The Effect of SNAP and School Food Programs on Food Spending, Diet Quality, and Food Security: Sensitivity to Program Reporting Error

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Goals

- Fairly large literature by now on the effects of SNAP on various food-related outcomes
- Smaller literature on the effects of school programs
- Reviews: Bitler (2016), Gregory et al. (2015), Hoynes et al. (2016), Hoynes and Schanzenbach (2016), among others
- Results often show favorable effects of program participation but a nontrivial number of insignificant effects and a few wrong-signed
- The main methodological issue discussed in the lit to possibly explain the weakness of many findings is selection bias
- But another hypothesis is measurement error in survey-measured SNAP participation

- Goal of this project: to use the FoodAPS data on survey-measured SNAP participation and from the administrative data to see if correcting for measurement error changes the estimates of the effect of SNAP on food-related outcomes
- Also have a brief, incomplete examination of school food programs: haven't had time to complete

Econometrics of Measurement Error

- In linear models with classical measurement error in a single continuous X in a regression, an OLS coefficient is biased downward in absolute value (i.e., biased toward zero)
- But if X is binary, the error is, by definition, nonclassical because it is generally depends on whether the true X is 0 or 1, so the bias is not the same in this case
- If the true X is endogenous, then IV will work if X is continuous and if you have an instrument uncorrelated with the measurement error but, again, this is not the case if X is binary

- Let y be the outcome variable, P^* be true participation, P^r be reported participation, and β is the true effect
- True model:

$$y = \alpha + \beta P^* + \varepsilon$$

- Case 1: Assume measurement error (=difference between P^* and P^r) and P^* are both uncorrelated with ε
- OLS reg of y on P^r yields coefficient $\beta(1 - q_1\pi_{10} - q_2\pi_{01})$ where π_{10} is the rate of false negatives (if the true is 1, the report is 0) and π_{01} is rate of false positives (true is 0, report is 1)
  and where q_1 and q_2 are fractions between 0 and 1)
- So, again, OLS coefficient is biased toward 0

- Case 2: Assume measurement error is correlated with ε but P^* is still uncorrelated with ε
- OLS bias equals the previous term plus an extra term which is a weighted average of two differences:

$$\begin{aligned} E(y|P^r &= 1, P^* = 1) - E(y|P^r = 0, P^* = 1) \\ E(y|P^r &= 1, P^* = 0) - E(y|P^r = 0, P^* = 0) \end{aligned}$$

  which tell you if the probability of a false positive is correlated with y and if the probability of a false negative is correlated with y, respectively
- This means that the total bias can now be upward, downward, or anything

- Case 3: Assume measurement error is independent of ε but P^* is correlated with ε, and you have an instrument Z which is independent of both measurement error and ε
- The IV coefficient is now

$$\frac{\beta}{(1 - \pi_{10} - \pi_{01})}$$

  and hence is biased upward in absolute value
- Case 4: Measurement error is correlated with ε and so is P^*
- In this case, the IV coefficient is the same (because the instrument is uncorrelated with measurement error)
- We will provide estimates of all of these bias terms with the FoodAPS data

Data

- Dependent Variables: LFS, Diet Quality (HEI total and subindices) and food expenditure (total, at home, and away from home) data
- Control variables: usual suspects
- SNAPNOWREPORT is the FoodAPS reported SNAP participation variable
- Administrative data complex, differs across states, as already discussed in other papers at this conference
- We estimate everything on three samples: Sample A: All states Sample B: All states except those with no ADMIN data Sample C: Only states with ADMIN data and caseload IDs that match to ALERT

Reporting Error

- Analytic Sample : $<$ 200% Poverty Level, at least 1 child, Asset level below $3,000, with Match consent
- We limit sample so that
  - it includes households that are more likely to be SNAP eligible
  - it pushes misreporting rates up slightly (but they are still small)

Table: Distribution of SNAPNOWREPORT and SNAPNOWHH

	SNAPNOWREPORT					
	Sample A		Sample B		Sample C	
SNAPNOWHH	0	1	0	1	0	1
0	0.457	0.004	0.475	0.005	0.506	0.002
1	0.036	0.503	0.039	0.481	0.038	0.455
N	1282		1109		687	

*The false negative and false positive rates are from the column percents in this table

Table: Estimated OLS and IV Biases

	Sample A	Sample B	Sample C
OLS Bias	0.919	0.914	0.926
IV Bias	1.081	1.094	1.088

- OLS bias reports the factor loading on β when measurement error is correlated with ϵ but P^* is uncorrelated with ϵ.
- IV bias reports the factor loading on the bias of an IV estimator.
- OLS estimates would underestimate the true effect of SNAP on outcome outcome variables by 7 to 9 percent.
- IV estimates would be biased upward by 8 to 9 percent. IV bias is not the smallest in the most accurate sample.

