

# The Economics of Obesity

by

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*Beyond Health Insurance*

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# Work Discussed Today

- Lakdawalla, D., T. Philipson, and J., Bhattacharya, (2005) "Welfare Enhancing Technological Change and The Growth in Obesity", *American Economic Review*, v 95 (2), pp 253-257.
- Philipson, T., and R., Posner, (2003), "The Long Run Growth of Obesity as a Function of Technological Change, *Perspectives in Biology and Medicine, Summer*, v 46, No 3, 87-108. [Also NBER Working Paper # 7423].
- Lakdawalla, D., and T. Philipson. "Labor Supply and Weight", *Journal of Human Resources*, 2006.
- Lakdawalla, D., and T. Philipson. "The Growth in Obesity and technological Change: A Theoretical And Empirical Examination." *NBER Working Paper #8446*
- Philipson, T., and R., Posner, " Is The Obesity Epidemic a Public Health Problem? A Decade of Research on The Economics of Obesity", forthcoming, *Journal of Economic Literature*, 2008

# Measurement of Obesity

- Height-Adjusted Body Weight
  - Body Mass Index (BMI):  $\text{weight}/\text{height}^2$
- Body Weight vs Body-Fat
  - Muscle & Weight
  - Data Availability
- Definitions in Population Data
  - Over-weight: BMI Above 25
  - Obese: BMI Above 30

# Obesity Epidemic (WHO 2006)

- Worldwide: 17% over weight, 5 % obese
- USA: 65% overweight, 33% obese

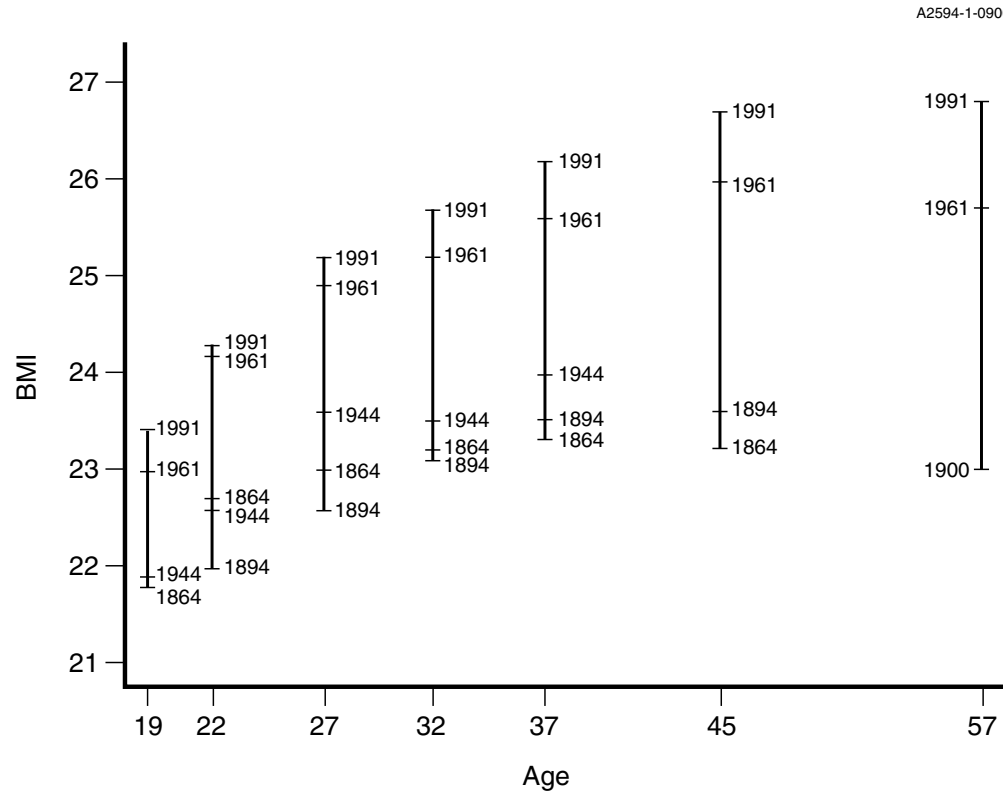
# Obesity and Public Finance

- “Big” : Prevalence Larger Than For
  - Smoking
  - Drug use
  - Any other Health Condition (?)
- “Big Impact”: Major Risk-Factor For
  - Heart Disease
  - Stroke
  - Diabetes
- Affects Major Public Programs
  - Social Security
  - Medicare + Medicaid

