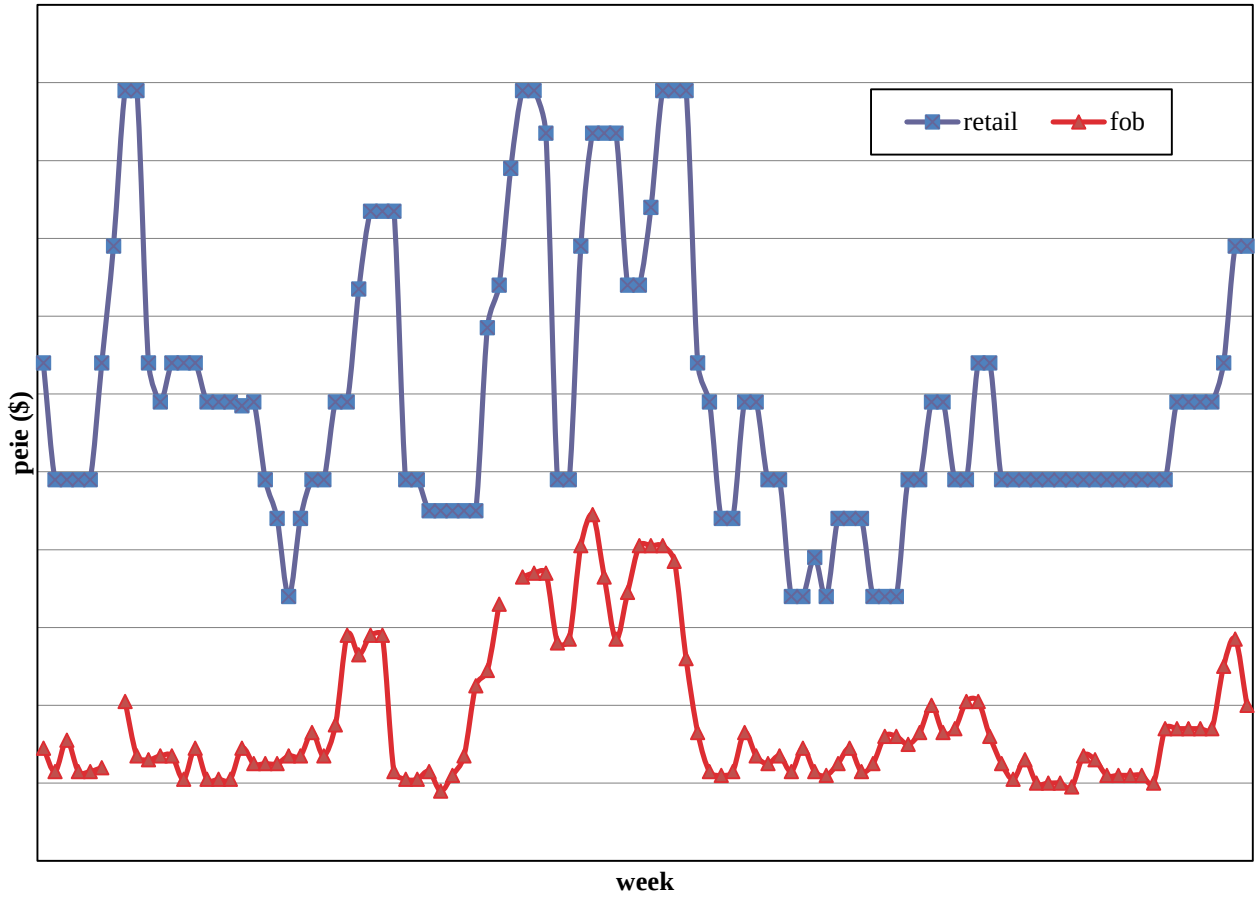
Markup pricing

- Set the markup fixed or fixed proportional to the acquisition costs.
- High correlation between retail price and farm price.



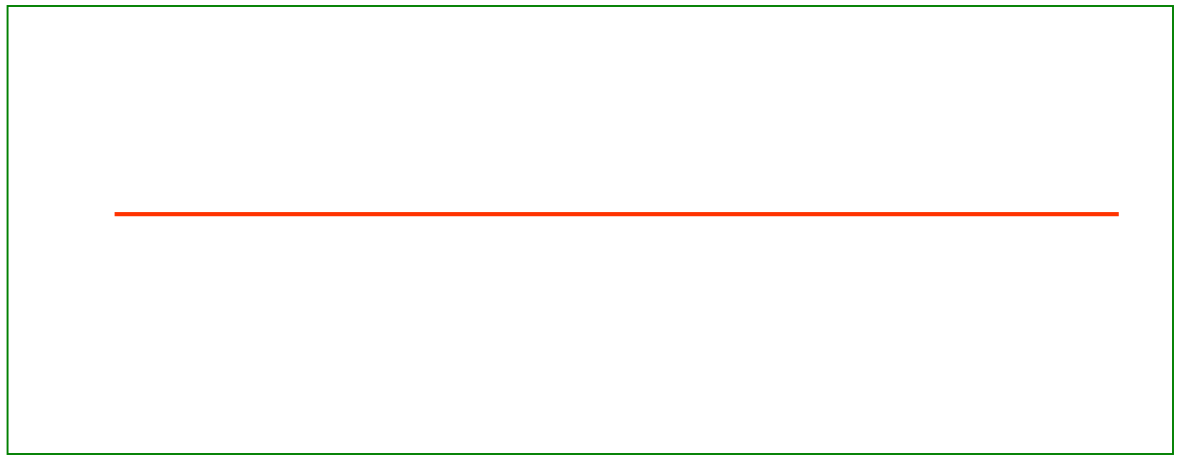
Example:

