

Obesity and Nutrition

University of Alabama

November 10, 2016

Last Class

- ▶ The pharmaceutical industry has led to many major breakthroughs in the treatment of conditions that previously went untreated, and it is one of the most profitable industries in the U.S.
- ▶ The pharma industry is regulated by the FDA, which institutes a very tedious and lengthy review process for new drugs.
- ▶ There is a trade-off between consumer protection and the encouragement of rapid innovation.
- ▶ Type I and Type II errors emerge from this review process, and the FDA really has only the incentive to limit Type I errors.
- ▶ Medical Marijuana is growing rapidly across states, and early studies conclude that marijuana may substitute for more costly prescription drugs.
- ▶ Studies of the relationship between medical marijuana and alcohol (complements or substitutes) are inconclusive.

Obesity Epidemic

- ▶ There has been a substantial rise in obesity rates across time in the U.S.
 - ▶ In 1970, 14% of the population was obese.
 - ▶ Today, 36% of the population is obese.
- ▶ Historically, increases in BMI have been seen as a good thing (the battle against food insecurity).
- ▶ Now, the average BMI is in a dangerous range.
- ▶ Obese individuals are at higher risk to suffer from a number of health problems including type II diabetes, heart disease, and hypertension.

Measure of Obesity

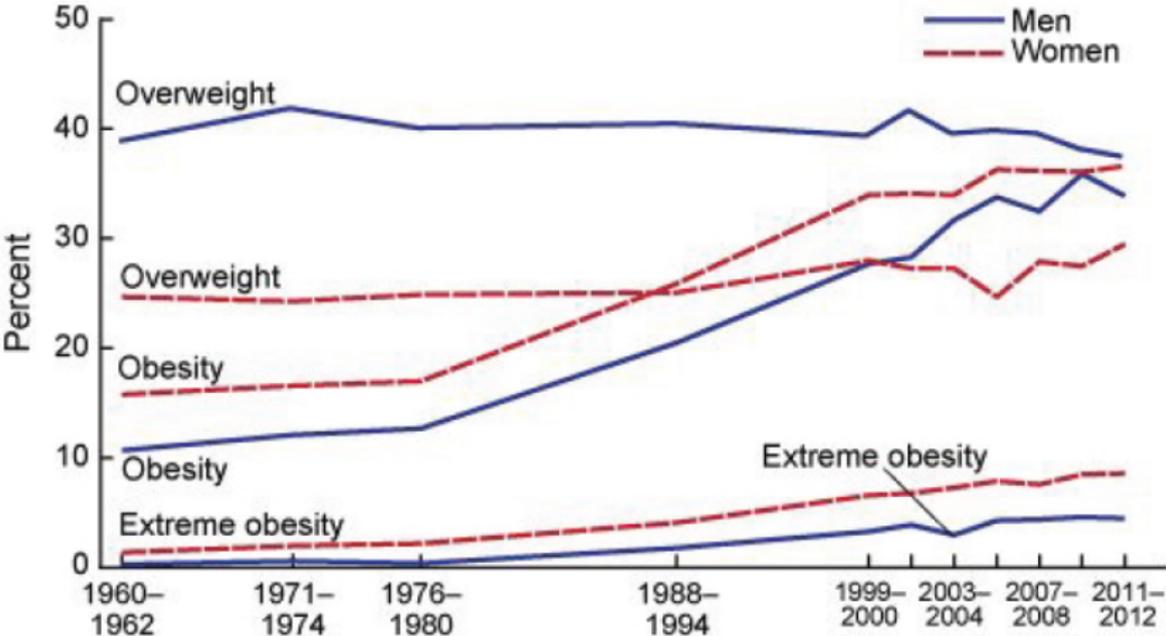
- ▶ Obesity is based on an individual's Body Mass Index (BMI).



$$BMI = \frac{weight(kg)}{height(m)^2}$$

- ▶ $BMI < 18.5$ is considered underweight.
- ▶ $18.5 < BMI < 25$ is considered normal weight.
- ▶ $25 < BMI < 30$ is considered overweight.
- ▶ $BMI > 30$ is considered obese.

