Effects of Agricultural Research and Farm Subsidy Policies on Human Nutrition and Obesity

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Presentation Outline

• Obesity in the U.S. – Trends, Costs and Presumed Causes
• One ‘Smoking Gun’ – HFCS and ‘Related’ Ag Policies
• A Broader Look at Agricultural Policy – Farm Subsidies and R&D
• Commodity Prices
• Food Prices
• Policy Instrument ‘Test’
• Preliminary Conclusions and Implications for Research and Policy
Children with BMI values at or above the 95th percentile of the sex-specific BMI growth charts are categorized as overweight.
Obesity Trends* Among U.S. Adults
(*BMI $\geq$30, or about 30 lbs overweight for 5’4” person)

Source: Behavioral Risk Factor Surveillance System, CDC.
Economic Costs

• Direct
  – Increased health care costs
    • $78.5 billion in the U.S. in 1998
    • $7.8 billion in California alone, 1998-2000

• Indirect
  – Morbidity costs
    • Lost productivity
    • Absenteeism
  – Mortality costs
    • Over 300,000 death per year attributable to obesity
    • Obese individuals have a 50 to 100% increased risk of premature death from all causes
Key Issues

• Why Is Obesity on the Rise?
  – Long-Term and Worsening Energy Imbalance
    • Energy Intake > Energy Expenditure

• Drivers of This Imbalance
  – Types and sources of food
  – Food portions
  – Energy expenditure patterns

• What Role of Agriculture and Agricultural Policy?
  – Getting us to this point?
  – Course correction?
Food Types and Sources Are Changing

• Eating More Energy-Dense Foods
  – Potato chips (23kJ/g), donuts (18 kJ/g), cheese (17 kJ/g), low-fat milk (1.6 kJ/g), raw vegetables and fruits (0.4-2.0 kJ/g)

• Snacks Versus Meals
  – Snacks – increasing proportion of caloric intake
  – Meals – decreasing proportion of caloric intake

• Meals Eaten Away-from-Home
  – 1977: 16% of food, 38% of all food expenditures
  – 1997: 29% of food, 49% of all food expenditures
Food Portions On The Rise

• McDonalds French Fries
  – 1950: one size (210 cal.)
  – 1970: small (210 cal.) and large (320 cal.)
  – 1990: small (210 cal.), large (450 cal.) and Super 450 cal.)
  – 2000: small (210 cal.), medium (450 cal.), large (540 cal.) and super (610 cal.)

• Coke
  – Original: 6.75 oz. (75 cal.)
  – Kids: 10 oz. (120 cal.)
  – Small: 12 oz. (150 cal.)
  – Medium: 18 oz. (230 cal.)
  – Large: 24 oz. (300 cal.)
  – King: 36 oz. (450 cal.)
  – Extreme Gulp: 52 oz. (650 cal.)
Is Agricultural Policy (Partially) Responsible?

• “[Our] cheap-food farm policy comes at a high price: . . . farmers in the United States have managed to produce 500 additional calories per person every day; each of us is, heroically, managing to pack away 200 of those extra calories per day.” (Pollan 2003)

• “Commodity prices . . . are so low that restaurants have been able to double serving sizes without doubling prices.” (Davis 2003)

• “Why healthier foods are slipping out of reach of large segments of the US population is a question with many policy and political implications.” (Drewnowski and Barratt-Fornell, 2004)
One ‘Smoking Gun’

Trends in Consumption of Corn Sweeteners

http://www.ers.usda.gov/data/foodconsumption/FoodGuideIndex.htm#calories
The More Complete Story

Trends in Consumption of Selected Sweeteners

Year

Avg. Kcalories/person/day


- Refined cane and beet sugar
- Corn sweeteners
- All Added sugars

http://www.ers.usda.gov/data/foodconsumption/FoodGuideIndex.htm#calories
White Sugar Policy – What Role?

Sugar Prices in the USA -- 1986-2004

Producer Support Estimate -- Sugar

Alston, Sumner, Vosti UCD/AIC/CNRPA
Sugar Prices -- Australia

- V. Consumption price (at farm gate)
- VII. Reference price (at farm gate)

AUD/ton (current)
The Australia Story: Obesity Trends

Figure 1: Projected increase in the prevalence of obesity (BMI ≥ 30) in South Australia

