Effects of Agricultural Policies on Human Nutrition and Obesity

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“[Our] cheap-food farm policy comes at a high price: … [with costs including] the obesity epidemic at home – which most researchers date to the mid-70s, just when we switched to a farm policy consecrated to the overproduction of grain.” (NYT, 2003, Michael Pollan)

• This view has become accepted as a fact, in spite of
  – No real evidence presented
  – Questions about the nature of effects
  – Grounds for skepticism about the size of effects
Objectives and Research Activities

• Key Objectives
  – Better understand the effects of selected agricultural policies on obesity
  – Identify policy culs-de-sacs
    • Based on policy-outcome links that never existed
    • Based on policy-outcome links that have changed over time
  – Identify agricultural policy options for helping to address the obesity problem
    • Mechanisms
    • Unexpected side-effects
    • Likely size of effects

• Selected Elements of Our Research Program
  – Price Trends
  – Farm Bill
    • Commodity Subsidies
    • Food Stamp Program
  – Market for Sweeteners
  – Latino Toddlers Participating in WIC Program
Trends in Commodity and Food Prices

&

One Key Driving Force

or

“Healthy Foods Are Increasingly Out of Reach to the Poor (and Bad Agricultural Policy Is Responsible).”
Nominal Commodity Prices Received by Farmers Have Increased

Real Commodities Prices Received By Farmers Have Generally Declined

Prices Paid By Consumers Have Also Generally Fallen, but Less Swiftly Than Commodity Prices

- **Eggs, Grade A Large**
  - 1980: $1.20
  - 1984: $1.00
  - 1992: $0.80
  - 1996: $0.60
  - 2000: $0.40
  - 2004: $0.20

- **Ground Chuck, USDA Choice Cons.Food_Prices!$N$7, 100% Beef**
  - 1980: $2.20
  - 1984: $2.00
  - 1988: $1.80
  - 1992: $1.60
  - 1996: $1.40
  - 2000: $1.20
  - 2004: $1.00

- **Chicken, w hole, fresh**
  - 1980: $0.90
  - 1984: $0.80
  - 1988: $0.70
  - 1992: $0.60
  - 1996: $0.50
  - 2000: $0.40
  - 2004: $0.30

- **Sugar, w hite, all sizes**
  - 1980: $0.20
  - 1984: $0.30
  - 1988: $0.40
  - 1992: $0.50
  - 1996: $0.60
  - 2000: $0.70
  - 2004: $0.80
Almost All Consumer Prices for Foods Have Fallen, Some More Swiftly Than Others

Statistics report proportional changes in real prices over 1980-2003: Data sources USDA
Trends in Aggregate Agricultural Productivity

Index of Land Productivity
(1977=100)

120
140
160

Index of Labor Productivity
(1977=100)

140
160
180

Total Factor Productivity Index
(1948=100)

150
170
190
210

Year


Year


Year


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Public Sector and Private Sector Trends in Agricultural R&D Spending

Total Federal and State Spending on Ag. R&D
(1925-1997)

Total Private Sector Spending on Ag R&D
(1960-1992)
The Effects of U.S. Farm Subsidies on Obesity

or

“If It Weren’t for Corn Subsidies, We’d All Be as Slender as Reeds”
Logical Sequence Linking Farm Subsidies to Obesity

• First, *farm subsidies* must have made farm commodities that are important ingredients of relatively fattening foods significantly more abundant and cheaper.

• Second, the lower commodity prices *caused by farm subsidies* must have resulted in significantly lower costs to the food industry, and cost savings to the food marketing firms must have been passed on to consumers in the form of lower prices of relatively fattening food.

• Third, food consumption patterns must have changed significantly in response to these policy-induced changes in the relative prices of more-fattening versus less-fattening foods.
<table>
<thead>
<tr>
<th>USDA Program</th>
<th>Expenditure in 2007</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food, Nutrition, and Consumer Services</td>
<td>54.4 billions of dollars</td>
<td>43.3 percent</td>
</tr>
<tr>
<td>Farm Service Agency <em>(farm programs)</em></td>
<td>33.9</td>
<td>27.0 percent</td>
</tr>
<tr>
<td>Rural Development</td>
<td>14.4</td>
<td>11.5 percent</td>
</tr>
<tr>
<td>Natural Resources and Environment</td>
<td>7.7</td>
<td>6.1 percent</td>
</tr>
<tr>
<td>Foreign Agricultural Service</td>
<td>5.2</td>
<td>4.1 percent</td>
</tr>
<tr>
<td>Risk Management <em>(mainly crop insurance)</em></td>
<td>4.2</td>
<td>3.3 percent</td>
</tr>
<tr>
<td>Res., Educ. and Econ. <em>(mainly ag. R&amp;D)</em></td>
<td>2.3</td>
<td>1.8 percent</td>
</tr>
<tr>
<td>Marketing and Regulatory Programs</td>
<td>1.7</td>
<td>1.4 percent</td>
</tr>
<tr>
<td>Other</td>
<td>1.8</td>
<td>1.4 percent</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>125.6</strong></td>
<td><strong>100.0 percent</strong></td>
</tr>
</tbody>
</table>
Fundamental Misconceptions Regarding The Effects of Agricultural Policies

