

# **Evaluation of USPB Marketing Activities:**

**FY 2002 - FY 2006**

by

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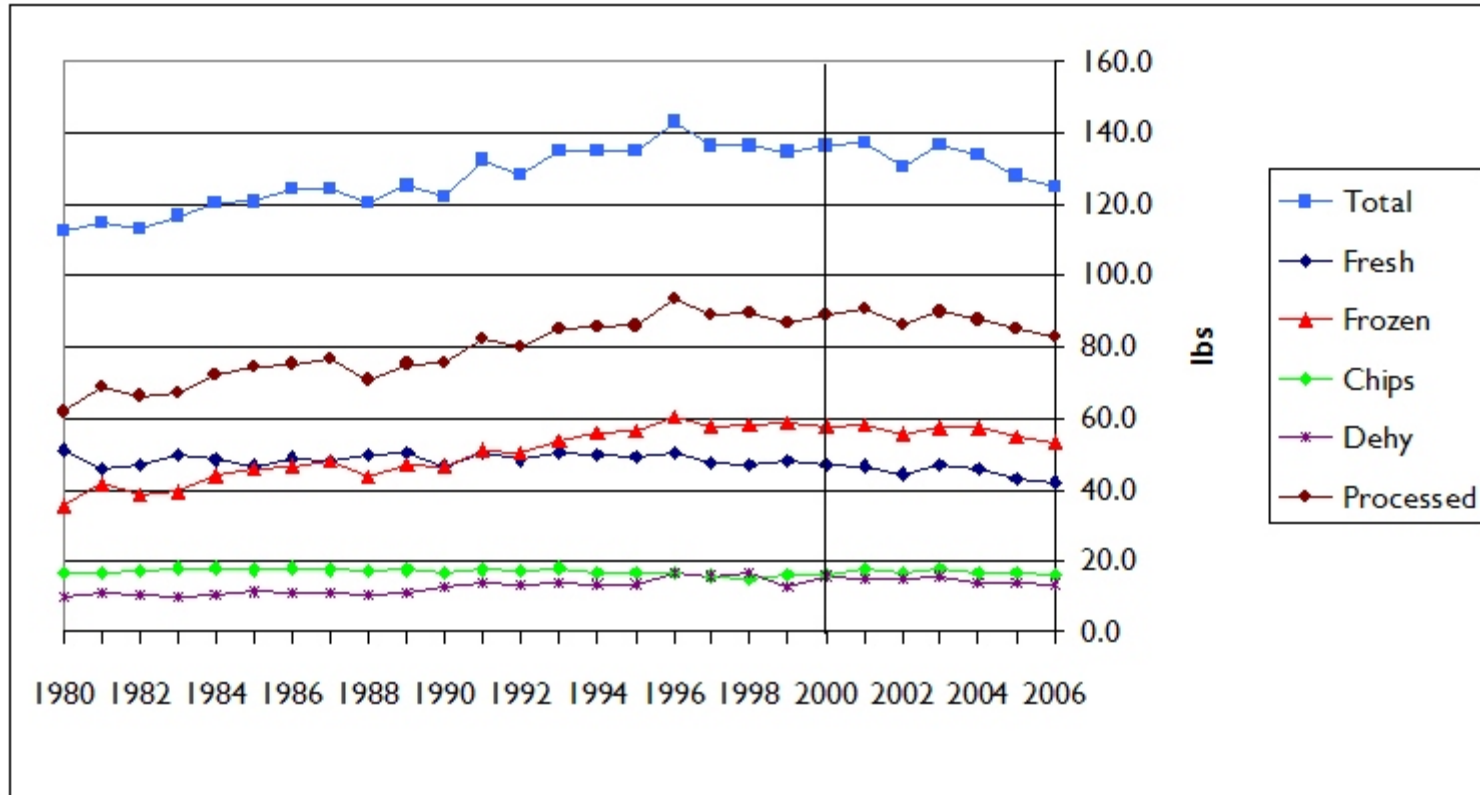
## Overview

- Motivation for Evaluation
- State of Potato Demand / Context
- Primary and Secondary Objectives
- Models of Potato Demand, Supply and Price Equilibrium
- Accounting for USPB Activities
- Results and Discussion
- Implications for Industry and Others

## **Research Motivation**

- Farm Bill Evaluation Mandate
  - Returns Measured at Grower Level; Last Completed in 2001
  - Econometric Evaluation of Return on Investment
  - Equilibrium Model of Supply / Demand and Prices
- Need for Information on New Programs
  - Shift from Advertising to Category Management
  - Need for Managerially Relevant Econometric Input

# State of Potato Demand



## State of Demand?

- Per Capita Consumption Down
- Potential Causes:
  - Higher Prices
  - Increased Competition for “Stomach Share”
  - Atkins Diet and Low Carb Fad
  - Demographic / Taste Changes
- Relevant Question: Where Would Demand be Without USPB?