Chain 15_retail plum tomatoes at Miami; FOB price



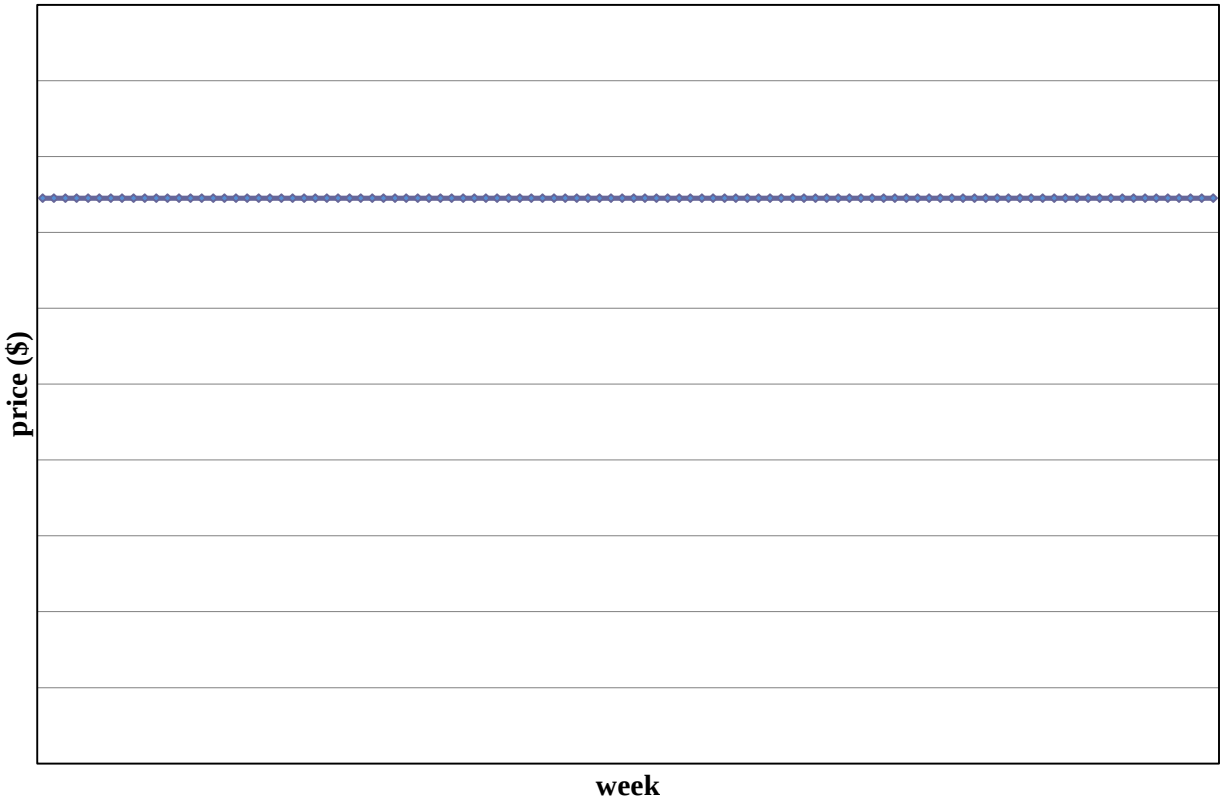
Fixed (constant) pricing

- Retail price is fixed at a certain level regardless the fluctuation of farm price.
- For example, every day low price (EDLP).
- 6 out of 15 chains in our data utilize this strategy.



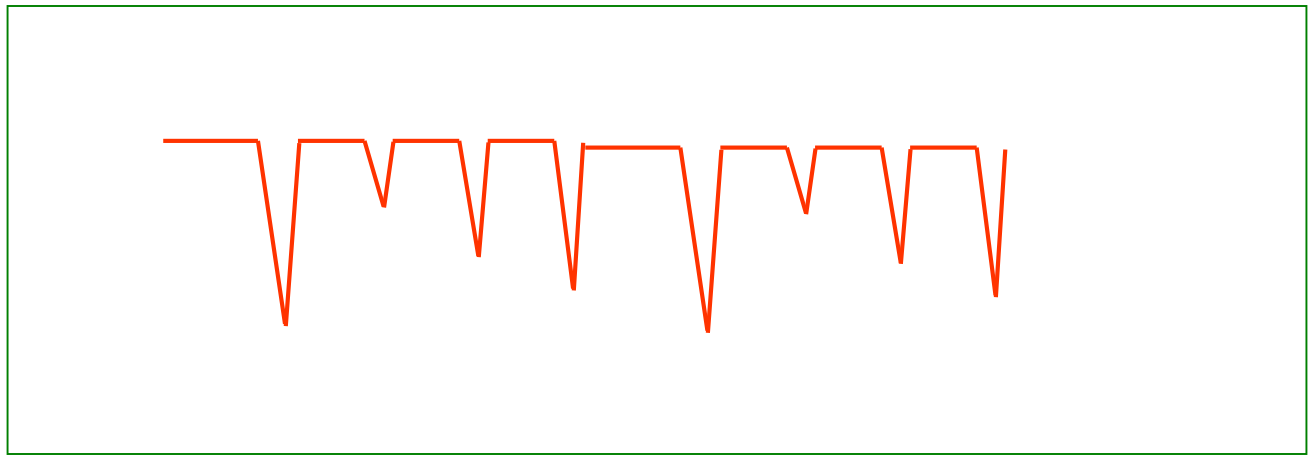
Example:

Chain 4 selling Fuji apples at Chicago



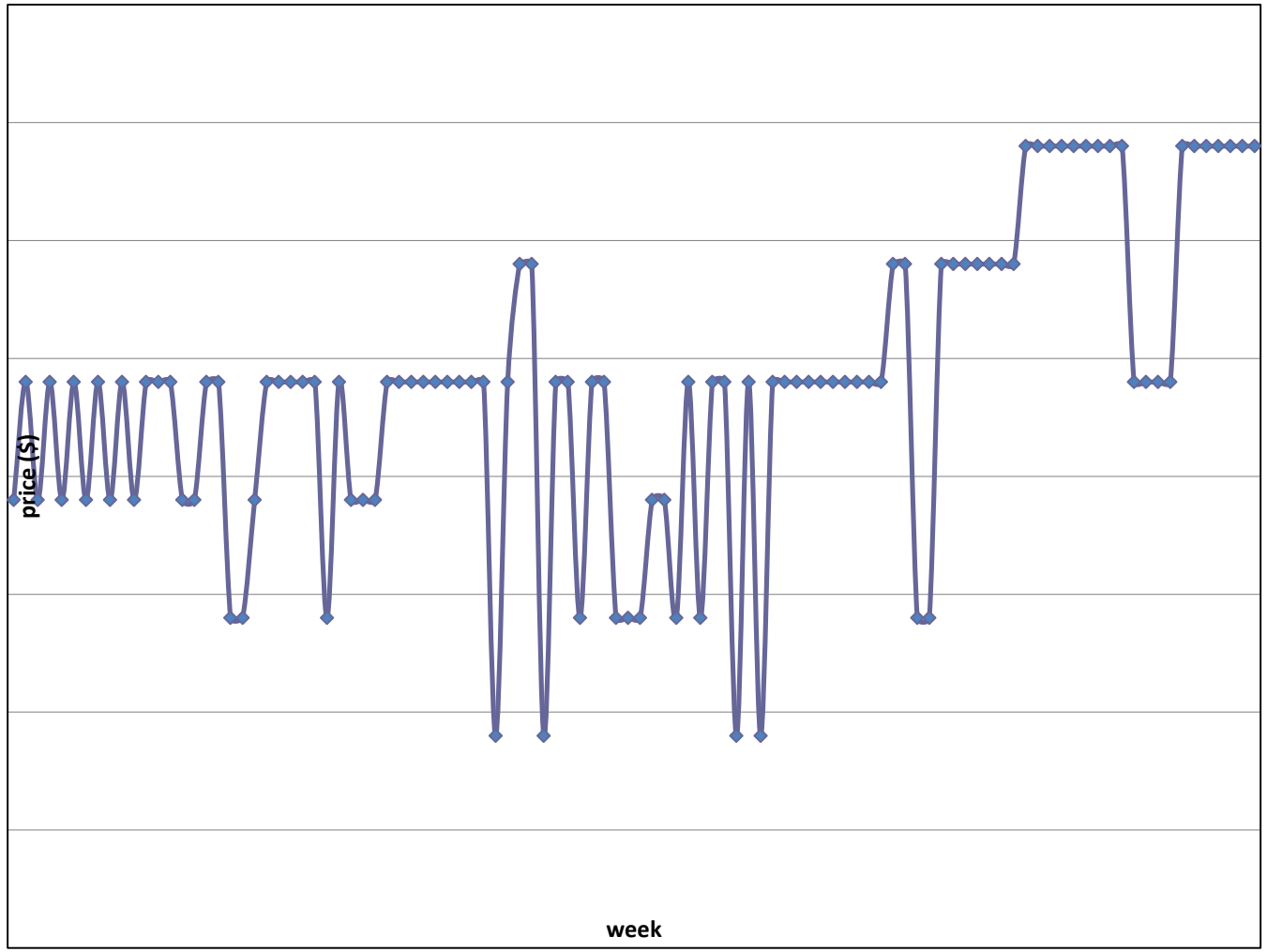
Periodic sale

- The retail price stays at a certain level for extended periods, interrupted by temporary price discounts, after which the price returns to its original level.
- A “regular price” or several mass point prices may exist.
- For example: the “weekly special”.



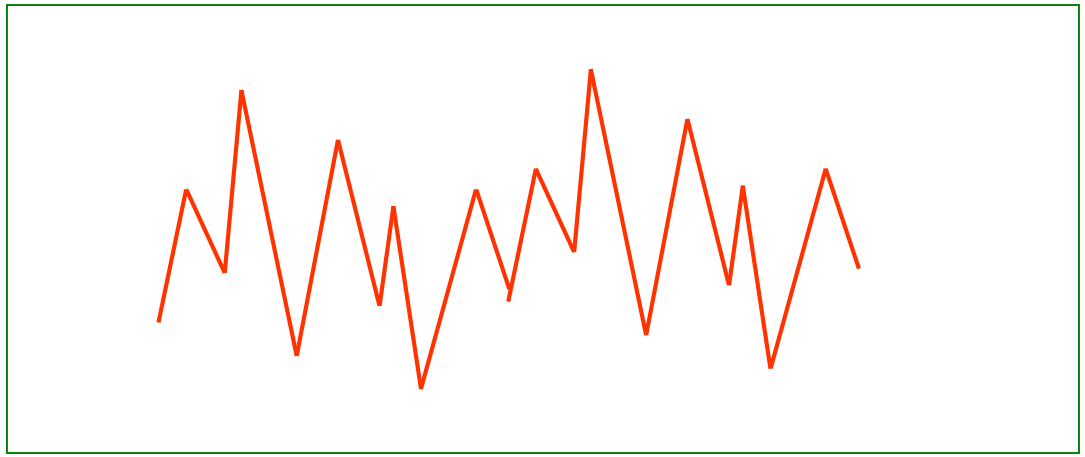
Example:

Golden delicious apple sold by chain 15 at Atlanta



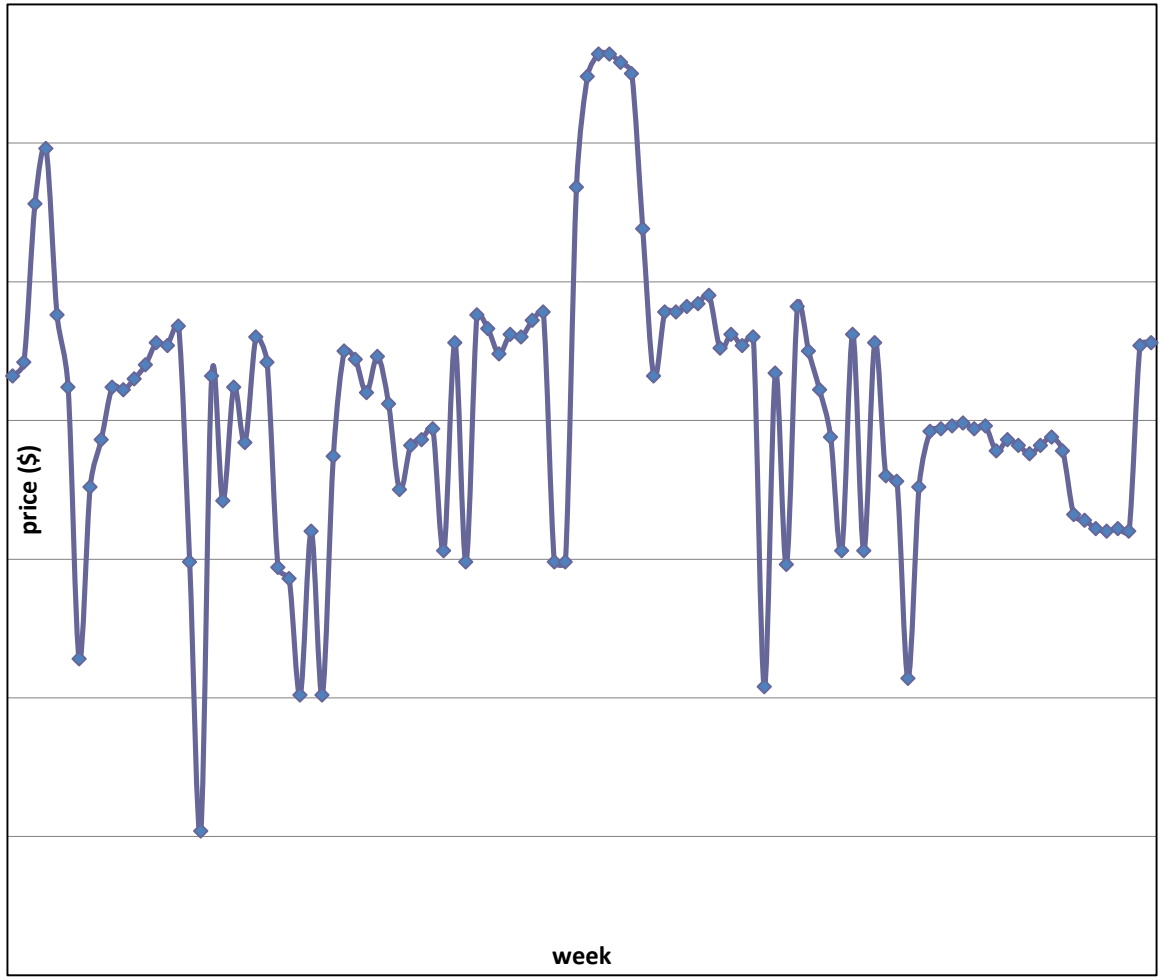
High-low pricing

- ☐ Price fluctuates frequently among different high and low levels.
- ☐ The mean of the prices may be relatively higher than fixed price.



Example:

Chain 1 selling greenhouse tomatoes



How are price decisions made?

The price decision is based on information such as (Nagle and Holden, 1994; Levy, et al. 1997; Nijs, Srinivasan, & Pauwels, 2007; Fassnacht and Husseini, 2013):

- wholesale price changes, promotions; Manufacturer and brand factors
- latest store information on the product, which may include last week's sale and prices; Retailer factors
- competitors' prices and promotions; Competitor factors
- Market and consumer factors
- menu costs.