# Obesity and Health Economics

- Health of Population often Determined by Behavior Outside Health Care Markets
  - Infectious Diseases
  - Obesity
  - Diets and Exercise
  - Genetic Composition and Transmission
- Common Behavior (Prevalence):
  - Large Benefits less understood than smaller Costs

# Historical Growth in Weight



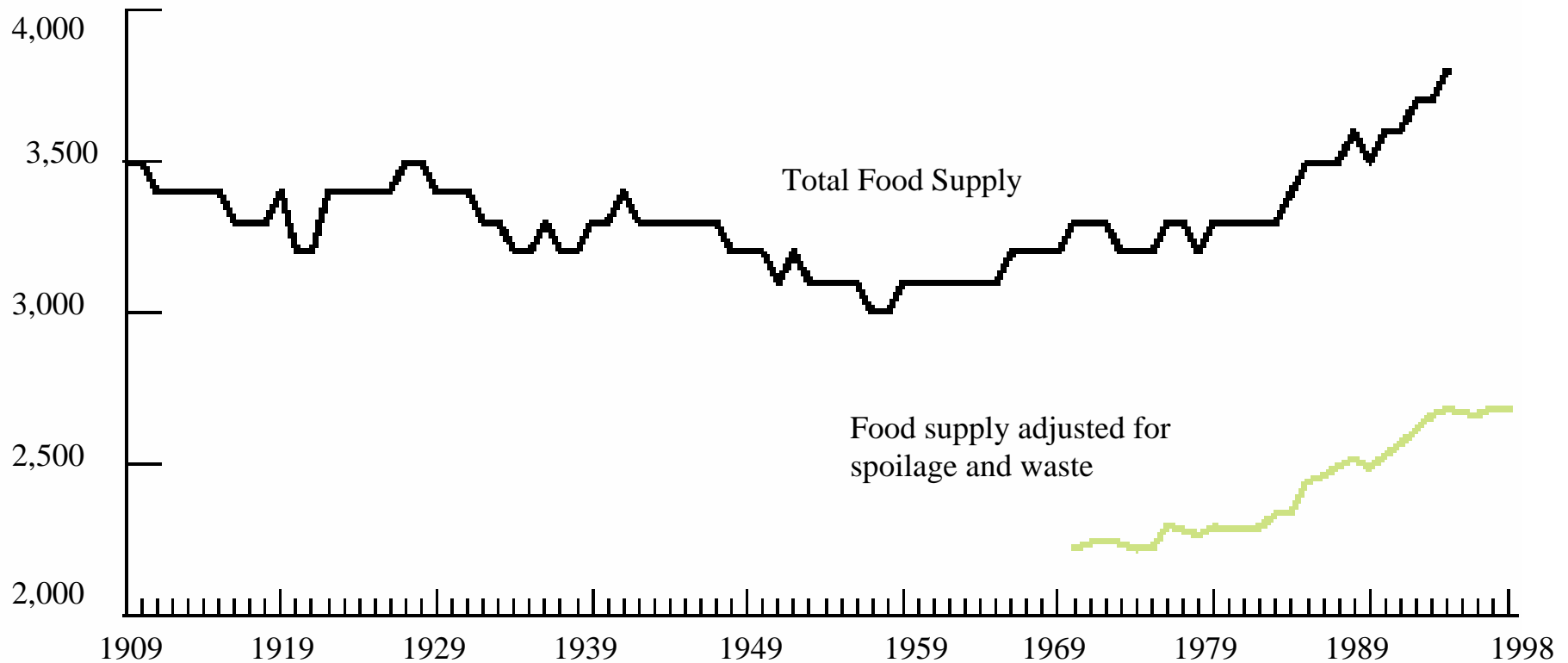
SOURCE: Costa D. and R. Steckel (1995), NBER Historical WP #76.