## Objectives

- Estimate Long Run Grower Return on Investment in:
  - Domestic Retail Marketing
  - Domestic Foodservice Activities
  - Export Marketing Programs
- Estimate Models of U.S. and Export Potato Demand
- Calculate Grower Price and Profit Impact
- Focus on Domestic Programs for this Study

## **Models of Potato Demand**

1. Domestic Retail: Logit Model
2. Domestic Foodservice: Logit Model
3. “Best Practices” Category Management Model: Difference-in-Difference
4. Export Models: Log-Log (not presented here)

## Domestic Retail Model

- Advantages of Logit Framework:
  - Standard in differentiated product demand analysis (Berry, 1994; Berry, Levinsohn and Pakes, 1995; Besanko, Gupta and Jain, 1998).
  - Consistent with utility maximization
  - Reliable and robust elasticity estimates
  - Straightforward to do welfare estimation
  - Allows for aggregate demand expansion with outside option

## Domestic Retail Model, cont.

- Indirect Utility

$$u_{hj} = v_{hj} + \epsilon_{hj} = \beta_{0j} + \sum_k \beta_{1k} x_{jk} + \sum_l \gamma_l f(A_l) - \alpha p_j + \xi_j + \epsilon_{hj},$$

- Assume  $\epsilon_{hj}$  distributed iid extreme value gives share equations:

$$S_j = \frac{\exp\left(\beta_{0j} + \sum_k \beta_k x_{kj} + \sum_l \gamma_l f(A_l) - \alpha p_j + \xi_j\right)}{1 + \sum_{i=1}^J \exp\left(\beta_{0i} + \sum_k \beta_k x_{ki} + \sum_l \gamma_l f(A_l) - \alpha p_i + \xi_i\right)}$$

- Price and “Advertising” elasticities similar:

$$\epsilon_{p_j} = (\partial S_j / \partial p_j)(p_j / S_j) = \alpha \bar{p}_j (1 - \bar{S}_j)$$

## Difference-in-Difference Model

- Exploits “Natural Experiment” Data
  - Category management implemented at one chain in 2005
  - Compare sales before / after and with / without CM
- Econometric Model:

$$S_{jt} = \beta_0 + \beta_1 TP_{jt} + \beta_2 BP_{jt} + \beta_3 TP_{jt} * BP_{jt},$$

where:  $TP$  = binary variable = 1 during program;

$BP$  = binary variable = 1 for intervention chain.

## **Accounting for Marketing Investments**

- No Data on Specific “Ad Buys”
- Marketing Activities Funded on a Continual Basis
- Assume Equal Spending by Month
- Create Accumulating Capital Variable
  - Depreciates straight-line over 3 quarters
- Use Geometric Lag Specification to Estimate Dynamic Effect
- Data Drives Aggregation over Activities to Avoid Collinearity

## Potato Supply and Welfare Calculation

- Potato Supply and Demand Simultaneously Determined
- Demand Model Estimated with Instrumental Variables (GMM)
- Supply Response Elasticity Estimated with NFAPP Models
- Producer Surplus Calculation:

$$d\pi = \sum_i S_i^f P_i Q_i d\ln W_i (1 + 0.5 d\ln X_i).$$

where:  $S^f$  = farm share of retail dollar;  
 $W$  = grower price;  
 $X$  = farm supply.

## Welfare Calculation, cont.

- Equilibrium Displacement Model for Price Impacts:

$$d\ln P = M^{-1}Gd\ln Z_r + M^{-1}Hd\ln Z_m + M^{-1}B_1d\ln A_1 + M^{-1}B_2d\ln A_2,$$

where:  $Z_r$  = retail demand shift factors;

$Z_m$  = import demand shift factors;

$A_i$  = marketing expenditures

$M = E_s T - w_r N_r - w_x N_x$  components are supply and demand response parameters.

## **Products**

- Domestic Retail:
  - Bulk Fresh, Bag Fresh, Refrigerated, Frozen, Chips, Dehy
- Domestic Foodservice:
  - Skins, Chips, Formed, Hash Browns, Mashed, Fries, Whole
- Best Practices:
  - Bulk Fresh

## USPB Activities

- Retail Partnerships
  - Category management programs
  - Market research / data investments
  - Work with United Potato Growers on flow management
- Product Development at Retail and Foodservice
- Public Relations Spending
  - Targeted ad buys / issue buys
  - Macy's parade / temporary store in NYC
  - Funding nutritional research / glycemic index