Explanations from Economics Literature

- Intertemporal discrimination model argues price discrimination
- The static model of retailer competition shows that in equilibrium, all retailers randomly choose prices every period.
- The multi-product retailer model show that goods with independent demand may have interrelated price by the same retailer.
- Menu cost may form a barrier of price changes at the micro level

Complexity behind Price Variation

- Many factors enter into the process: product price history, product cost, consumer demand, promotion by competitors, the price change for good that are close substitutes, etc.

- On the other hand, movements of the retail price may also affect consumer demand, competitor’s price and sales, etc.

- There are complex feedback loops that affect the variations of retail price and those driving factors.

Panel vector autoregressive model (Panel-VAR)

- Panel VARs are able to (i) capture both static and dynamic interdependencies, (ii) treat the links across units in an unrestricted fashion, (iii) easily incorporate time variations in the coefficients and in the variance of the shocks, and (iv) account for cross sectional dynamic heterogeneities. (Lütkepohl, 2005; Canova and Ciccarelli, 2013).

- VAR model captures complex interactions among retail prices and the driving factors, while the panel structure incorporate additional information across product categories.

More Reference on VAR model if interested

- Nijs, et. al. (2007, Marketing Science) marketing science paper on Retail-Price Drivers and Retailer Profits

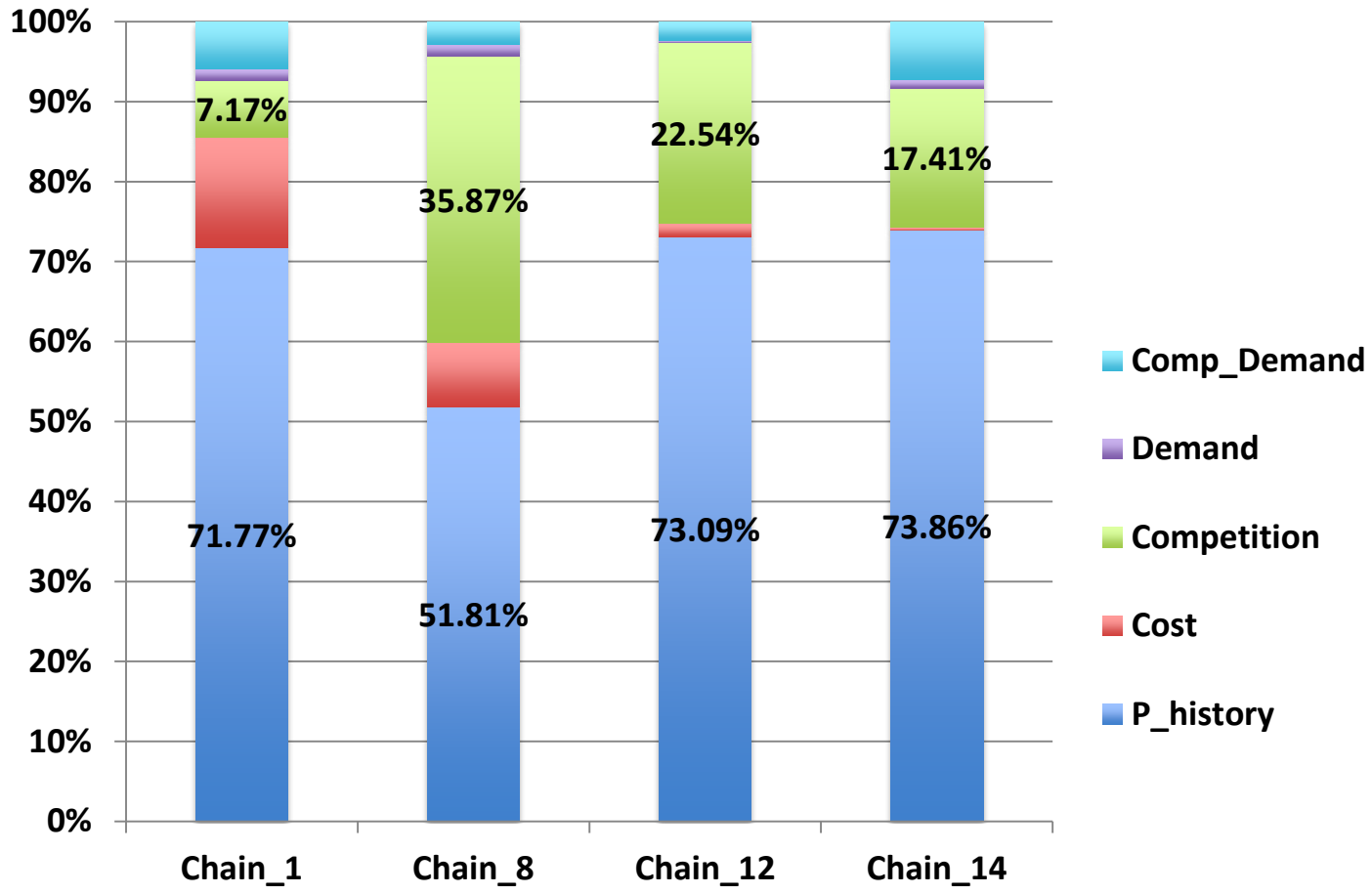
- Hassouneh, et. al. (2012, TRANSFOP) Recent Developments in the Econometric Analysis of Price Transmission

- Li and Volpe (2014, working paper) New Categorization of Retail Pricing Behaviors

Findings

- Driving factors of retail price variations include: retail price history, cost of the product, competition, and consumer demand
- Retail price history plays an important role in determining retail price variation in general.
- Meanwhile, the relative importance of different driving factors to price movement varies across retail chains.
- Some chains responds more readily to change of product cost and competition than others.

Relative Impact of Retail Driving Factors (LA)



Price Responsiveness and Profitability (LA)

Table 4: Relative Market Share v.s. Relative Profit

	Relative Market Share	Relative Profit
Chain_1	19.02%	13.69%
Chain_8	23.82%	26.88%
Chain_12	24.92%	25.12%
Chain_14	32.24%	34.32%

Findings

- High level of price dispersion found at retail market for produce products.
- Chains exhibit different types of retail pricing strategies.
- Panel-VAR model used to identify the driving factors of retail price variation, including retail price history, competition, and farm price
- Driving factors have different impacts to different types of retailers. Pricing decisions reflect different marketing emphasis and management considerations.
- Higher responsiveness to competition may indicate superior management ability that translates into higher profitability

Farmer Welfare Concern

How does the retail price dispersion affect farmers' welfare?

