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The Effect of School Food Programs on Childhood Obesity

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The Effect of School Lunch Program on Childhood Obesity

World Class. Face to Face.

WASHINGTON STATE

Yongwon Cho and Bidisha Mandal

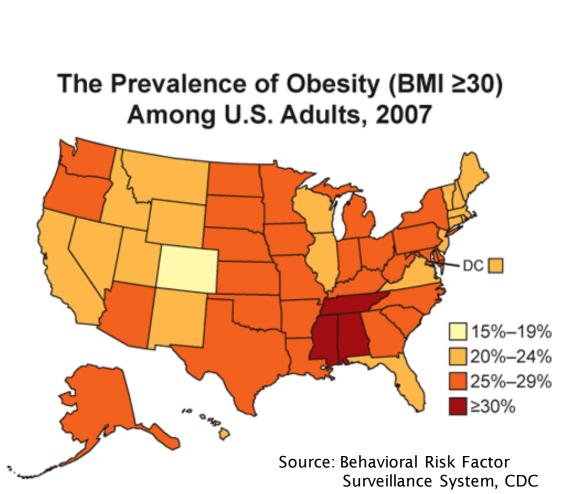
School of Economic Sciences, Washington State University

Introduction

- Childhood obesity problem raises new social issue in developed countries by changing societal attitudes
- National School Lunch Program (NSLP) can be effective policy tool to control childhood obesity
- We Investigate effects of enrollment in NSLP on student's BMI
- We set up a **student's utility maximization problem** to choose food between school lunch or outside restaurants
- We focus on twin students in ECLS-K data to control

identification problems

- Nationwide longitudinal study from kindergarten to 8th grade, 15000 students in 100 different schools



Individual Effects

- Metabolism, Exercise
- Race, Age, Gender
- Appearance

Family Effects

- Family Income
- Employment status
- Parent's Education level

Food Consumption

- At home, restaurant
- School Food Programs
 - School Breakfast Program
 - National School Lunch Program

Student's Body Mass Index (BMI)*

Obese / Overweight

Normal

- Independent variables
- * : Do not consider underweight

Results

Theoretical Model: Student's Utility Maximization Problem

$$Max_{\{q_{\tau i}\}}U = U(Z, H, BMI)$$

s.t.
$$Z = Z(q_{\tau i}; c_{\tau}), H = \overline{H}, BMI = \delta(Z + H) - CO$$

where Z, H are food consumption in school and home, respectively CO is total amount of calories-out, c_{τ} is exogenous calories $q_{\tau i}$ is frequency of τ types of food, δ is given metabolism rate i = 1(NSLP), 0 (otherwise)

$$\frac{dBMI^*}{dq_{\tau 1}^*} = \delta \left[\frac{\partial Z}{\partial q_{\tau 1}^*} + \frac{\partial Z}{\partial q_{\tau 0}^*} \frac{\partial q_{\tau 0}^*}{\partial q_{\tau 1}^*} \right]$$

Only if $\frac{\partial Z}{\partial q_{\tau 1}^*} > \frac{\partial Z}{\partial q_{\tau 0}^*}$, the *NSLP* affects positively to reduce obesity.

Ordinary Least Square (OLS) Result for Entire Students

	Overall	Obese
Dependent variable is <i>BMIt</i>	N=5584	N=606
BMIt-1	.992 (.016)***	.967 (.054)***
Calorie-in	.041 (.018)**	.118 (.111)
Exercise	.026 (.021)	.308 (.166)*
Trying to lose weight	.729 (.116)***	968 (1.21)
Buying frequency in school	.091 (.023)***	.596 (.261)**
Participating NSLP	.449 (.113)***	047 (.645)
Initial weight	.049 (.021)**	.225 (.116)*
Parent's education	.018 (.009)*	.133 (.077)*

OLS, Generalized Estimation Equation (GEE) Result for Twins

	OLS	GEE
Dependent variable is $\Delta BMIt$	N=84	N=168
BMIt-1	.418 (.161)***	.768 (.064)***
Calorie-in	.080 (.268)	.682 (.187)***
Exercise	.019 (.314)	_
Trying to lose weight	.386 (.516)	-
Buying frequency in school	.311 (.324)	.538 (.210)***
Participating NSLP	-	2.81 (1.39)**
Initial weight	.580 (.602)	.464 (.237)***





Why Twins?

- Control environmental, biological unobservable variables
- Family characteristics, innate ability
- Eliminate any absolute ability bias in BMI difference

Key Findings

- NSLP effect on student's BMI is determined by size of marginal product of NSLP and outside restaurant
- BMI determinants of obese students are **different** to normal students so that policy should be **differentiated**
- Total amount of calorie, buying frequency from vending machine in school affect to increase twin's BMI difference

Policy Implications

- Reduce number of vending machines in school
- Provide low calorie foods to both NSLP and vending machine

TO WIN, WE HAVE TO LOSE