• Directions of Effects on Production and Prices Are **Not** the Same for All Policies, e.g., …
  – Sugar is more expensive due to trade and other policies
  – Corn and soybeans are probably cheaper than they otherwise would be
  – Dairy policies make milk products more expensive, but policies that make animal feed cheap work in the opposite direction
  – Some of these effects might actually help reduce obesity
    • E.g., more expensive sugar and dairy products may reduce calorie and fat consumption

• Magnitudes of Effects Are Generally **Small**, e.g., ..
  – Policy effects on the prices of most field crops (e.g., wheat, corn and soybeans) are small
  – Policy effects on other commodities (e.g., rice, cotton and sugar) are larger
## Production and Price Effects of Eliminating U.S. Commodity Programs and Policies

<table>
<thead>
<tr>
<th>Commodity</th>
<th>% Change in Output in 2016*</th>
<th>% Change in Producer Prices in 2016*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soybeans</td>
<td>-2.86</td>
<td>-1.14</td>
</tr>
<tr>
<td>Wheat</td>
<td>-7.58</td>
<td>1.52</td>
</tr>
<tr>
<td>Maize</td>
<td>-3.79</td>
<td>0.26</td>
</tr>
<tr>
<td>Rice</td>
<td>-11.71</td>
<td>-3.87</td>
</tr>
<tr>
<td>Cotton</td>
<td>-13.88</td>
<td>-6.10</td>
</tr>
<tr>
<td>Cane and beet</td>
<td>-33.31</td>
<td>-15.30</td>
</tr>
<tr>
<td>Fruit and vegetables</td>
<td>4.42</td>
<td>-5.16</td>
</tr>
<tr>
<td>Beef cattle</td>
<td>1.44</td>
<td>-3.31</td>
</tr>
<tr>
<td>Pigs and poultry</td>
<td>0.41</td>
<td>-0.01</td>
</tr>
<tr>
<td>Milk</td>
<td>-0.45</td>
<td>-0.01</td>
</tr>
</tbody>
</table>


(*based on the differences in 2016 between the prices and quantities that emerge from a status quo policy scenario and those that emerge from a scenario in which all commodity programs are gradually eliminated over the period 2006-2016)
Conclusions for the U.S. and Policy Implications

- The U.S. Farm Bill’s Commodity Programs are Inefficient and Unfair
  - These are good (and sufficient) reasons to eliminate them
  - But do NOT expect that action to affect obesity, because …

- Commodity Programs’ Effects on Commodity Prices Are Generally Small and Varied

- The Effects of Commodity Prices on Food Prices Is Declining

- The Responsiveness of Food Demand to Changes in Food Prices Is Generally Low
An Economic Assessment of A Proposed Change to the Food Stamp Program

- Proposed Changes
  - Restrict the Use of Food Stamps for ‘Unhealthy’ Foods

- What Would the Likely Effects On:
  - Food consumption of FSP participants
  - Food consumption of eligible non-participants
Supply Response to Policy Change

The Market for “Healthy” Food

Price ($P_h$)

$P_{h,0}$

$P_{h,1}$

$P_{h,2}$

Healthy Food ($h$)

$0$ $h_0$ $h_2$ $h_1$ $1$

$SU$ $SH$

$DH_2(P_{u,2}, FSP_1)$

$DH_1(P_{u,0}, FSP_1)$

$DU_0(P_{h,0}, FSP_0)$

$DU_1(P_{h,0}, FSP_1)$

$DU_2(P_{h,2}, FSP_1)$

The Market for “Unhealthy” Food

Price ($P_u$)

$P_{u,0}$

$P_{u,1}$

$P_{u,2}$

Unhealthy Food ($u$)

$0$ $u_0$ $u_1$ $u_2$
Main Conclusions

• Restriction of food stamps to only healthy foods may have unintended consequences
  – If constraint is not binding (because “healthy” food expenditure exceeds food stamp value) no effect
  – If constraint is binding . . . .
    • Reduced participation by some eligible households
    • Reduced consumption of “unhealthy” foods by some FSP households => induced price changes and increased consumption of “unhealthy” foods by non-participants

• Targets and instruments
  – Use food stamps to provide food for the poor
  – Use other policies to encourage a healthy diet
An Economic Analysis of the Market for Sweeteners

or

“If It Weren’t for HFCS, We’d All Be Svelte”
Issues Addressed

- What Is the Influence of Farm Policy on Changes in Added Sugar in the US Diet?
- Has Farm Policy Contributed to the Change in Sweetener Consumption and Composition?
- What Is its Contribution Today?
Per Capita Sweetener Consumption