Obesity Across Time



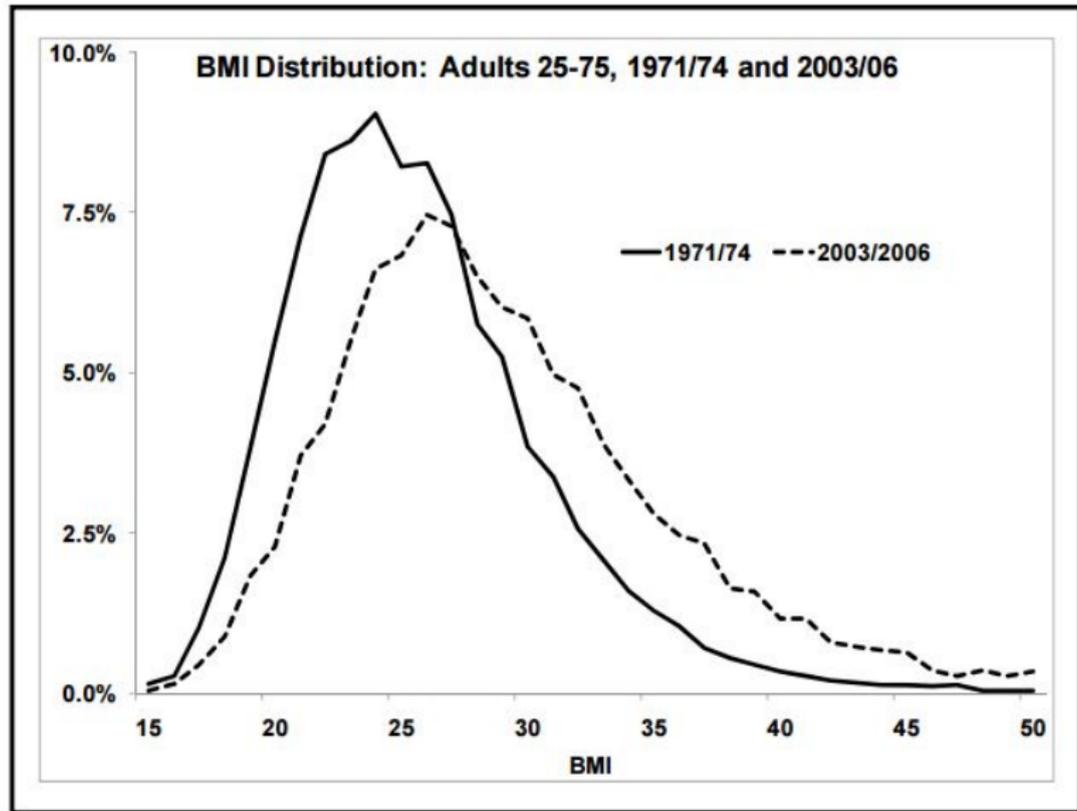
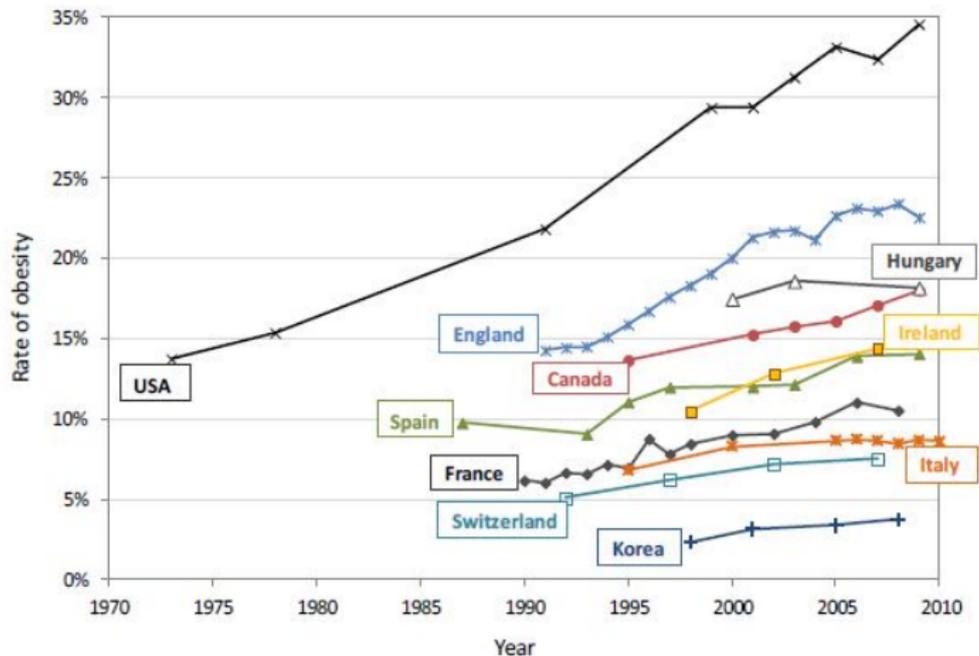