- When the measurement error is independent of the error term in the outcome equation, misreporting affect estimates by the same factor regardless of the outcome variables used.
- If measurement error is correlated with ϵ, the OLS estimates are biased by an additional term depending on the dependent variable.

Table: Magnitude of Dependent variable-specific Bias

	LFS	Total HEI	Vegetables	Greens and Beans	Fruit	Whole Fruit	Whole Grain
Sample A	0.004	0.632	0.286	-0.351	0.324	0.466	-0.207
Sample B	0.018	0.876	0.276	-0.315	0.277	0.372	-0.273
Sample C	0.043	-4.6	-0.634	-0.702	0.023	-0.157	-0.068
	Dairy	Protein	Sea Plant	Fatty Acid	Sodium	Refined Grain	SOFAAS
Sample A	0.738	0.05	0.257	-1.442	-0.578	0.769	0.322
Sample B	0.708	0.105	0.255	-1.365	-0.384	0.986	0.235
Sample C	0.432	-0.462	-0.918	-1.566	1.672	0.766	-2.984
	FAFH	FAH	Tot. Exp				
Sample A	-18.934	-4.077	-19.071				
Sample B	-20.346	0.218	-16.564				
Sample C	-2.157	10.756	8.872				

- Biases are small relative to the means for LFS.
- Biases are more than 10% of the means for sea plant, fatty acide, FAFH, and Total Expenditure.
- The direction and the magnitude of the bias due to endogeneity of reporting error differs across the three samples, often largest for sample C.

- What explains variation in false negatives and false positives? Usual candidates:
  - Primary respondent characteristics (e.g., race, gender, age, and marital status, education)
  - Household characteristics (e.g., household size, presence of younger children and elder)
  - Household's economic characteristics (e.g., Household income, housing status, and work status)
- Little explanatory power for misreporting by observable characteristics. Slightly higher R^2 values for false positives.

Determinants of Misreporting

Table: False Negatives

	Sample A	Sample B	Sample C
Male	0.013	0.018	0.011
	(0.014)	(0.018)	(0.009)
Age	0.003	0.004	0.001
	(0.003)	(0.003)	(0.001)
Age Squared	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Black	-0.011	-0.013	-0.008
	(0.011)	(0.014)	(0.005)
Hispanic	-0.016*	-0.019**	-0.006
	(0.008)	(0.009)	(0.007)
Married	-0.009	-0.012	-0.004
	(0.006)	(0.007)	(0.006)
Widowed	-0.018*	-0.020*	-0.009
	(0.010)	(0.011)	(0.007)
Less than HS	0.004	0.004	0.007
	(0.011)	(0.014)	(0.006)
HS only	0.000	0.002	0.001
	(0.004)	(0.006)	(0.006)
Household size	0.001	0.001	-0.001
	(0.002)	(0.003)	(0.003)
Children, aged 4 to 10	0.006	0.006	0.004
	(0.011)	(0.014)	(0.014)
Elder present	-0.003	-0.003	-0.006
	(0.009)	(0.011)	(0.004)
Metro	0.014	0.014	0.007
	(0.009)	(0.009)	(0.005)
Health	0.006	0.013	0.021
	(0.010)	(0.019)	(0.024)
Working	-0.003	-0.004	-0.004
	(0.006)	(0.008)	(0.008)
log income	-0.022	-0.022	0.001
	(0.021)	(0.024)	(0.006)
Own Housing	-0.001	0.000	-0.004
	(0.006)	(0.008)	(0.003)
Constant	0.109	0.101	-0.027
	(0.118)	(0.133)	(0.036)
N	462	394	261
R-squared	0.030	0.035	0.018