Source: USDA/Economic Research Service
Industrial Use of Sugar, by Product Group

Source: Calculated from U.S. Census Bureau
### Changes in US Sugar Market

#### Correlations among raw, whole, and retail sugar prices

<table>
<thead>
<tr>
<th>Time period</th>
<th>Retail, wholesale refined</th>
<th>Wholesale refined, raw</th>
<th>Retail, raw</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960-1981</td>
<td>0.97</td>
<td>0.99</td>
<td>0.94</td>
</tr>
<tr>
<td>1982-2006</td>
<td>0.44</td>
<td>0.58</td>
<td>0.14</td>
</tr>
<tr>
<td>1995-2006</td>
<td>0.60</td>
<td>0.65</td>
<td>0.01</td>
</tr>
</tbody>
</table>
## Changes in Links Among Markets

Correlations among corn, HFCS, and carbonated drink prices

<table>
<thead>
<tr>
<th></th>
<th>Corn, carbonated drinks</th>
<th>HFCS, carbonated drinks</th>
<th>Corn, HFCS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1978-2006</strong></td>
<td>-0.21</td>
<td>-0.30</td>
<td>0.42</td>
</tr>
<tr>
<td><strong>1978-1992</strong></td>
<td>-0.06</td>
<td>0.51</td>
<td>0.47</td>
</tr>
<tr>
<td><strong>1993-2006</strong></td>
<td>-0.28</td>
<td>0.07</td>
<td>0.33</td>
</tr>
</tbody>
</table>
Summary and Lessons Learned

• Ag R&D Affects Commodity Prices
  – Corn price has fallen faster than sugar price
  – Price of HFCS has fallen over time and lowered unit cost of sweeteners

• Ag input costs are falling relative to other input costs in food processing

• Today: tenuous link between farm/commodity policy and the retail cost of sweetened goods

• Evidence from other high-income countries shows little relationship between consumption of sugar and sugar policies
Latino Toddlers in the WIC Program

• **Research Questions**
  – What are the effects of child feeding practices on nutritional status and growth?
  – How do caregiver, household and neighborhood factors condition these effects?

• **Sample**
  – Approximately 100 Latino toddlers from the Sacramento, California area

• **Research Methods**
  – Baseline data collection: anthropometrics, feeding practices (new survey instrument developed), dietary intake, socioeconomic factors
  – Second round data collection: anthropometrics, feeding practices, dietary intake, changes in key socioeconomic factors
  – Econometric model to identify links
### Toddler Weight Status (n=94):

<table>
<thead>
<tr>
<th>Status</th>
<th>WHO</th>
<th>NCHS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>68.1%</td>
<td>77.6%</td>
</tr>
<tr>
<td>Overweight</td>
<td>24.5%</td>
<td>16%</td>
</tr>
<tr>
<td>Obese</td>
<td>7.4%</td>
<td>6.4%</td>
</tr>
</tbody>
</table>

### Toddler Weight/Length Z-Scores

![](image)

- **WHO Standards**
- **WIC Sample Children**
Maternal BMI (n=95):
- Normal = 22%
- Overweight = 37%
- Obese = 41%

% of Monthly Food Expenditures

- Meat and Poultry: 22%
- Prepared Foods: 4.2%
- Dairy Products: 10.7%
- Breads and Cereals: 6%
- Tortillas: 5.0%
- Dried Beans, Pasta, and Rice: 2.2%
- Cookies, Crackers, and Bakery Goods: 2.0%
- Canned and Bottled Goods: 4.7%
- Miscellaneous Dry Goods: 2.2%
- Baby Food: 0.3%
- Oils, and Lard: 0.9%

Household Characteristic | Mean
--- | ---
size of household | 5.24
% live with extended family | 0.35
number of children | 2.30
born in US | 0.23
speak English at home | 0.14
employed | 0.35
years of school | 10.88
monthly income | 2215.13
Complex Links among Factors Potentially Influencing Toddler Nutritional Outcomes

- **Neighborhood Level**
  - Food Outlets Types
  - Densities
  - Recreational Options

- **Household Level**
  - Income and Wealth
  - Food Purchases
  - Food Availability

- **Caregiver Level**
  - Toddler Feeding Practices
  - Nutritional Knowledge
  - Employment Status

- **Toddler Level**
  - Food Intake
  - Genetics
  - Energy Expenditures
  - Nutritional Status
  - Genetics

- **Characteristics**

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Next Steps

• Agricultural Policies
  – Specialty crop R&D
  – Biofuels

• Sweetener Study
  – Changes in market structure
  – Model simulations

• WIC Toddler Study
  – Final round of data collection
  – Analysis and policy messages to WIC
Publications to Date