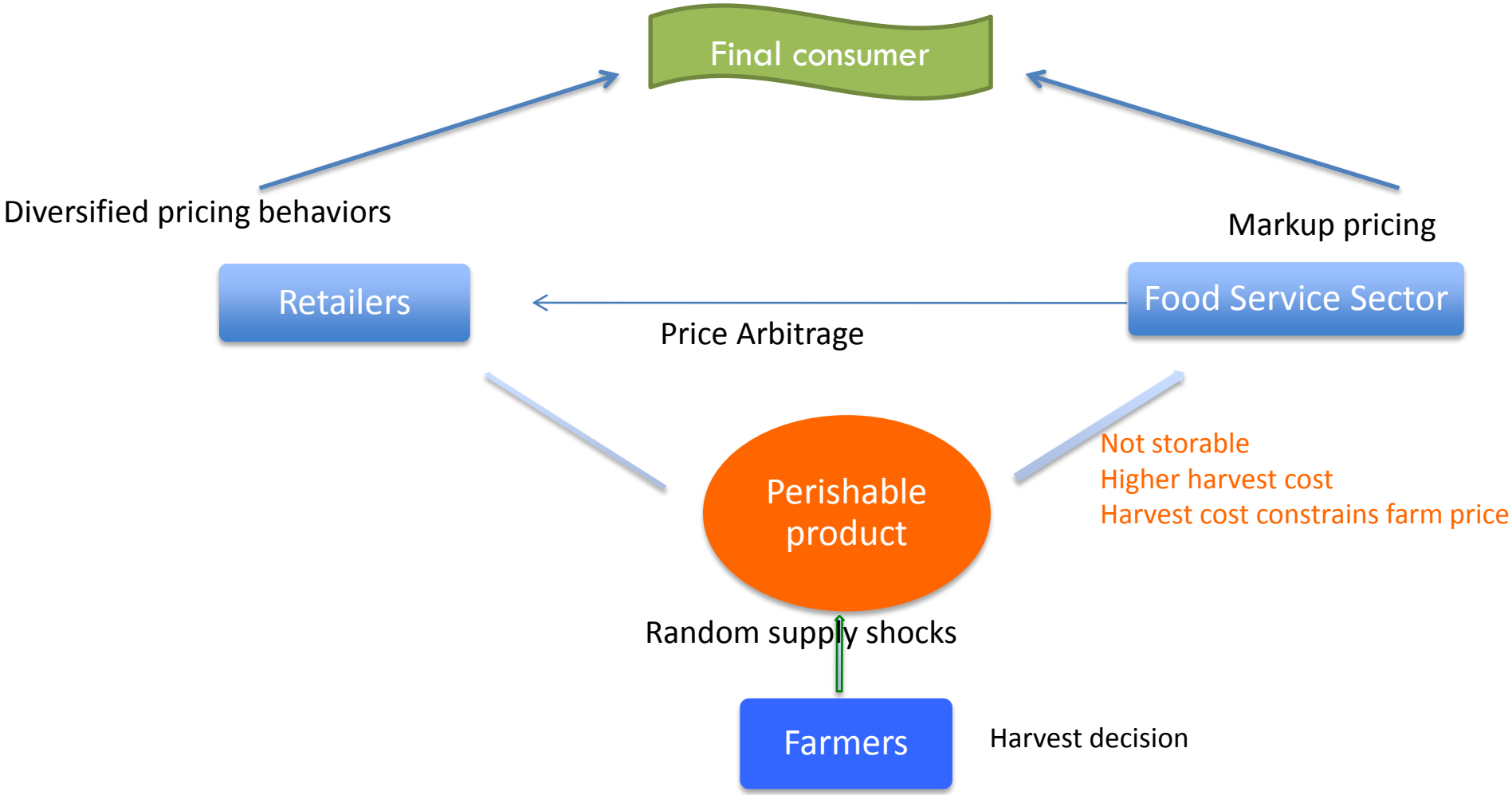
Typical model:

- Markup pricing
- Reflect farm supply shocks effectively

In practice:

- Diversified price strategies
- Some do not reflect farm supply variations effectively

An Illustrative Model



Model Assumptions

- Total consumer demand for the farm product is divided between Two markets outlets:
  - Grocery retail (retail market or market 1)
  - food service (market 2)

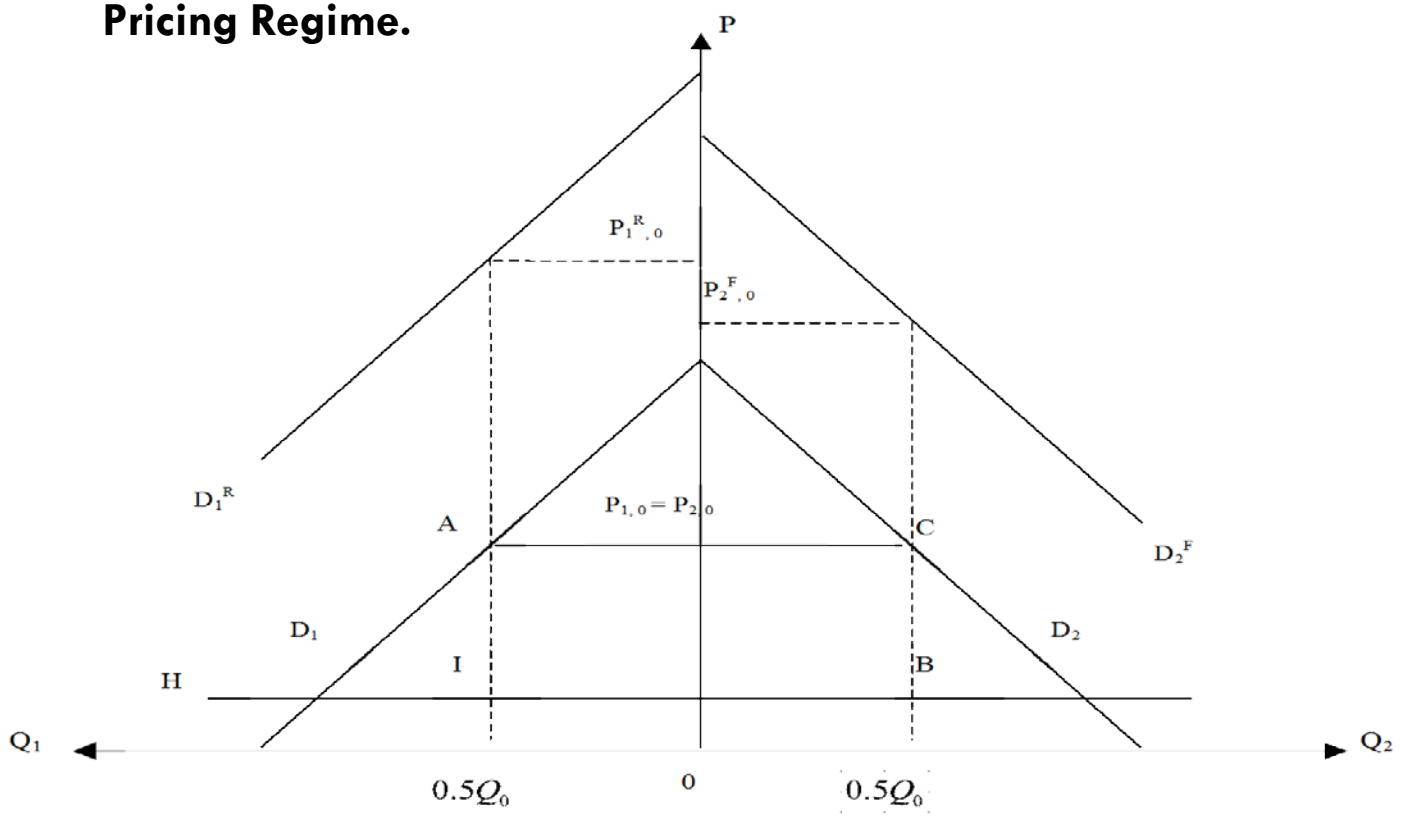
- Retailers set their price strategically.
- Food service sector utilizes markup pricing.
- Random farm supply shocks present.
- no demand shock, no storage.
- Total farm demand and farm price are normalized to one at the mean harvest level.