Figure 1. Obesity rates



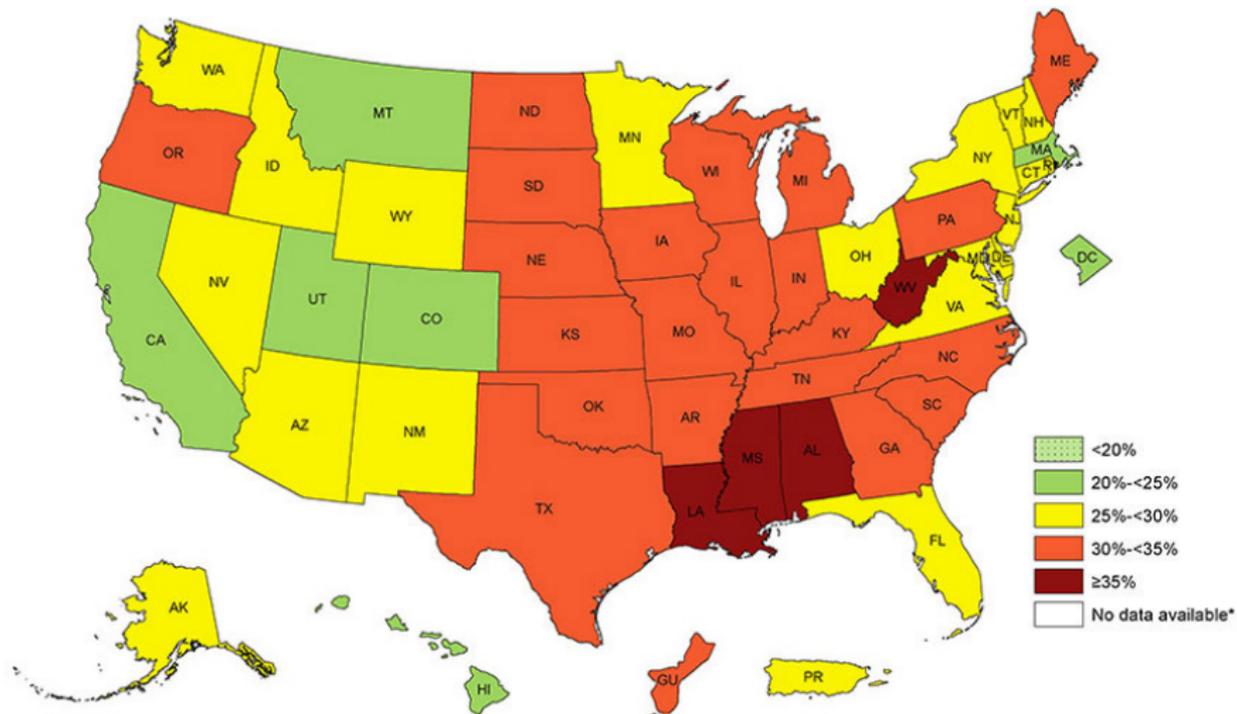
% Obese for Different Groups

Group	71-75	07/09	Δ (% change)
Single male	8	33	25 (313%)
Married male	12	39	27 (225%)
Single female	18	37	19 (106%)
Married female, working	18	33	15 (83%)
Married female, not working	16	37	21 (131%)