Table: False Positives

	Sample A	Sample B	Sample C
Male	0.079	0.131**	0.110
	(0.047)	(0.062)	(0.113)
Age	-0.010	-0.006	-0.004
	(0.008)	(0.009)	(0.012)
Age Squared	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Black	0.023	0.011	-0.037
	(0.022)	(0.028)	(0.037)
Hispanic	0.005	0.001	-0.005
	(0.023)	(0.023)	(0.033)
Married	0.076**	0.066*	0.086**
	(0.035)	(0.035)	(0.036)
Widowed	0.013	0.050	0.099
	(0.072)	(0.104)	(0.111)
Less than HS	0.011	-0.024	0.026
	(0.031)	(0.034)	(0.030)
HS only	-0.016	-0.040	-0.008
	(0.028)	(0.034)	(0.047)
Household size	0.003	0.006	-0.003
	(0.010)	(0.011)	(0.011)
Children, aged 4 to 10	0.006	0.012	-0.036
	(0.052)	(0.056)	(0.047)
Elder present	-0.105***	-0.127***	-0.110**
	(0.031)	(0.033)	(0.044)
Metro	0.066**	0.045	0.080**
	(0.027)	(0.033)	(0.036)
Health	-0.053	-0.067	-0.080
	(0.049)	(0.050)	(0.064)
Working	0.036	0.026	0.045
	(0.025)	(0.024)	(0.034)
log income	0.011	0.018	0.007
	(0.013)	(0.016)	(0.026)
Own Housing	0.032	0.045	0.075*
	(0.025)	(0.029)	(0.040)
Constant	0.041	-0.037	0.009
	(0.188)	(0.210)	(0.358)
N	766	668	398
R-squared	0.054	0.075	0.088

- So: Reporting error exists, but the degree of misreporting is very small. OLS and IV estimates are still biased by about 8 percent.
- Misreporting is correlated with LFS, Diet Quality, and food expenditures.
- We estimate OLS regressions of the following form:

$$Y = \gamma SNAP + X'\beta + e$$

- Y is one of the food outcomes
- SNAP $\in \{SNAPNOWHH, SNAPNOWREPORT\}$

- Start with the analysis of LFS
- Start with OLS, IV second
- OLS: start with the broadest sample, sample A (all states)
- Results for OLS of LFS on Sample A:
- (1) SNAP coefficients are negative but insignificant
- (2) They become more negative as more controls are added
- (3) With no controls, the coefficients using survey vs administrative SNAP are approximately identical (the 2 types of bias go in opposite directions)
- (4) With controls, the coefficients remain almost identical

Table: OLS Estimates of the Effect of SNAP on Households' Low Food Security Status: Sample A

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SNAPNOWREPORT	-0.007		-0.019		-0.019		-0.030	
	(0.031)		(0.033)		(0.033)		(0.028)	
SNAPNOWHH		-0.007		-0.018		-0.019		-0.031
		(0.030)		(0.032)		(0.034)		(0.030)
Primary Resp. Char.	No	No	Yes	Yes	Yes	Yes	Yes	Yes
HH char.	No	No	No	No	Yes	Yes	Yes	Yes
HH Economic char.	No	No	No	No	No	No	Yes	Yes
R-squared	0.000	0.000	0.027	0.027	0.040	0.042	0.059	0.061

- Samples B and C:
- (1) SNAP coefficients are less negative than for Sample A and sometimes positive
- (2) They become less negative or more positive as more controls are added
- (3) They are all statistically insignificant
- (4) The point estimates are different for survey vs administrative SNAP but both highly insignificant

Table: OLS Estimates of the Effect of SNAP on Households' Low Food Security Status, sample B and C

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
sample:	B	C	B	C	B	C	B	C
SNAPNOWREPORT	0.018	0.028	-0.006	-0.006				
	(0.035)	(0.042)	(0.030)	(0.037)				
SNAPNOWHH					0.020	0.030	-0.005	-0.004
					(0.034)	(0.042)	(0.030)	(0.038)
Controls	N	N	Y	Y	N	N	Y	Y
R-squared	0	0.002	0.059	0.074	0.001	0.002	0.061	0.074

Selection Bias

- SNAP participation is endogenous
- Selection bias is often controlled by (1) using the historical introduction of SNAP and over-time policy variation in SNAP or (2) variations in state level SNAP policies as instruments
- We do (2)
- See the next table for sample of past studies using SNAP policies
- We tested several; the results reported here use state level variations in outreach spending, use of biometric technique, and use of simple reporting rule.
- 1^{st} stage F-stats are 7.7 (sample A), 10.9 (sample B), and 9.6 (sample C) for the strongest instruments.
- Want to do more work on instruments