**Mean BMI by Age Group and Year, 1863-1991**

# Calories Produced per Person-Day, 1906-1998

## Calories Available

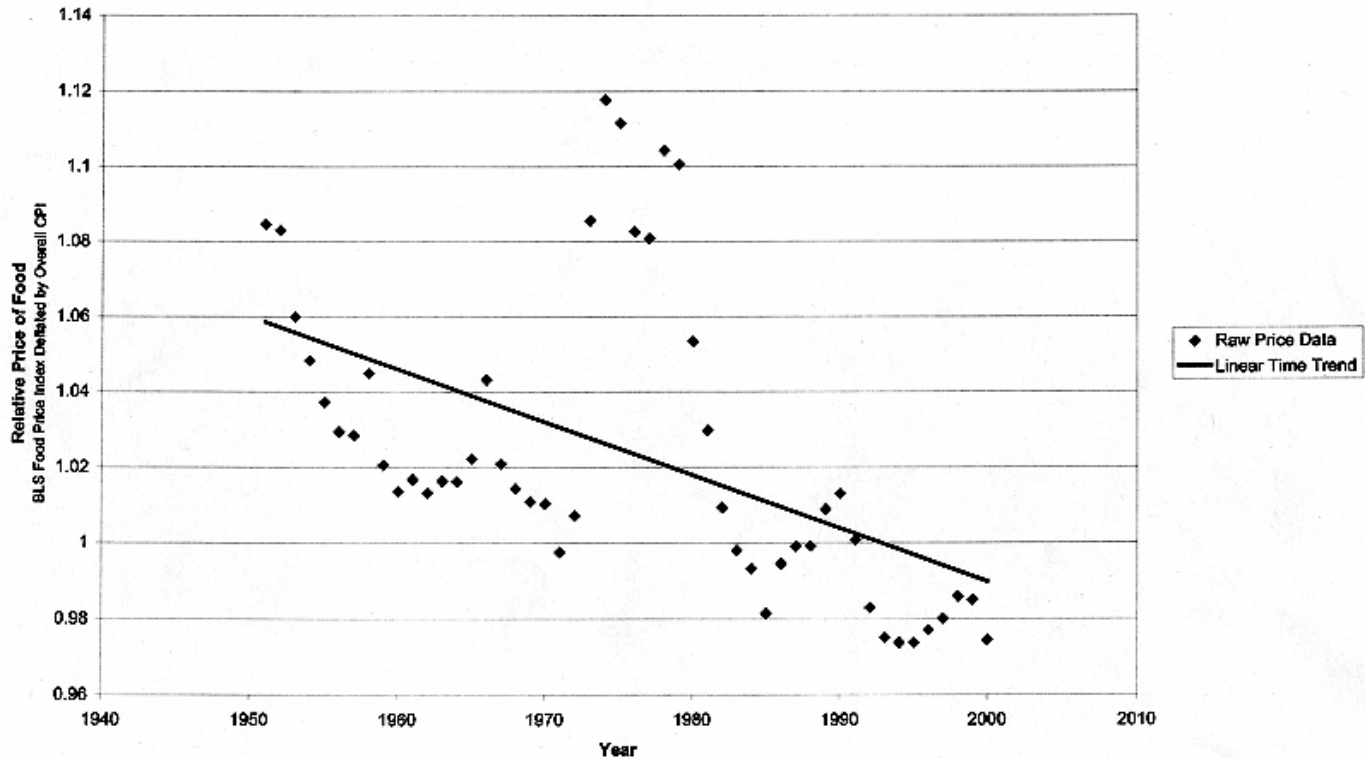
Calories per person per day



Source: USDA's Economic Research Service

# Food Price Time Series

Figure 3: Changes in the Relative Price of Food in the US, 1951-2000.



# Technological Change & Obesity

## Economic Forces Have Been Neglected

- Agricultural TC: Price of Calorie Consumption Fallen
  - Specialization In Production: Agriculture
  - Specialization in Preparation: Home vs Market
    - Female Labor Supply + Value of Speed
- Productivity Enhancing TC: Price of Calorie Spending Has Risen
  - *Pay*, as opposed to get *Paid*, to Exercise
  - Labor to Leisure : Gym +Jogging (Total Up)

# Dynamics of Weight Management

- Optimal weight vs Over-weight
- Weight state variable controlled by food consumption

$$V(W) = \max U(W, F, C) + bV(W')$$

subject to

$$pF + C = Y$$

[“Income spent on food and other forms of consumption”]

and

$$W' = g(S, F, W)$$

[“Future weight  $W'$  falls in current calorie spending  $S_{,11}$  rises in current calorie intake  $F$ , and past weight  $W$ ”]

# Steady State Weight- Complementarity

- Calorie Intake and Calorie Spending  
Complementary :  $dF/dS > 0$
- Implies: Total Weight Effect less than Partial
  - $dW/dS < dg/dS$
  - Downward Bias in The effect of Job Strenuousness on Weight
- Weight Rises but Food Consumption Falls with more Sedentary Technologies:
  - $dW/dS < 0$  &  $dF/dS > 0$ .
  - Aggregate Time Series Behavior

