

Mushroom Demand:

Analysis of Regional Product Sales

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Overview

- Short run and long run own-, cross-, and expenditure elasticities are estimated for white, Portabella, other brown, Shiitake, and other specialty mushrooms.
- Provides insights into consumer behavior, impacts of price promotions, and outlook for variety sales



Methods and Data

- Linear Approximate Almost Ideal Demand system used in estimating model
 - Geometric lag structure adopted to identify short run and long run responses
 - Consumers may be slow to adjust purchase patterns in response to changes in price or expenditures due to buying habits or a lack of familiarity with other products



Methods and Data (cont.)

- The Perishables Group data
 - Scanner-based retail sales data
 - Five regions: West, Midsouth, Southeast, Central, Northeast
 - Weekly data: Jan 3, 1998 – Jun 29, 2002
 - Quantities represent average sales per store per week
 - Product sales aggregated to form subcategories
 - Data pooled across regions and time periods for estimation



Methods and Data (cont.)

- Consumer response parameters:
 - Price elasticities of demand (ϵ) – measures the percentage change in quantity demanded given a one percent change in price
 - Expenditure elasticities of demand (η) – measures the percentage change in demand given a one percent change in category expenditures



Own-Price Elasticities

- Elastic demands – Percentage change in quantity demanded exceeds percentage change in price.
 - Arises when there are many available substitutes or when a product constitutes a large share of consumer's budget
- Inelastic demand – Percentage change in quantity demanded is less than percentage change in price
 - Arises when there are few substitutes, highly differentiated products, or product constitutes a small share of consumer's budget



Own-Price Elasticity and Total Revenue

	Elastic Demand $ \epsilon > 1$	Inelastic Demand $ \epsilon < 1$
Increase Price	↓ TR	↑ TR
Decrease Price	↑ TR	↓ TR



Results: Preliminary Analysis

- Analysis of relationship between price and product form (packaged and/or sliced)
- Initial, required step for developing product aggregates used in demand analysis
- Findings:
 - Packaged products sell at a premium over bulk on a per pound basis
 - For white mushrooms, sliced products sell at a premium over whole



Results: Preliminary Analysis (cont.)

- Implications:
 - Package product premium
 - Reflects added value for consumer?
 - Value of brand?
 - Raises the question – are there new value added opportunities for mushrooms that will earn producers higher returns and/or expand product sales?



Results: Short Run

- Own-price elasticities:
 - Elastic demands: White mushrooms ($\epsilon = -1.072$), Portabella ($\epsilon = -1.522$), other brown mushrooms ($\epsilon = -2.799$)
 - Decrease in price would increase demand by a proportionally larger amount, thereby increasing total revenue.
 - Inelastic demands: Shiitake ($\epsilon = -0.998$), other specialty ($\epsilon = -0.275$)
 - Decreases (increases) in price will decrease (increase) total revenue.



Results: Short Run

- Own-price elasticities - implications:
 - Inelastic demands arise in differentiated product markets; revenues rise with price; supply controls could raise price.
 - Are there new opportunities to differentiate mushrooms products – to make demand more inelastic? (Value-added opportunities?)
 - Caveat: There is a limit to increasing revenues through higher prices for products with inelastic demands. Demand becomes more elastic at higher price or lower volume.



Results: Short Run

- Cross price elasticities:
 - Most products are weak substitutes
 - Increases in white mushroom prices appear to induce sales of Portabellas and other brown mushrooms (consumers may be moving from whites to Portabellas and other browns)
- Expenditure elasticities:
 - White mushrooms would benefit the most from an increase in mushroom category expenditures in the short run
 - Currently accounts for 92% of category sales



Results: Long Run

- Own-price elasticities:
 - Consumers are more responsive in the LR; all product demands are elastic, except other specialty mushrooms.
- Cross-price elasticities:
 - Most products are still weak substitutes.
 - Consumers more readily substitute Portabella and other browns for whites



Results: Long Run

- Expenditure elasticities:
 - White mushroom sales continue to increase given rising mushroom category sales ($\eta = 1.895$)
 - Shiitake would realize expanding sales growth, along with other brown mushrooms
 - Shiitake: $\eta = 2.119$
 - Other brown mushrooms: $\eta = 1.544$