Table: Summary of Key Studies

Study	Subsample	Dataset	IV	Dependent Variable
Greenhalgh-Stanley et al (2013)	$\geq$ 60 years-old \$3,000 and \$5,000 asset limit monthly income $\leq$ PL+ \$500	Health and Retirement Study (HRS) 2000-2008 recertification period	Outreach, CAPs, EBT implementation,	SNAP participation Food Insecurity
Shaefer and Gutierrez (2012)	HH w/ at least one adult and one child, $<$150 PL	SIPP 1996,2001,2004	short recertification period	FSP participation Food Insecurity
Ratcliffe et al (2010)	HH w/ $<$150PL, \$4000 or \$5000 asset limit	SIPP 1996,2001,2004	biometric technology outreach spending partial/full immigrant eligibility	FSP participation Food Insecurity
Kabbani and Yazbeck (2004)	$<$ 185 PL	April 1995,97,99,01 CPS Food Security Supplements	short recertification monthly reporting EBT implementation outreach spending	FSP participation Food Insecurity
Gregory et al (2013)	HH with 200 PL at least 19	2003-2008 NHANES	use of BBCE, exempt one vehicle from asset test	HEI, macro-nutrients intake
Gregory et al (2016)	HH with $<$130 PL	2009-2011 CPS-FSS	citizenship, certification interval	Food Insecurity
Deb and Gregory (2016)	HH with $<$185 PL	2006-2013 Dec. CPS -FSS	Outreach spending	Food Spending Food Insecurity
Kabbani and Yazbeck	HH with $<$185 PL	April 1995, 97, 99, 01	citizenship, certification	FSP participation
Baum (2007)	Individuals with no more than a HS education	NLSY79 NLSY79	value of vehicles elderly	Obesity

- IV results: SNAP coefficients increase in magnitude (positive and negative)
- Highly insignificant
- For both survey and administrative SNAP variables
- Same for Samples A, B, and C

Table: IV Estimates of the Effect of SNAP on Households' Low Food Security Status

	(1)	(2)	(3)	(4)	(5)	(6)
	Sample A		Sample B		Sample C	
SNAPNOWREPORT	0.058		-0.088		-0.014	
	(0.188)		(0.160)		(0.298)	
SNAPNOWHH		0.040		-0.094		0.023
		(0.182)		(0.158)		(0.334)

Diet Quality and Food Spending

- Diet Quality and Food Spending: Again, OLS on Samples A,B,C followed by IV
- OLS results: No statistically significant effect of SNAP on most food outcomes
- Some positive effects on FAH and Total expenditure
- Larger differences in OLS coefficients across the two measures of SNAP participation, as predicted by the bias estimates

