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The Effect of Food Stamp Participation on Adult Body Mass

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Background

- Dramatic rise of the prevalence of obesity, and body mass index (BMI), particularly among low income people
- Food Stamp Program (FSP) as a potential source for excessive energy intake among recipients
- The effect of FSP on increasing BMI is important because
  - FSP is entirely federally funded
  - Public health risks and a substantial burden to taxpayers with medical expenditure due to high BMI

Motivation

- FS may increase food consumption and consequently BMI compared to equal amounts of cash assistance?
- But, FSP participation potentially endogenous
- Possibly a heterogeneous relationship between the FSP participation and BMI on the entire distribution of BMI
- If the FSP participation affect BMI for people only in the top or bottom of the distribution of BMI, the mean value would not change with thinner and wider distribution of BMI

Food Stamp Program

- The largest domestic food and nutrition assistance program in the United States
- Supported approximately 27million people in 2006
- Entitlement program
- Eligibility based on income < 130% of the Federal poverty guideline, monthly net income < 100% of the poverty guidelines, & < $2,000 of assets
- The average benefit level in 2007
  - $96 per person; $215 per household each month

Prior Literature (1)

- Mostly report a significantly positive effect of FSP participation on adult BMI or obesity (Gibson, 2003; Gibson, 2004; Gibson, 2006; Chen et al, 2005; Baum, 2007; Townsend et al, 2001), particularly among women
- Kaushal (2007) reports an insignificant negligible association between the FSP participation and BMI among immigrants

Prior Literature (2)

- Results from longitudinal models indicate a substantial decrease in the size of the association between FSP participation and BMI (Gibson, 2003; Gibson, 2004; Gibson, 2006; Baum, 2007; Meyerhoefer and Pylypchunk, 2007)
- State-level instrumental variables are used to control for the endogeneity of the FSP participation:
  - Variations in political orientation and FSP related rules (Baum, 2007)
  - Expenditures on FSP outreach programs and the FSP related rules (Meyerhoefer and Pylypchunk, 2007)
  - A variation of the PRWORA of 1996 enactment at the state level (Kaushal, 2007)

Objectives

- Quantile regression model
  - Capture a potential change in the dispersion of conditional BMI following FSP participation
- Control for the potential selection into the FSP participation using propensity score methods and two stage instrumental variable estimation technique

Empirical Model (1)

$$BMI_{it} = \beta_0 + \beta^{FSP} FSP_{it-1} + \beta^{X} X_{it} + \varepsilon_{it} \qquad (1)$$

$$BMI_{it} = \beta_0 + \beta^{FSP} FSP_{it-1} + \beta^{X} X_{it} + \mu_i + \nu_{it} \qquad (2)$$

$$q_\tau(BMI_{it}) = \beta_\tau^0 + \beta_\tau^{FSP} FSP_{it-1} + \beta_\tau^{X} X_{it} + \varepsilon_{it} \qquad (3)$$

Empirical Model (2):
Propensity score matching method

- Match individuals in the treated and the untreated groups based on various characteristics using a single variable, the propensity score
- Advantageous over a regular multivariate regression models because it allows comparing only for individuals who have matches with overlapping characteristics
- Matching + Conditional regression adjustment

Empirical Model (3): Two-Stage Instrumental Variable Model

- Control for an evaluation error due to unobservables
- Two sets of state-level instruments
  - FSP participation rate
  - Selected state welfare regulations
    - Limitation on the incremental increase in benefits for a new born while receiving aid;
    - Limitation on benefits due to the amount of time that they have received aid;
    - Requirement on an immunization and/or health screening and sanction policies;
    - Limitations on benefits and eligibility for "deemed" (not actually available) income of stepparents, grandparents to determine

Data Source

- National Longitudinal Survey of Youth 1979
- Nationally representative sample of 12,686 persons aged 14–22 in 1979
- Our estimation sample from six waves of data including1992, 1994, 1996, 1998, 2000, and 2002

Sample Size

- The final sample of 9,369 women and 11,994 men with less than high school or high school education
- After dropping women who were pregnant at the time of interview, respondents whose BMI is implausible (larger than 60 or smaller than 12) and missing in other covariates

Dependent Variable

- Body Mass Index (BMI)
  - Self-reported weight in kilograms divided by self-reported height in meters squared
- BMI in our sample is on average:
  - 27.3 for women
  - 27.7 for men

Explanatory Variable of Interest

- Food Stamp Program participation
  - Whether the respondents or their spouses participated in FSP in the previous calendar year from the time of interview
  - Participation rate
    - 14% of women
    - 5% of men

Other Covariates

- Prices of fast food & fruits and vegetables
  - From the American Chamber of Commerce Researchers Association (ACCRA) Cost of Living Index
  - Matched to the NLSY79 by county-level geocode identifiers
- AFDC/TANF program participation
- Implementation of the Food Stamp Nutrition Education Program & approved federal funding at state-level
- Other covariates
  - Age, race, marital status, number of children, AFQT scores, work status, hourly wages, the extent of urbanicity of the respondents' residence

Data Distributions

- 1/3 non-Hispanic Black
- 1/5 Hispanic for both genders
- Aged 27-45 years with the average at 35 years
- > 50% married
- 1.6 children (women); 1.1 child (men)
- < 20% urban residents; 10% suburban residents
- Full time work: 75% (men) & 50% (women)
- Part time work: 18% (men) & 37% (women)
- Hourly wages: $13 (men) & $9 (women)

