Milk Marketing Order
Winners and Losers

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Our Objective

• determine the distributional effects of milk marketing orders
• determine whether the policy is regressive
Milk Market

• not a textbook competitive industry
• affected by 3 government programs
  • dairy price supports
  • import quotas on dairy products
  • milk marketing orders
History

• for several decades, supports, quotas, and marketing orders jointly determined farm, wholesale, and retail prices for milk and manufactured products

• by the mid-1980s:
  • price supports had become essentially irrelevant to market outcomes in the dairy industry
  • trade policy was renegotiated in the 1986 GATT Uruguay Round
Marketing Orders

• most states covered by federal milk marketing order (FMMO)
• 4 state orders (only Virginia’s and California’s orders completely replace federal orders)
• milk marketing laws cause “price discrimination” (classified pricing)
Price Discrimination

- Class I milk: fluid beverage products.
- Class II milk: used in soft dairy products such as ice cream, cottage cheese, and yogurt
- Class III milk: used in hard dairy products such as butter and cheese
- Class III–A milk: used to manufacture nonfat dry milk
FMMO History

• Federal Agriculture Improvement and Reform Act of 1996 mandated reforms to the FMMO program
  • changed the way that minimum prices paid to farmers were determined
  • consolidated the number of FMMOs from 42 to between 10 and 14 by January 2000
• 1997–1999 was a significant transition period
Figure 1. Federal Milk Marketing Order Minimum Prices, 1997-1999
Price Differentials 1997-1999

• minimum Class III FMMO price = basic formula price (BFP)
• minimum Class II price = BFP from two months previous + $0.30/cwt
• average minimum Class I price = BFP + $2.60/cwt
• average farm–level prices:
  • Class I $15.58/cwt
  • Class II $13.04
  • Class III $12.91
  • farm–level FMMO blend price $14.04/cwt
• average dairy support price $10.05/cwt
Empirical Study

- scanner data: weekly city–level purchases of dairy products matched with demographic characteristics of the purchasing households in 22 cities
- prices adjusted for taxes
- program’s transition period of 1997–1999
Estimation model

• generalization of AIDS: linear and quadratic in prices, linear in income (LQ–IDS)
• nonlinear 3-stage least squares estimation
• includes city–level demographic variables:
  • ethnicity
  • home ownership
  • employment status
  • occupation
  • age and number of children in the household
  • education and age of household heads
  • income
Incomplete Demand System

• consistent with utility theory: consistent estimates of elasticities and welfare measures
  • 2 primary differences w/ complete demand system
    • budget constraint is an inequality
    • demand for the \( n+1 \)st good is not forced to have exactly the same functional form as the included goods
  • can be made complete by identifying the demand for expenditure on other goods through the budget identity
NL3SLQ

- 856 instruments
- 819 structural parameters
- total of 3,588 cross-section/time-series observations per demand equation
- given 14 demand equations, 50,162 total observations
Estimation Model’s Properties

- has null hypothesis of zero for each price and income elasticity (cf. AIDS: null is -1 for own-price and 1 for income)
- flexible with respect to price and income effects
- satisfies necessary and sufficient conditions for a rational, representative consumer in each city
14 Products

• milk: non–fat, 1% milk, 2% milk, whole
• cream/creamers: dairy cream (including half and half), coffee creamers
• spreads: butter and margarine
• ice cream (including frozen yogurt and ice milk)
• yogurt: cooking (plain and vanilla yogurt), flavored
• cheese: cream cheese, shredded and grated, American and other processed cheese, natural
Disaggregation affects Substitution

• whole, 2%, 1%, and nonfat milk should be close substitutes
• if price of 2% milk > average of whole and nonfat milk prices, mixing two half gallons of whole and nonfat gives 1.9% milk at a reduced cost
• thus, we expected ex ante (and found) larger estimated own–price elasticities of demand than in studies w/ more aggregated products
Welfare

• we use the carefully estimated demand system to calculate equivalent variation of milk marketing orders by demographic groups

• check whether policy is regressive
Previous Loss Estimates

• 2 studies: average annual consumer surplus losses due to marketing orders 1970s-mid 1980s
  • $700 million ($1967)
  • $3.6 billion ($2000)

• 3 studies: social costs of $175 million, $25 million and $70 million per year, respectively ($1967)
Previous Pricing Studies

• raw milk prices would fall nearly 20% in the absence of marketing orders
• if retail pass-through is 100%, retail prices would also decrease 20%
• eliminating the New England Dairy Compact, which acted much like a marketing order, would result in a 4% to 70% decrease in fresh milk prices
Eliminating Milk Marketing Orders

- general agreement on effect on fluid milk, some minor dispute about effect on manufactured dairy prices
- we consider 3 scenarios:
  - milk -20%, manufactured no change
  - milk -20%, manufactured +5% increase
  - averages of literature’s estimates
### Percentage Change in Quantity