Table: OLS Estimates of the Effect of SNAP on Food Outcomes

		HEI-2010	Vegetables	Beans	Fruit	Whole Fruit	Whole Grain	Dairy	Protein
SNAPNOWREPORT	sample A	-0.702	-0.063	-0.009	-0.124	-0.089	-0.095	0.116	-0.081
		(0.798)	(0.097)	(0.144)	(0.145)	(0.190)	(0.323)	(0.269)	(0.103)
	sample B	-0.762	0.014	-0.04	-0.175	-0.211	-0.232	0.135	-0.03
		(0.755)	(0.094)	(0.159)	(0.135)	(0.196)	(0.314)	(0.272)	(0.101)
	sample C	0.005	0.046	-0.034	0.13	0.111	0.106	0.028	-0.116
		(0.737)	(0.130)	(0.208)	(0.139)	(0.150)	(0.286)	(0.366)	(0.142)
SNAPNOWHH	sample A	-1.095	-0.072	-0.012	-0.265*	-0.226	-0.172	0.1	-0.026
		(0.880)	(0.120)	(0.143)	(0.148)	(0.197)	(0.330)	(0.271)	(0.101)
	sample B	-1.211	0.041	-0.051	-0.296**	-0.31	-0.332	0.131	0.008
		(0.908)	(0.114)	(0.155)	(0.140)	(0.217)	(0.318)	(0.290)	(0.100)
	sample C	-0.3	0.121	-0.003	0.066	0.079	0.018	0.215	-0.073
		(0.901)	(0.136)	(0.200)	(0.152)	(0.163)	(0.295)	(0.436)	(0.136)
		Seafood	Fatty Acid	Sodium	Refined Grain	SOFAAS	FAFH	FAH	Tot. Expenditure
SNAPNOWREPORT	sample A	-0.077	-0.194	-0.215	0.203	-0.073	-8.479	26.080***	21.674*
		(0.134)	(0.270)	(0.317)	(0.281)	(0.467)	(5.392)	(8.397)	(11.229)
	sample B	-0.176	-0.095	-0.064	0.189	-0.077	-8.624	39.669***	35.046***
		(0.143)	(0.300)	(0.299)	(0.338)	(0.404)	(6.316)	(8.969)	(10.715)
	sample C	-0.377**	-0.173	-0.16	0.252	0.191	-8.656	33.792***	28.404**
		(0.165)	(0.396)	(0.278)	(0.415)	(0.506)	(9.228)	(8.472)	(13.211)
SNAPNOWHH	sample A	-0.056	-0.05	-0.257	0.063	-0.124	-6.467	25.962***	21.572*
		(0.144)	(0.285)	(0.325)	(0.292)	(0.497)	(5.606)	(8.488)	(11.689)
	sample B	-0.168	0.031	-0.131	-0.032	-0.102	-6.647	36.987***	31.698***
		(0.138)	(0.330)	(0.309)	(0.331)	(0.433)	(6.661)	(8.224)	(10.789)
	sample C	-0.244	-0.213	-0.454	-0.017	0.205	-7.829	33.689***	26.545*
		(0.154)	(0.455)	(0.275)	(0.436)	(0.586)	(9.230)	(9.308)	(14.437)

- With IV's, we find strong, significant, negative effect of SNAP receipt on diet quality (HEI-2010, Vegetables, Beans, Fruit, Whole Frut, Seafood) and negative, insignificant effect on food spending.
- Similar patterns are observed if we use benefit amounts instead

Table: IV Estimates of the Effect of SNAP on Food Outcomes

		HEI-2010	Vegetables	Beans	Fruit	Whole Fruit	Whole Grain	Dairy	Protein
SNAPNOWREPORT	sample A	-21.414***	-1.544*	-3.767*	-3.243***	-5.137***	-1.893	-1.191	0.299
		(7.808)	(0.905)	(1.930)	(1.009)	(1.450)	(1.486)	(1.814)	(0.596)
	sample B	-23.377***	-2.062**	-3.626**	-3.565***	-4.476**	-0.549	-1.091	0.357
		(8.175)	(0.841)	(1.602)	(0.978)	(1.074)	(1.815)	(1.661)	(0.509)
	sample C	-16.304	-2.737**	-2.355	-1.143	-0.726	2.216	3.55	-1.189
		(11.504)	(1.149)	(2.002)	(0.878)	(1.077)	(2.214)	(2.248)	(0.823)
SNAPNOWHH	sample A	-21.691**	-1.546	-3.769*	-3.349**	-5.215***	-1.981	-1.231	0.318
		(8.221)	(0.942)	(2.077)	(1.142)	(1.498)	(1.329)	(1.738)	(0.589)
	sample B	-23.189***	-1.999**	-3.627**	-3.626***	-4.627	-0.789	-1.201	0.413
		(8.354)	(0.884)	(1.677)	(1.116)	(1.051)	(1.667)	(1.626)	(0.500)
	sample C	18.532	-2.905**	-2.447	-1.407	-0.976	2.018	3.804	-1.169
		(12.911)	(1.273)	(2.110)	(0.990)	(1.159)	(2.627)	(2.390)	(0.871)
		Seafood	Fatty Acid	Sodium	Refined Grain	SOFAAS	FAFH	FAH	Tot. Expenditure
SNAPNOWREPORT	sample A	-2.419**	0.073	-1.734	3.72	-4.577	-60.185	-28.703	-60.455
		(1.096)	(1.992)	(2.237)	(2.900)	(3.738)	(35.806)	(52.291)	(64.601)
	sample B	-1.731*	-0.238	-3.126	2.635	-5.906*	-35.404	-32.685	-56.986
		(0.963)	(1.914)	(2.407)	(2.507)	(3.446)	(22.777)	(64.809)	(72.522)
	sample C	-3.454*	-4.221	-3.005	2.744	-5.984	-67.827*	-54.403	-99.695
		(1.896)	(2.571)	(2.941)	(3.800)	(5.639)	(36.250)	(95.393)	(112.753)
SNAPNOWHH	sample A	-2.394**	0.216	-1.773	3.696	-4.663	-57.494	-33.755	-65.372
		(1.081)	(1.850)	(2.351)	(2.998)	(3.787)	(38.798)	(56.712)	(74.116)
	sample B	-1.751*	0.017	-3.054	2.663	-5.607	-36.366	-35.308	-60.792
		(0.952)	(1.766)	(2.523)	(2.547)	(3.534)	(26.318)	(67.373)	(82.522)
	sample C	-3.944*	-4.617	-3.731	2.556	-5.714	-77.635*	-66.644	-117.955
		(1.976)	(2.920)	(3.413)	(4.478)	(6.919)	(42.031)	(110.363)	(132.834)