# Why Both Forms of Technological Change ?

- Together Imply: weight rises, calorie intake ambiguous, and price falls
- Fall in Food Prices Alone:
  - Cannot Explain Lack of Time Series Correlation Between Weight and Calorie Intake
- More Sedentary Technologies Alone:
  - Cannot Explain Increases in Calorie Intake
- Demand Explanations (“Food Culture”):
  - Demand increase alone cannot explain the 3 time trends together

# Weight and Income

- Sedentary Technological Change
  - Productivity Gains:  $S(Y)$  falls with Income  $Y$
  - *Pay vs Paid* to Exercise: Work to Leisure
- Impact on Weight  $W(Y, S(Y))$  :

$$\frac{dW}{dY} = W_Y + W_S S_Y$$

- $dW/dY$  larger *Across* vs *Within* countries

# Earned vs Unearned Income Effects

- Asset Market vs Labor market Effects
- Income Effects Within vs Across Countries
- Public Redistribution Effects
- Future Time-Series dependent on which effect dominates.

# On-The-Job Exercise and Weight

- The Effect of Physical Activity at work on BMI
  - Strenuousness from *Dictionary of Occupational Titles*
  - Merge with data from NHIS (1976-1994) and NLSY (1978-1996)
- Exploit NLSY features
  - Estimate long-run effects of occupation on weight
  - Assess Endogeneity of occupation and weight
- Main Results : Work Effects & Decomposition
  - Weight differences due work-career 3.3 BMI
    - Large relative to secular trends

# Alternative Explanations

- Addiction
  - Does not Explain Cross Country Data
  - Affects Size of Price Responses but not Cause
- Nutritional Knowledge
  - Wrong Time Trend-Know *More* Now
  - Knowledge and Health Covary but Endogenous
- Weight as Signal
  - Time Trend Difficult to Explain
- Genetics
  - Speed Difficult To Explain
  - Interaction (not Nurture vs Nature) explains price effects
- Market Preparation & Fast Food
  - Producer=Consumer Interest ?
  - Fast Food *Implication* of Technological Change and Value of (Female)Time
  - Fast Food Share Less Than 10 % of Calories

# Government Interventions

## General Issues

- Economic vs Public Health Rationales
  - Private sector weight loss programs not effective, how does public sector improve on this?
  - Obesity Public as opposed to Private Problem?
  - Over-weight in medical vs Pareto efficiency sense
  - Infectious Disease Paradigm and Obesity “Epidemic”
- If technological change cause obesity growth, can/should government affect them?
  - Trend of falling food prices desirable in a world sense
  - Benefits of sedentary technologies outweigh obesity costs
    - » 7-10% of health care spending small relative to gains

# Main Rationale for Intervention: Fiscal Externalities

- Public subsidies for health care
- About 7-10% of public health care spending has been estimated to be due to excess weight
- However
  - Offsetting Fiscal Effects Ignored (Public Annuities)
  - Regressive nature of Medicare (Bhattacharya)

# Subsidies: Education and Information

- Education Subsidies
  - Main public response
    - Benefits of physical activity and nutritional diets
  - Food Label (NLEA) 1992
  - Not main force:
    - Information has increased with weight
- Public financing vs Production of Education
- General vs Specific Education
  - General Education reduces obesity (value of life)
  - Specific less clear
- Is weigh loss rocket science?
  - Incentives not information has changed
- Advertising Regulations and Parental Control
  - Role for third party controlling information flow
    - State
    - Rating Services
    - Similar to Pornography



Department of Health and Human Services  
Food and Drug Administration

***Calories Count***  
**Report of the**  
**Working Group on Obesity**



# Taxes

- Standard food taxes regressive
  - Food consumption both good and bad
    - Not like cigarettes
  - Includes taxes to limit addictions
- Want non-linear tax on over-consumption
  - Over consumption of food alone or relative to calorie spending
  - Ingredient or Overall Taxes: Both non-linear
  - Too costly to enforce
  - Essentially taxes obesity

# Addiction and Government Intervention

- Addictive aspect of Obesity
  - Some behavior cannot be explained by regular economic consumption models
- Government “Rehab” Rationale
- How Relate to Private Sector Responses to Addiction?
  - Weight Watchers similar to AA
  - Stomach (bariatric) surgery commitment device
  - Comparative Advantage of Government ?
    - Personal savings and government deficits

# Medical R&D Subsidies

- Medical R&D subsidies for preventing or treating obesity
- Analog for Infectious Diseases
  - HIV: Risky Behavior vs Vaccine
  - Rather have vaccine when substitutes for risky behavior are costly and hence risky behavior inelastic
- Successful drug will be most profitable ever launched (half of US population)
  - Pipeline spending large of major drug companies

# Questions and Answers?