Perishable Products and Harvest Cost

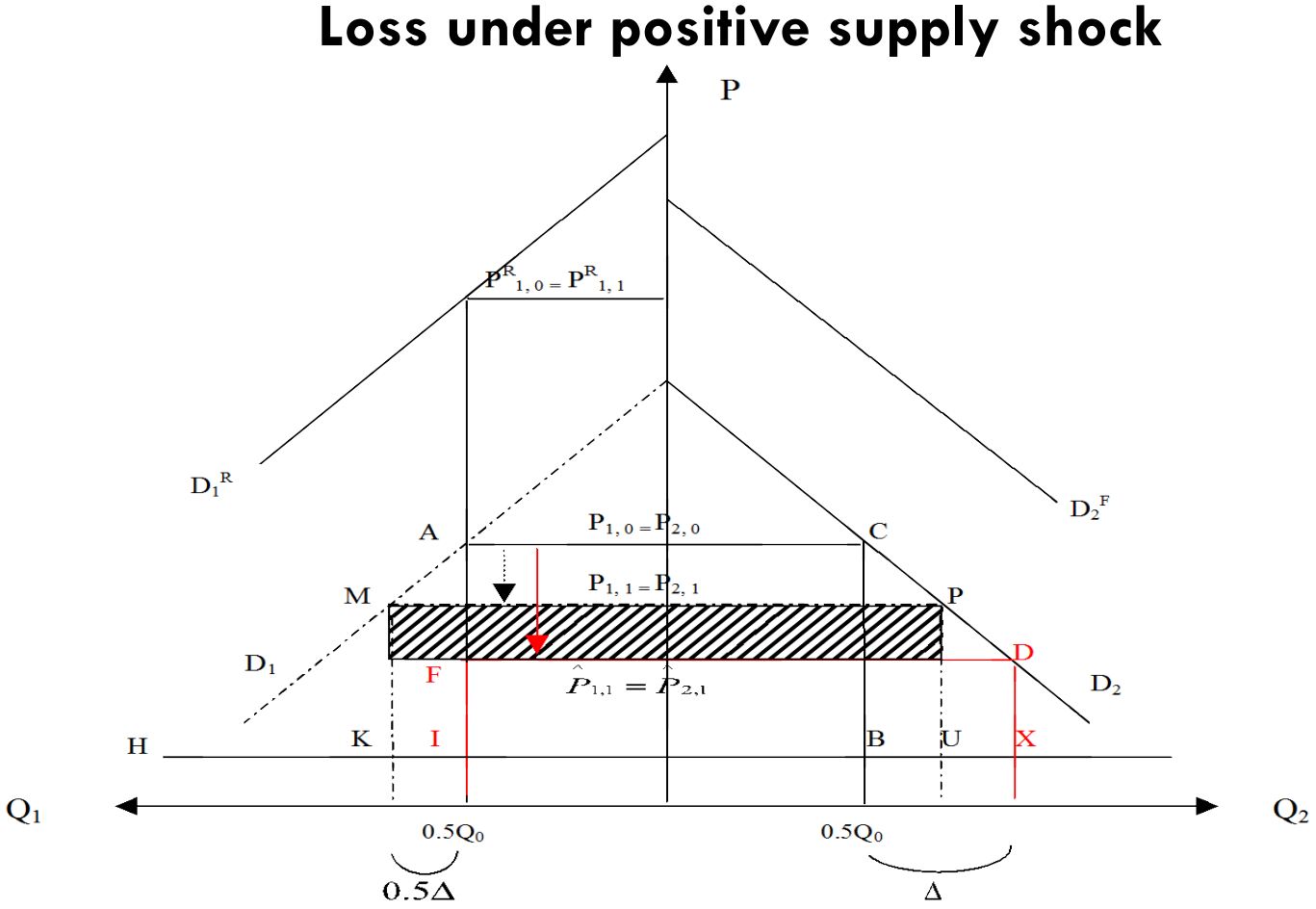
- Short run supply for perishables is perfectly inelastic
  - Product not storable
  - Short optimal harvest window
  - Producers have little or no power over retailer in bargaining
- Marginal harvest cost forms a lower bound for farm price
  - Perishable produce has relatively higher harvest cost
  - No product will be harvested at price below harvest cost

Baseline Model

Retail Demand (D_1^R), Food Service Demand (D_2^F), and Farm Demands (D_1 and D_2) under Mark-up Pricing Regime.