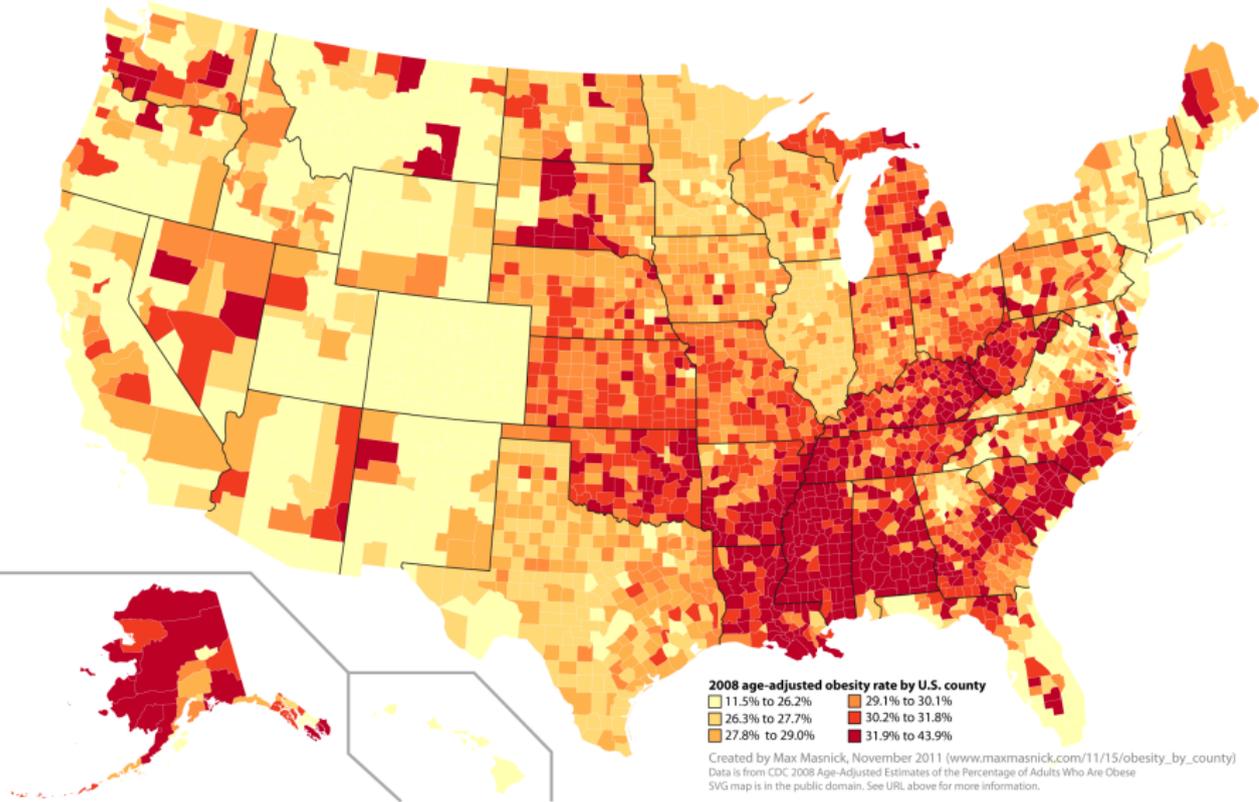
% Obese for Different Groups

Group	88-94	05-08	Δ (% change)
Male, College	15.6	27.4	11.8 (75.6%)
Male, HS	21.8	34.8	13.0 (59.6%)
Male, <HS	22.6	32.1	9.5 (42.0%)
Female, College	15.3	23.4	8.1 (52.9%)
Female, HS	28.2	39.8	11.6 (41.1%)
Female, <HS	31.7	42.1	10.4 (32.8%)

Percent Obese by State



Percent Obese by County



Why the Increase in Obesity?