## Data

- Domestic Retail:
  - Perishables Group / A. C. Nielsen FreshFacts
  - Quarterly (2002 I - 2006 II) retail scanner data
- Domestic Foodservice:
  - NPD IFMATRAC
  - Quarterly (2002 I - 2006 II) operator survey data
- Best Practices:
  - Weekly 3/04 - 10/06 retail scanner data
  - Perishables Group FreshFacts for Jewel / ROM in Midwest

## Results: Econometric Estimates

- Domestic Retail Program:

Variable	Estimate	t-ratio
Bulk Fresh	0.121*	7.409
Bag Fresh	0.355*	12.134
Refer	-0.214*	-5.560
Frozen	0.173*	9.370
Chips	0.473*	9.628
USPB	0.001*	2.473
News	0.001*	3.065
Lag Share	0.816*	43.525
Price	-0.115*	-6.114
LR	4,338.144	

## Results: Domestic Retail Elasticities

	Short Run	Long Run
<b>Price</b>	-0.200* (-6.114)	-1.088* (-12.643)
<b>USPB</b>	0.079* (2.473)	0.430* (2.485)
<b>News</b>	-0.003* (-3.065)	-0.015* (-3.063)

Note: t-ratios in parentheses

## Results: Econometric Estimates

- Domestic Foodservice Program:

Variable	Estimate	t-ratio
<b>Skins</b>	2.610*	7.137
<b>Chips</b>	4.344*	5.211
<b>Formed</b>	4.127*	5.086
<b>Hash Browns</b>	3.919*	5.097
<b>Mashed</b>	2.810*	5.030
<b>Fries</b>	6.042*	5.633
<b>Whole</b>	0.898*	2.505
<b>Income</b>	-2.593*	-5.570
<b>USPB</b>	0.021*	2.716
<b>News</b>	0.001	0.127
<b>Lag Share</b>	0.281*	2.771
<b>Price</b>	-0.729	-1.909
<b>LR</b>	206.354	

## Results: Domestic Foodservice Elasticities

	Short Run	Long Run
<b>Price</b>	-0.484*	-0.672*
	-1.909	-1.740
<b>USPB</b>	0.015*	0.021*
	2.716	3.265
<b>News</b>	-0.003	-0.004
	-0.127	-0.127

## **Domestic Results Interpretation**

- Idaho Potato Commission Ad Buys also Included
  - Not significant; negative point estimates
  - Highly contentious in industry
- Negative “News” Estimate Implies Effective USPB Efforts
  - News index defined as “net negative” or “bad - good”
  - Lower values of the index expected to raise demand
- Generally Significant Positive Impact of USPB Marketing

## Results: Econometric Estimates

- Best Practices Program:

Variable	Estimate	t-ratio
<b>Intercept</b>	213,981.579*	21.600
<b>Best Practice</b>	-11,705.875	-0.671
<b>Jewel</b>	174,751.292*	12.473
<b>Best Practice*Jewel</b>	41,019.622*	2.369
<b>R<sup>2</sup></b>	0.578	
<b>Program Return (409 Stores)</b>	\$4,255,571.40	
<b>Grower Gross Return</b>	1.02	
<b>Program Return (4,200 Stores)</b>	\$43,700,987.00	
<b>Grower Gross Return</b>	6.50	

## Results: Domestic Retail Benefit:Cost Ratios

<b>Short Run</b>		<b>Elasticity of Supply</b>			
<b>Farm Share</b>	0.25	0.75	1.00	1.50	
0.215	2.307	1.026	0.803	0.559	
0.235	2.450	1.113	0.874	0.612	
0.255	2.585	1.198	0.945	0.664	

<b>Long Run</b>		<b>Elasticity of Supply</b>			
<b>Farm Share</b>	0.25	0.75	1.00	1.50	
0.215	12.484	5.565	4.357	3.039	
0.235	13.256	6.035	4.743	3.321	
0.255	13.986	6.498	5.126	3.604	

## Results: Domestic Foodservice Benefit:Cost Ratios

<b>Short Run</b>	<b>Elasticity of Supply</b>			
<b>Farm Share</b>	0.25	0.75	1.00	1.50
0.18	7.260	2.827	2.166	1.476
0.2	7.908	3.127	2.401	1.640
0.22	8.532	3.424	2.635	1.804
<b>Long Run</b>	<b>Elasticity of Supply</b>			
<b>Farm Share</b>	0.25	0.75	1.00	1.50
0.18	8.809	3.556	2.740	1.877
0.2	9.557	3.929	3.035	2.086
0.22	10.269	4.296	3.328	2.295

## **Conclusions**

- BCRs Interpreted as Rates of Return
  - High relative to alternative investments
  - High relative to previous results (2001)
  - High relative to IPC advertising buys
- USPB Appears Heading in Right Direction
  - Combat issues with public relations
  - Invest in retail partnerships
  - Product development and marketing
  - Pricing research with United Potato Growers