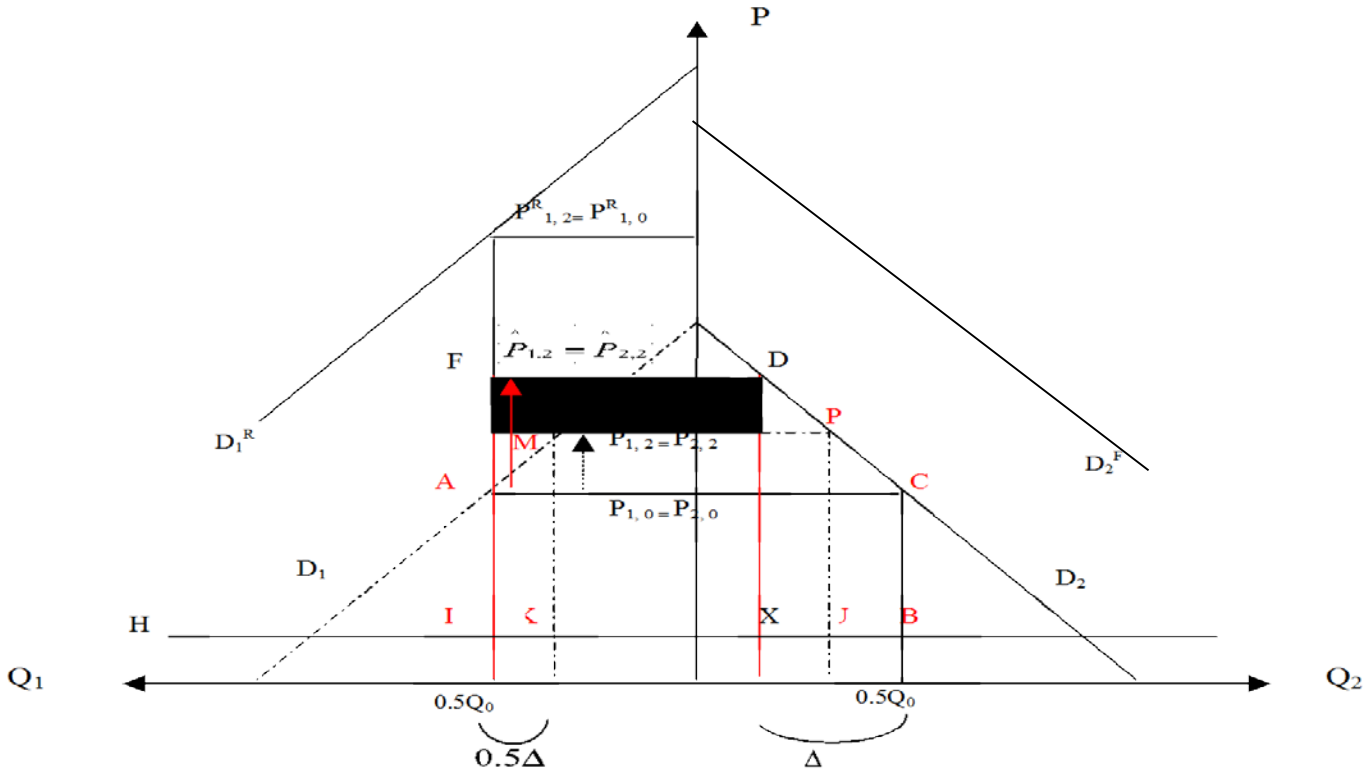


Impact of fixed pricing on farmer welfare



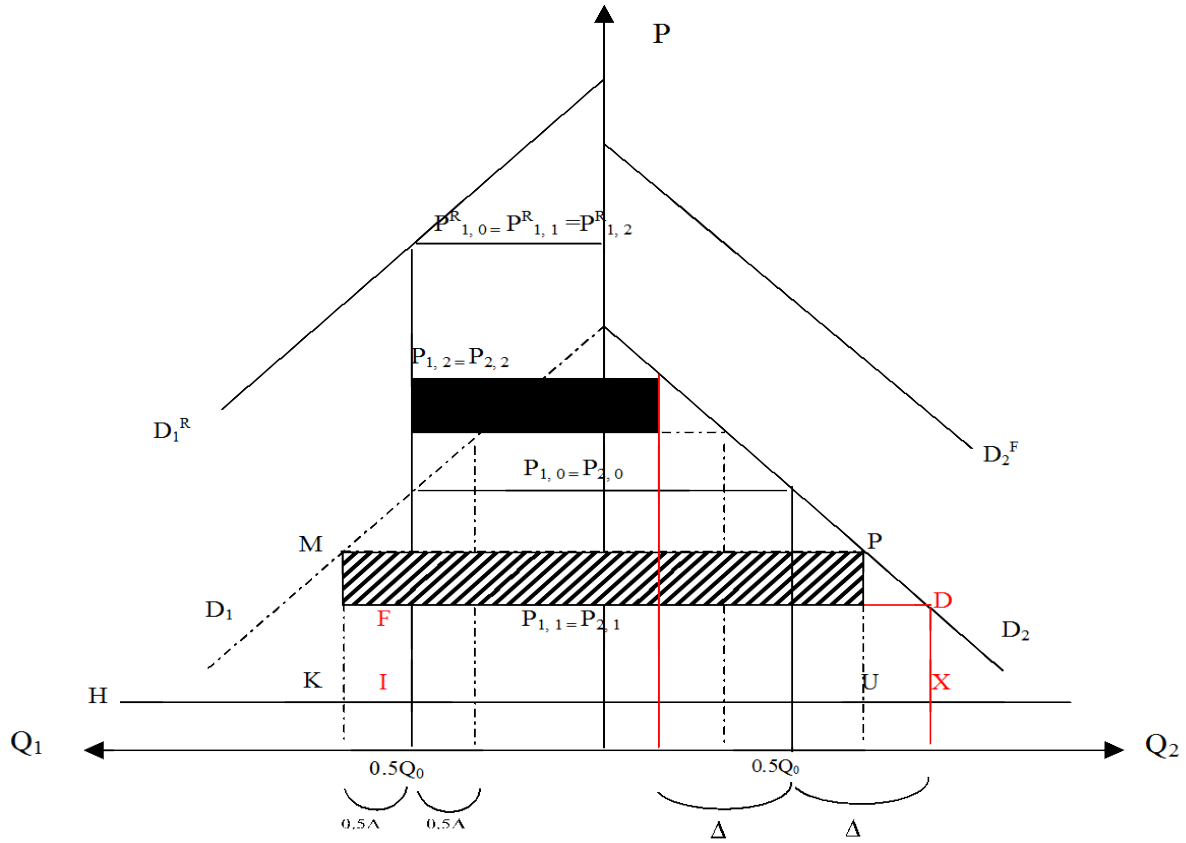
Impact of fixed pricing on farmer welfare (cont')