There are a few potential reasons:

- ▶ The widespread emergence of TV and Internet.
- ▶ The explosion of fast food.
- ▶ Convenience eating, i.e. it is much easier to eat out, and restaurant meals are typically larger than meals at home.
- ▶ More mothers working at the labor market.
- ▶ Increases in mass food preparation.

A Large Literature Studying Obesity

Numerous papers in health study obesity. Examples of empirical questions studied include:

- ▶ Does access to PE class impact childhood obesity?
- ▶ Do food stamps cause obesity?
- ▶ Do reduced price lunches and the school breakfast program affect obesity?
- ▶ Do higher taxes on “bad” foods decrease obesity?

Obesity in the U.S.

“Why Have Americans Become More Obese?” *Journal of Economic Perspectives*, 2003.

By David M. Cutler, Edward L. Glaeser, and Jesse M. Shapiro

Cutler et al. (2003)

- ▶ Uses health and weight data from the National Health and Nutrition Examination Surveys (NHANES) over the period 1971-1994.
- ▶ Uses data from food intake from food recall studies and agricultural sales data collected by the U.S. Department of Agriculture. Respondents detail everything they ate in the previous 24-hour period.
- ▶ How much of the increase in average BMI can be attributed to increased consumption of food?
- ▶ Calories in versus calories out.
 - ▶ Clearly if BMI has gone up over time, either people are eating more or exerting less energy.

Table 2

Changes in Food Consumption, 1977–1978 to 1994–1996

		<i>Calories^a</i>			<i>Percentage of Total Change</i>
<i>Meal</i>		<i>1977–1978</i>	<i>1994–1996</i>	<i>Change</i>	
Male	TOTAL	2080	2347	268	100%
	Breakfast	384	420	36	13
	Lunch	517	567	50	19
	Dinner	918	859	-59	-22
	Snacks	261	501	241	90
	Calories per meal	573	566	-7	
	Meals per day	3.92	4.53	.61	
Female	TOTAL	1515	1658	143	100%
	Breakfast	286	312	26	18
	Lunch	368	398	31	22
	Dinner	676	602	-74	-52
	Snacks	186	346	160	112
	Calories per meal	422	408	-14	
	Meals per day	3.86	4.44	.58	

Note: Data are from the Continuing Survey of Food Intake 1977–1978 and 1994–1996.

^aAverage calories except for the row reporting average meals per day.

Table 3

Time Use, 1965–1995*(Minutes per day, age 18–64)*

<i>Activity</i>	<i>1965</i>	<i>1975</i>	<i>1985</i>	<i>1995</i>
Paid work	290	258	259	266
Eating on the job	11	8	8	—
Breaks	8	4	3	1
Household work	146	128	124	102
Food preparation	44	41	39	27
Meal cleanup	21	12	10	4
Child care	37	31	31	18
Obtaining goods and services	51	45	53	49
Personal needs and care	622	644	634	632
Meals at home	58	54	50	65
Meals out	11	19	19	(meals at home & out)
Sleeping/napping	473	496	479	495
Education and training	12	16	18	23
Organizational activities	20	24	18	17
Entertainment/social	78	65	65	72
Recreation	27	37	43	47
Active sports	5	4	10	13
Outdoor	1	7	5	6
Walking/hiking/exercise	1	2	4	5
Communication	158	191	195	212
TV	89	129	129	151
TOTAL	1440	1440	1440	1440
Kcal per minute per kilogram	1.69	1.57	1.62	1.53
<i>E</i> for 70 kilogram man	16.4	13.5	14.7	12.6
<i>E</i> for 60 kilogram woman	15.1	12.3	13.5	11.3

Cutler et al. (2003)

The Theory of Mass Preparation:

- ▶ Traditionally, consumers took raw agricultural products and transformed them into edible food. This preparation took a long time.
- ▶ Technological innovations since 1970 allowed preparation to be done in restaurants and in factories, exploiting technology and returns to scale.
- ▶ Consider the example of French fries. Prior to WWII, Americans ate massive amounts of potatoes, largely baked, boiled, or mashed. French fries were rare due to the time cost of peeling, cutting, and cooking.
- ▶ In the post-war period, new technology allowed the centralization of French fry production, and now fries are peeled, cut, cooked, and frozen to be shipped to consumers.
- ▶ From 1977 to 1995, total potato consumption increased by 30%, driven almost entirely by French fries.