Body weight status, persons aged 18 years and over, NSW 1989/90 and 1995

Table 1: Prevalence of BMI categories in 1991 and 2001

<table>
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<th>BMI category</th>
<th>1991</th>
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<th>2001</th>
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<td>% (95% CI)</td>
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<td>% (95% CI)</td>
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<tr>
<td>Underweight (&lt;18.5)</td>
<td>4.2 (3.5 – 5.0)</td>
<td>3.0 (2.4 – 3.8)</td>
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<tr>
<td>Normal (18.5-24.9)</td>
<td>57.9 (56.1 – 59.7)</td>
<td>46.2 (44.3 – 48.2)</td>
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<tr>
<td>Overweight (25.0-29.9)</td>
<td>27.6 (26.0 – 29.3)</td>
<td>33.0 (31.2 – 34.9)</td>
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<td>Obese (30.0-34.9)</td>
<td>8.1 (7.1 – 9.1)</td>
<td>12.1 (10.8 – 13.4)</td>
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<tr>
<td>Severely obese (≥35.0)</td>
<td>2.2 (1.7 – 2.9)</td>
<td>5.7 (4.9 – 6.7)</td>
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</table>
The Much More Complete Story

Calories from Different Food Groups

Avg. Kcalories/person/day

Meat, eggs, and nuts
Dairy
Fruit
Vegetables
Flour and cereal products
Added fats
Added sugars

Year


http://www.ers.usda.gov/data/foodconsumption/FoodGuideIndex.htm#calories
### Types and Magnitudes of Agricultural Policies

<table>
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<th>USDA Program</th>
<th>Expenditure in 2004</th>
<th>Percent of Total</th>
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<td></td>
<td><strong>billions of dollars</strong></td>
<td><strong>percent</strong></td>
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<td>Food, Nutrition, and Consumer Services</td>
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<td>Farm Service Agency <em>mainly farm commodity programs</em></td>
<td>27.4</td>
<td>24.3</td>
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<td>Rural Development</td>
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<td>Foreign Agricultural Service</td>
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<tr>
<td>Risk Management <em>mainly crop insurance</em></td>
<td>4.1</td>
<td>3.6</td>
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<tr>
<td>Research, Education and Economics <em>mainly ag. R&amp;D</em></td>
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<td>Marketing and Regulatory Programs</td>
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<tr>
<td>Other</td>
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<td>TOTAL</td>
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</table>
Links Between Selected Agricultural Policies and Human Nutrition

Agricultural R&D

Farm Production Costs

Commodity Prices

Food Industry

Food Prices

Food Intake

Genetic Factors

Nutritional Status

Agricultural Commodity Programs

Farm Income

Disposable Income

Available Time

Information & Sociocultural Factors

Activity Levels
Support to Agriculture

Producer Support Estimates

Consumer Support Estimates

General Services Support Estimate

Transfers from Taxpayers to Consumers -- All Commodities

- V.1 Consumer Support Estimate (CSE)
- P. Transfers to producers from consumers (-)
- Q. Other transfers from consumers (-)
- S. Excess feed cost

- A. Market price support
- B. Payments based on output
- C. Payments based on area planted/animal numbers
- D. Payments based on historical entitlements
- E. Payments based on input use
- F. Payments based on input constraints
- G. Payments based on overall farming income

- IV. General Services Support Estimate (GSSE)
- I. Research and development
- M. Marketing and promotion
- N. Public stockholding
- O. Miscellaneous

- R. Transfers to consumers from taxpayers

- Food stamp program 0.36 * 12-3505-0-1-605
- Nutrition Assistance for Puerto Rico 12-3550-0-1-605
- State Child Nutrition Program 12-3539-0-1-605
- WIC nutrition programs 12-3510-0-1-605
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)

Year
mil. $

Private Ag R&D Spending
Trends in Aggregate Productivity Measures

Index of Land Productivity
(1977=100)

Index of Labor Productivity
(1977=100)

Total Factor Productivity Index
(1948=100)
Trends in Crop/Product Productivity

Average Yield of Corn 1900-1997

Milk Production per Cow 1929-1996
Trends in Prices Received By Farmers

Deflated Prices Received for Selected Fruits
(1977=100)

Year

Prices received Deflated with prices paid (Commodities, services, interest, taxes, wages) (1977=100)

Deflated Prices Received for Selected Grains
(1977=100)

Years

Deflated Prices Received for Selected Fruits
(1977=100)

Year

Alston, Sumner, Vosti UCD/AIC/CNRPA
Prices Paid By Consumers – Basic Stuff

Consumer Prices for Eggs Deflated by CPI (food at home)

- $/doz.
- Eggs, Grade A Large

Consumer Prices for Chicken deflated by CPI (food at home)

- $/lb.
- Chicken, whole, fresh

Consumer Prices for Ground Beef Deflated by CPI (food at home)

- $/lb.
- Ground Chuck, USDA Choice Cons.Food Prices/$N$/7, 100% Beef

Consumer Prices for White Sugar Deflated by CPI (food at home)

- $/lb.
- Sugar, white, all sizes
Prices Paid By Consumers – Fruits and Vegetables