Gain under negative supply shock

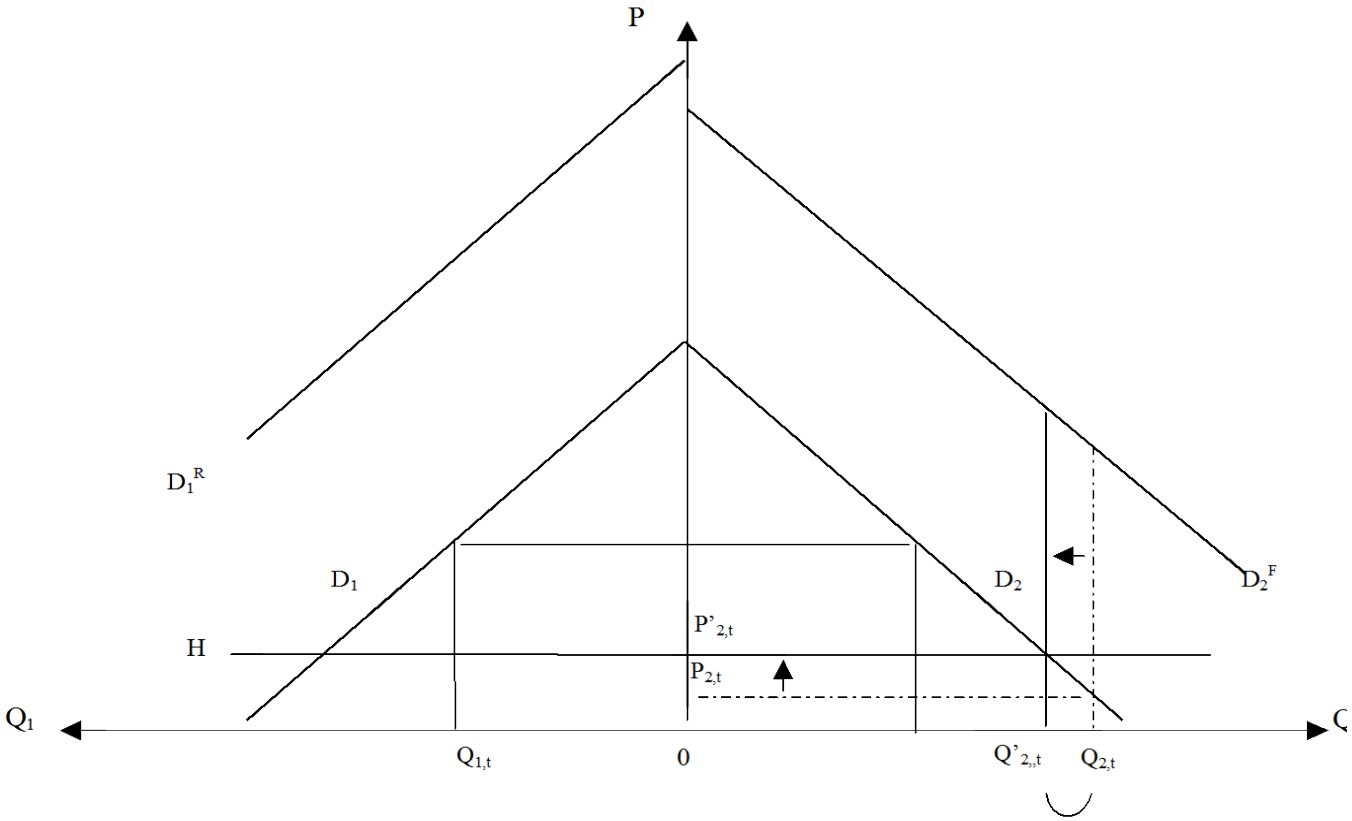


Impact of fixed pricing on farmer welfare (cont')

Combine positive and negative shocks (loss>gain)



Harvest cost forms a lower bound for farm price



Measurements of farmer welfare impact

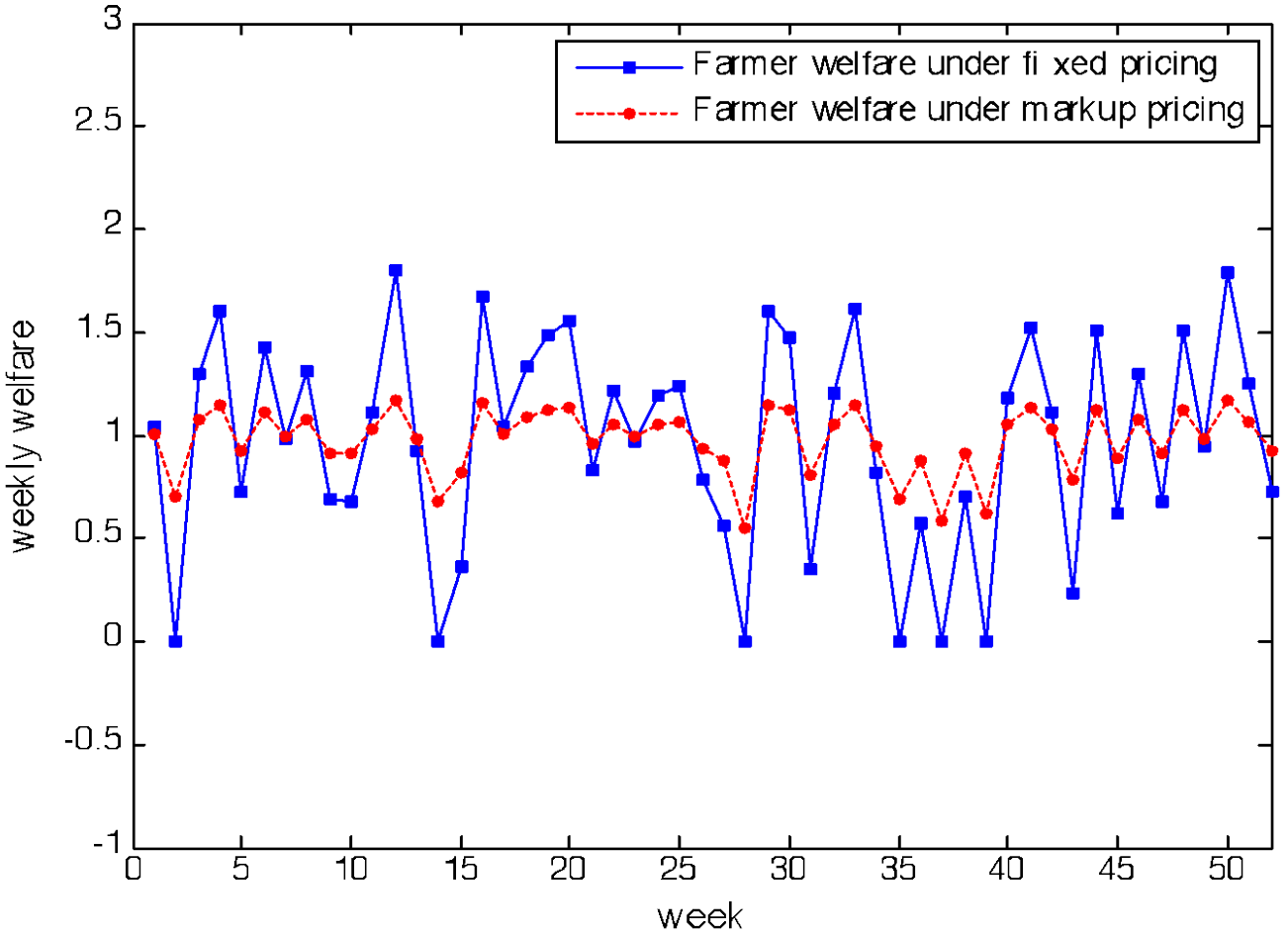
- Difference in expected farm income -- $\Delta \sum W_t$

$$\Delta \sum W_t = \frac{\sum R_{alternative} - \sum R_{base}}{\sum R_{base}} = f(\rho, \varepsilon, \Delta, H)$$

  - Retailer's market share -- ρ
  - Initial farm demand elasticity -- ε
  - Farm supply shocks -- Δ
  - Marginal harvest cost -- H

- Farm income volatility $sd.(W_t)$

Fixed pricing increases farm income volatility



Welfare impact by alternative pricing strategy

	$\Delta\sum W_t$	$sd.(W_t)$
Fixed Pricing	-1.63%	0.54
Periodic Sale	-1.74%	0.54
High-low pricing	-1.89%	0.52
Markup Pricing (Baseline)	0	0.18

Retail price dispersion tends to diminish farm income, and exacerbate farm income volatility

Recap and Reflect

- Retail price dispersion is evident. The use of markup pricing assumption for agricultural economics research needs careful justification.

- Although EDLP and High-low Pricing are identified as typical pricing choices by retailers, the reality is much more complex.

- Driving factors of retail price change include: retail price history, cost of the product, competition, and consumer demand; but different retailers place different importance on these factors and respond differently

- Alternative retail pricing strategies can potentially diminish farmer welfare and exacerbate farm price volatility. But many factors can affect your analysis (elasticity, harvest cost, etc.)