Time Costs by Demographic Group

(minutes)

	1965		1995	
	<i>Meal Prep.</i>	<i>Meal Prep. + Cleanup</i>	<i>Meal Prep.</i>	<i>Meal Prep. + Cleanup</i>
Adults				
Single male	13.6	18.1	15.5	17.3
Married male, nonworking spouse	6.5	9.4	13.2	14.4
Married male, working spouse	8.1	11.9	13.2	14.4
Single female	38.1	60.1	28.9	33.1
Married female, working	58.3	84.8	35.7	41.4
Married female, not working	94.2	137.7	57.7	68.8
Elderly				
Male	16.6	26.3	18.5	20.2
Female	65.9	10.4	50.1	60.3

Source: Authors' calculations from Americans' Use of Time Survey Archives, 1965 and 1995.

Cutler et al. (2003)

- ▶ So due to technology and mass production, there seems to be a decrease in the time cost of food preparation.
- ▶ What happens when the cost of a good goes down? This should, in theory, lead to an increase in the amount of food consumed, just as reductions in any good's price should lead to increased demand for that good (law of demand).
- ▶ The mass preparation theory suggests four empirical implications:
 1. Lower costs of food preparation mean that individuals should consume a wider range of products at more times in a day.
 2. Increase in food consumption should come mostly in foods that had an improvement in mass preparation technology (and complements to those foods).
 3. Individuals who have taken the most advantage of the new technologies should have had the biggest increase in obesity.
 4. Obesity rates should be higher in countries with greater access to technological change.

Cutler et al. (2003)

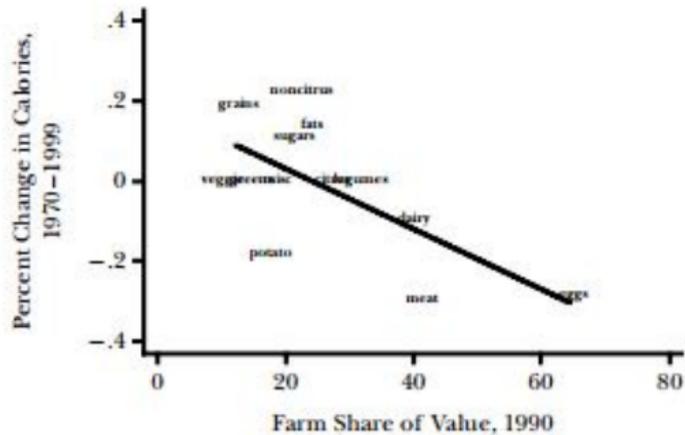
Implication 1, Changes in Food Type, Composition, and Timing:

- ▶ Lower costs of food preparation should lead individuals to consume a wider range of foods at more times throughout the day.
- ▶ From the earlier table, we already noted the increase in snack consumption. Today, snacks have a prep cost of zero in many cases.

Implication 2, Calories from Different Food Productions:

- ▶ Consumption should have increased the most for food items that have experienced the most time-saving technological change.
- ▶ The best measure of the degree of mass preparation is the U.S. Department of Agriculture's measure of the share of costs going to farmers instead of other food preparers, called the "farm value share."
- ▶ Food items with a great deal of mass preparation have low farm values.

Figure 3
Food Preparation and Changes in Intake



Categories of food that have experienced the most growth in consumption have lower farm share values, and hence have higher amounts of mass preparation.

Cutler et al. (2003)

Implication 3, Changes in Obesity Across Demographic Groups:

- ▶ Obesity should increase the most for whom the costs of food preparation fell the most (those that originally made most of their food at home).
- ▶ To test this implication, they relate changes in obesity across demographic groups to changes in the amount of time spent preparing food between 1965 and 1995.
- ▶ They assume it is the time cost of the entire family (the joint decision) that matters as opposed to the individual decision.
- ▶ They regress changes in BMI on average initial time costs of food preparation (1965 time costs) and the amount of change in time costs from 1965-1994. So intuitively, those that spend the most time preparing food in 1965 should gain the most weight from 1965-1994.