Results (1):
Propensity Score Matching

	Kernel Matching	Single Nearest Neighbor Matching	
		Replacement	No replacement
Women	0.8036**	0.9259**	0.9766***
	(0.3130)	(0.4187)	(0.3013)
N	*7034*	*1198*	*1001*
Men	0.3901	0.4048	0.0415
	(0.2910)	(0.2636)	(0.2433)
N	*8940*	*831*	*555*

Results (2):
Propensity Score Adjustment

		Model 1	Model 2
Women (*N*=9117)	FSP	1.6617***	-0.6859***
		(0.4429)	(0.1736)
	FSP*PS	-2.1126*	2.6989***
		(1.0931)	(0.4482)
	PS	2.1583**	-3.6973***
		(0.9216)	(0.4081)
Men (*N*=11308)	FSP	-0.3051	-0.5798***
		(0.4138)	(0.1514)
	FSP*PS	2.9150**	3.1414***
		(1.1727)	(0.5281)
	PS	-3.2260***	-3.1687***
		(0.9262)	(0.4576)
Individual fixed effects controlled		No	Yes

Results (1):
Qunatile Regression w/ Propensity Score

		Q10	Q25	Q50	Q75	Q90
Women (N= 9117)	FSP	0.2274	0.9543**	1.5026***	2.5027***	1.9447***
		(0.3295)	(0.3805)	(0.4686)	(0.5987)	(0.6585)
	FSP* PS	-0.388	-0.9646	-2.6431***	-3.3100**	-1.5902
		(0.6293)	(0.7543)	(1.0222)	(1.3331)	(1.5417)
	PS	0.388	0.846	2.3194***	3.0817***	2.1155*
		(0.3722)	(0.5292)	(0.7991)	(1.0785)	(1.1549)
Men (N= 11308)	FSP	-0.7694*	0.0188	-0.4268*	-0.1649	-0.2967
		(0.4307)	(0.3776)	(0.2570)	(0.4262)	(0.4829)
	FSP* PS	3.8871***	1.5581*	3.2925***	2.2896**	2.2252*
		(1.0705)	(0.8888)	(1.0198)	(1.1053)	(1.2698)
	PS	-4.1583***	-3.2162***	-4.4180***	-2.9035***	-2.1199**
		(0.8571)	(0.6448)	(0.8493)	(0.7033)	(0.8511)

Results (3):
IV Model-First Stage

IV	*N*	IV Strength		Over-Identification	Exogeneity
		F values	Marginal R2	*p*-value	*p*-value
Women					
Participation rate	9369	$F = 12.57$ $p = .0004$	0.0024	N/A	0.2750
Welfare rules	6229	$F = 14.5$ $p = .0007$	0.0050	0.536878	0.5416
Men					
Participation rate	11994	$F = 22.91$ $p = .0000$	0.0058	N/A	0.1345
Welfare rules	6751	$F = 20.37$ $p = .0001$	0.0126	0.0558	0.1273

Results (4):
OLS-IV Model

	Cross-sectional	Cross-Sectional IV	Longitudinal	Longitudinal - IV
Women				
Participation rate	1.1820***	1.1062***	0.2421*	0.2296
(*N*=9369)	(0.3088)	(0.3482)	(0.1368)	(0.1400)
Welfare rules	0.9695*	0.9075*	0.0803	0.1130
(*N*=6229)	(0.5020)	(0.5323)	(0.1777)	(0.1807)
Men				
Participation rate	0.2274	0.1504	0.0420	0.0253
(*N*=11994)	(0.4189)	(0.3856)	(0.1292)	(0.1256)
Welfare rules	-0.0735	-0.224	-0.1133	-0.1869
(*N*=6751)	(0.4348)	(0.4325)	(0.4695)	(0.4132)

Results (5):
Quantile Regression-IV Model

	q10	q25	q50	q75	q90
Women					
Quantile	0.2868	0.7519***	1.0910***	1.7822***	2.0139***
	(0.3223)	(0.2274)	(0.3770)	(0.4526)	(0.6767)
Quantile-IV	0.2606	0.6796***	0.9457**	1.7136***	1.7183**
	(0.3079)	(0.2331)	(0.4469)	(0.5178)	(0.6745)
N	9369				
Quantile	0.3188	0.8479***	1.0092**	1.5676***	1.9575**
	(0.5671)	(0.2882)	(0.4540)	(0.5840)	(0.7943)
Quantile-IV	0.7227	0.8381**	0.6409	1.4615**	1.5602
	(0.5594)	(0.3340)	(0.5034)	(0.6718)	(0.9827)
N	6229				
Men					
Quantile	-0.216	0.2929	-0.2921	0.1963	1.3687*
	(0.3748)	(0.2432)	(0.2599)	(0.3690)	(0.7159)
Quantile-IV	-0.2024	0.2554	-0.4008	0.0672	1.3832**
	(0.3629)	(0.2101)	(0.2601)	(0.3965)	(0.6345)
N	11994				
Quantile	-0.0521	0.5994*	-0.4265	-0.1835	0.7321
	(0.5994)	(0.3618)	(0.3613)	(0.7227)	(0.9434)
Quantile-IV	-0.0891	0.536	-0.5365*	-0.5164	0.6536
	(0.6315)	(0.4335)	(0.3147)	(0.8006)	(0.9948)
N	6751				

Conclusions

- FSP participation incrementally increases female recipients' BMI
- The mean estimate from cross-sectional OLS model underestimates the effect of the FSP participation at higher quantiles, but overestimates the effect at lower than 50^{th} quantiles
- Controlling for the endogeneity of the FSP participation slightly reduces the estimated increase of BMI consequent to the FSP participation

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Euna Han

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"No relationships to disclose"

Thank you!

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