**Consumer Prices for Broccoli Deflated by CPI (food at home)**

- \$/lb.
- Year: 1986 to 2004

**Consumer Prices for Oranges Deflated by CPI (food at home)**

- \$/lb.
- \$/12 oz.
- Year: 1980 to 2004

**Consumer Prices for Potatoes Deflated by CPI (food at home)**

- \$/lb.
- Year: 1986 to 2004

**Consumer Prices for Strawberries Deflated by CPI (food at home)**

- \$/12 oz.
- Year: 1980 to 2004
# Getting the Price Story Right: Strawberries

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<th>Year</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
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A Closer Look at Strawberry Prices

June Strawberry Prices
(BLS data)

\[ y = -0.0089x + 18.289 \]
\[ R^2 = 0.5356 \]

Price $ per dry pint (12oz)

Year

Feb Strawberry Prices
(BLS data)

\[ y = -0.0003x + 1.4305 \]
\[ R^2 = 0.0003 \]

Price $ per dry pint (12oz)

Year

Consumer Prices for Strawberries Deflated by CPI (food at home)

Year

$/12 oz.

Strawberries, Dry pint

Alston, Sumner, Vosti UCD/AIC/CNRPA
Consumer Prices for Foods

White Sugar: -.008
Butter: -.023
Milk: -.011
Cheese: -.033
Eggs: -.015
Beef: -.031
Turkey: -.021
Chicken: -.009

Lettuce: -.004
Tomatoes: +.003
Carrots: -.003
Potatoes: 0.0
White Bread: 0.0
Rice: -.031
Pasta: -.008
Bananas: -.004
Apples: -.006
Oranges: 0.0
Grapefruit: -.002

Food Prices in Terms of the Wages

- Tomatoes (3 lbs.) (18% of the historical price today)
  - 1919: 101 minutes
  - 1997: 18 minutes
- An Orange (13% of the historical price today)
  - 1919: 68 minutes
  - 1997: 9 minutes
- 3-Pound Chicken (9% of the historical price today)
  - 1919: 2 hours 37 minutes
  - 1997: 14 minutes
- Dozen Eggs (6% of the historical price today)
  - 1919: 80 minutes
  - 1997: 5 minutes
- Hamburger (33% of the historical price today)
  - 1940: 27 minutes of work
  - 1997: 9 minutes of work
- Pizza (88% of the historical price today)
  - 1958: 57 minutes
  - 1997: 50 minutes

Source: Dallas Fed
‘Disconnect’ Between Commodity & Food Prices

Divergence Between Restaurant and Shippers’ Prices
Costs of Producing Fast Foods

Farmer Prices for the Components of a McDonalds Quarter Pounder

Costs to Consumer for Components McDonalds Quarter Pounder with Cheese

Percent of Costs and Expenses
McDonalds Corporation

http://www.mcdonalds.com/corp/invest/pub.html
Policy Instrument ‘Test’

• Size of the Externality
  – Social costs associated with obesity
• Size of Behavioral Response
  – Price elasticities tend to be very low (USA)
• Implementation Costs
• Lags in Intended Effects
• Unintended Effects
• Alternative Policy Instruments

Preliminary Conclusions and Policy Implications

• Agricultural Policy ➔ Commodity Prices
  – Commodity Support Programs
    • Effects on farmer income are large; Effects on commodity prices are small, varied and difficult to predict
  – Publicly Sponsored Agricultural Research
    • Chiefly responsible for past yield increases and price declines

• Commodity Prices ➔ Food Prices ➔ Caloric Intake
  – Increasing ‘disconnect’ between commodity prices and food prices
  – Role of food industry needs to be better understood and exploited
    • Entry points for changes in food preparation technologies and portion sizes

• Managing food consumption via macro-management of commodity prices is probably a bad strategy
  – Is cheap food a bad thing?
  – Can reductions in agricultural R&D reduce obesity?

• Micro-Management of Food Prices Might Not Be Wise
  – Price responses are generally low

• Agricultural Policy for Dealing with Obesity
  – Increased yields, and improved quality and availability of fruits/vegetables
    • Large role for private sector

• Difficult to Defend the ‘Increasingly Out of Reach’ Hypothesis
Next Steps

• ASSA Paper (Joint Presentation with IFPRI/FCND)
  – Implications for developing countries of research results to date

• USDA Small Grant
  – Effects of agricultural policies on low-income consumers in the USA

• USDA Large Grant (pending)
  – Joint with Iowa State University
  – Agricultural policies, sweetener subsector, WIC
    • Research, training, outreach, curriculum development

• Dual-Constraint Model
  – Combined effects of income and time constraints on consumption patterns of low-income groups
Muito Obrigado!