<table>
<thead>
<tr>
<th></th>
<th>$p$</th>
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<th>$p$</th>
<th>$Q$</th>
<th>$p$</th>
<th>$Q$</th>
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</thead>
<tbody>
<tr>
<td><strong>1% Milk</strong></td>
<td>−20</td>
<td>32.9</td>
<td>−20</td>
<td>32.7</td>
<td>−15.5</td>
<td>25.0</td>
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<tr>
<td><strong>2 % Milk</strong></td>
<td>−20</td>
<td>12.2</td>
<td>−20</td>
<td>12.9</td>
<td>−15.5</td>
<td>9.5</td>
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<tr>
<td><strong>Nonfat Milk</strong></td>
<td>−20</td>
<td>8.8</td>
<td>−20</td>
<td>9.6</td>
<td>−15.5</td>
<td>7.4</td>
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<tr>
<td><strong>Whole Milk</strong></td>
<td>−20</td>
<td>9.2</td>
<td>−20</td>
<td>6.8</td>
<td>−15.5</td>
<td>6.8</td>
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<tr>
<td><strong>Fresh Cream</strong></td>
<td>0</td>
<td>1.3</td>
<td>+5</td>
<td>2.1</td>
<td>1.25</td>
<td>0.8</td>
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<tr>
<td><strong>Natural Cheese</strong></td>
<td>0</td>
<td>0.6</td>
<td>+5</td>
<td>−0.9</td>
<td>0.5</td>
<td>0.2</td>
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<tr>
<td><strong>Cream Cheese</strong></td>
<td>0</td>
<td>0.3</td>
<td>+5</td>
<td>−3.8</td>
<td>0.5</td>
<td>−1.1</td>
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<tr>
<td><strong>Butter</strong></td>
<td>0</td>
<td>−1.4</td>
<td>+5</td>
<td>−1.8</td>
<td>−3.0</td>
<td>−0.3</td>
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<tr>
<td><strong>Ice Cream</strong></td>
<td>0</td>
<td>1.0</td>
<td>+5</td>
<td>1.2</td>
<td>−1.0</td>
<td>1.9</td>
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<tr>
<td><strong>Flavored Yogurt</strong></td>
<td>0</td>
<td>−0.1</td>
<td>+5</td>
<td>−2.7</td>
<td>1.25</td>
<td>−1.0</td>
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## Equivalent Variation ($/week)

<table>
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<tr>
<th></th>
<th>0%</th>
<th>5%</th>
<th>literature</th>
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<tr>
<td><strong>Mean</strong></td>
<td>1.44</td>
<td>0.63</td>
<td>2.94</td>
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<tr>
<td><strong>White</strong></td>
<td>1.50</td>
<td>0.68</td>
<td>2.96</td>
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<tr>
<td><strong>Non–white</strong></td>
<td>0.96</td>
<td>0.23</td>
<td>2.10</td>
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<tr>
<td><strong>Income=$10,000</strong></td>
<td>1.73</td>
<td>0.80</td>
<td>3.84</td>
</tr>
<tr>
<td><strong>Income=$50,000</strong></td>
<td>0.94</td>
<td>0.33</td>
<td>1.41</td>
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<tr>
<td><strong>Income=$90,000</strong></td>
<td>0.15</td>
<td>–0.14</td>
<td>–0.92</td>
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<tr>
<td><strong>Young Child (0–5.9)</strong></td>
<td>1.68</td>
<td>0.76</td>
<td>3.88</td>
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<tr>
<td><strong>No Children</strong></td>
<td>1.69</td>
<td>0.84</td>
<td>2.83</td>
</tr>
<tr>
<td><strong>Family with 3 Children ($20K)</strong></td>
<td>1.25</td>
<td>0.70</td>
<td>5.77</td>
</tr>
<tr>
<td><strong>Childless Couple ($60K)</strong></td>
<td>0.22</td>
<td>–0.37</td>
<td>3.34</td>
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Regressive

- marketing orders are highly regressive
- fall disproportionately on the poor
Regulatory Burden

- regulatory burden: household’s annual equivalent variation from removing the marketing order divided by its annual income
- look at the regulatory burden from 20% decrease in fluid milk prices and 5% increase in manufacturing prices
- the following figure compares the regulatory burden as a function of income for White and Nonwhite families
Distribution of Regulatory Burden for Federal Milk Marketing Orders
Conclusions

• milk marketing orders *harm widows and orphans* (raises fluid milk price)
• *help yuppies* (lowers triple cream cheese, premium ice cream prices)
Harm

• luckily the losses are relatively small per average household:
  • $2.94/week
  • $152.88/year

• total harm to society (given 100 million HHs buy dairy products): $15.3 billion