*Table 5***Time Costs and Changes in BMI***(Dependent variable: change in BMI, 1971–1975 to 1988–1994)*

<i>Independent Variable</i>	<i>(1)</i>	<i>(2)</i>	<i>(3)</i>
Sex-specific time cost (min.), 1965	0.0155 (0.0027)		
Household-specific time cost (min.), 1965		0.0078 (0.0055)	
Change in sex-specific time cost, 1965–95			-0.0182 (0.0050)
Constant	1.3043 (0.1712)	1.3774 (0.5134)	1.7983 (0.1768)
Observations	8	8	8
Adjusted <i>R</i> -squared	0.8156	0.1223	0.6336

Notes: Standard errors are in parentheses. Data on the change in BMI are from the NHANES surveys of 1971–1975 to 1988–1994. The initial time cost is from 1965, computed as minutes spent preparing and cleaning up after meals. The data are from the Americans' Use of Time Survey Archive.

(1): RHS variable is food prep time for average individual, (2): food prep time for avg. household, and (3): change in the time spent preparing food (those that saw a large reduction in the time spent preparing food also had large increases in BMI)

Cutler et al. (2003)

Implication 4: Obesity Across Countries:

- ▶ Reduced time for preparing food should have a greater effect in countries where the appropriate technological innovations are encouraged.
- ▶ Many countries have explicit or implicit restrictions on the ability of food producers and consumers to have access to such technologies.
- ▶ For example, in 2003, 80% of U.S. households had microwaves, compared to only 14% in Italy.
- ▶ Perhaps countries with more regulation on food-industry technological innovation are less obese.
- ▶ They regress the % of the adult population that is obese on a variety of regulatory controls including frequency of price controls, a measure of producer protection, the number of food laws, a measure of regulation related to civil law, etc.

Table 6

International Regressions*(Dependent variable: percentage of adult population that is obese)*

<i>Independent Variable</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Frequency of price controls ^a		-3.7 (1.3)					
Producer protection ^a			-4.5 (1.7)				
Number of food statutes ^a				-7.4 (2.2)			
Civil law origin					-7.5 (2.2)		
log(time to open business)						-2.6 (1.1)	
Cost of a Big Mac (US2000\$) ^a							-4.7 (2.3)
log(GDP per capita), 1998	0.68 (4.57)	-4.63 (4.25)	6.78 (4.59)	5.10 (3.76)	-1.58 (3.72)	-4.72 (4.56)	10.65 (6.80)
% females in labor force, 1992	0.24 (0.31)	0.04 (0.27)	0.81 (0.66)	0.69 (0.41)	0.26 (0.25)	-0.15 (0.31)	0.46 (0.47)
Constant	-0.35 (19.27)	22.73 (17.98)	-42.96 (33.38)	-31.42 (22.05)	11.15 (15.82)	39.75 (23.15)	-39.30 (31.83)
Observations	22	21	9	9	22	21	13
Adjusted R-squared	-0.072	0.204	0.491	0.310	0.557	0.128	0.124

Notes: Standard errors are in parentheses. Appendix Table 3 shows the available countries and source of data.

^aData are standardized to have a mean of 0 and standard deviation of 1.

Cutler et al. (2003)

Summary:

- ▶ Studies the growth in obesity in the U.S. across time.
- ▶ Develops a theory that the increase in obesity is related to a reduction in the time costs of preparing food (a reduction in costs of a good leads to increased demand).
- ▶ Develops the theory further by showing that:
 1. Lower costs of food prep leads to consumer of more products (i.e. snack consumption has grown).
 2. Increases in caloric consumption should be most for foods that had the largest improvements in mass prep technology (i.e. sugary, processed foods).
 3. People that originally spent the most time in food prep should have gained the most weight.
 4. Obesity increases should be higher in countries with greater access to technological change (i.e. lower regulatory countries).

Next Class

Midterm #2 Review Session