- Weakness in the instruments and/or the cross-sectional nature of the FoodAPS may be accountable

SBP and NSLP

Two Questions addressed in the literature:

- Do SBP/NSLP affect health outcomes?
  - Dependent Variables: Overweight, Obese, and BMI
  - SBP and NSLP participation: equal to 1 if breakfasts (lunch) were free at or a reduced price, 0 otherwise.
  - Sample: children from the three sample households aged 5 to 18, if their schools were in session at the time of the interviews.
  - We estimate OLS coefficients of SBP and NLS
- Do SNAP participation affect SBP/NSLP participation?
  - Dependent Variables: SBP and NSLP.
  - Method: Regress Y on SNAP and the usual set of covariates.

- Insignificant effect of SBP/NSLP on health outcomes
- Adding SNAP participation have little effect on the coefficients.
- Larger differences across samples compared to differences across the three specifications.
- OLS only. IVs used in the literature include schooling and price of school breakfast/lunch. Weak instrument problem in our sample.

Table: OLS Estimates of the Effect of SBP

	(1) Overweight	(2) Obese	(3) BMI	(4) Overweight	(5) Obese	(6) BMI	(7) Overweight	(8) Obese	(9) BMI
Sample A	-0.037	-0.056	-0.418	-0.030	-0.036	0.007	-0.031	-0.038	-0.015
	(0.039)	(0.042)	(0.578)	(0.038)	(0.043)	(0.651)	(0.038)	(0.043)	(0.661)
Sample B	0.005	-0.057	-0.379	0.002	-0.037	-0.156	0.001	-0.040	-0.184
	(0.037)	(0.057)	(0.756)	(0.039)	(0.057)	(0.791)	(0.039)	(0.058)	(0.802)
Sample C	0.028	0.040	0.291	0.023	0.093	0.835	0.020	0.089	0.768
	(0.049)	(0.073)	(1.053)	(0.054)	(0.072)	(1.061)	(0.055)	(0.074)	(1.089)
SNAPNOWHH	N	N	N	Y	Y	Y	N	N	N
SNAPNOWREPORT	N	N	N	N	N	N	Y	Y	Y

Table: OLS Estimates of the Effect of NSLP

	(1) Overweight	(2) Obese	(3) BMI	(4) Overweight	(5) Obese	(6) BMI	(7) Overweight	(8) Obese	(9) BMI
Sample A	-0.003	-0.016	-0.594	0.030	-0.020	-0.540	0.025	-0.031	-0.652
	(0.031)	(0.033)	(0.452)	(0.031)	(0.033)	(0.509)	(0.031)	(0.034)	(0.495)
Sample B	-0.003	-0.006	-0.551	0.026	-0.015	-0.484	0.021	-0.027	-0.591
	(0.031)	(0.036)	(0.444)	(0.032)	(0.033)	(0.452)	(0.032)	(0.034)	(0.459)
Sample C	0.008	-0.070	-1.251**	0.031	-0.081*	-1.172	0.024	-0.092*	-1.325*
	(0.037)	(0.041)	(0.586)	(0.029)	(0.043)	(0.767)	(0.029)	(0.046)	(0.747)
SNAPNOWHH	N	N	N	Y	Y	Y	N	N	N
SNAPNOWREPORT	N	N	N	N	N	N	Y	Y	Y

- SNAP participation positively predicts SBP and NSLP participation
- Stronger Effect on NSLP participation

Table: OLS and IV, Substitutability of SNAP and School Nutrition Programs

	SBP		NSLP	
OLS	SNAPNOWREPORT	SNAPNOWHH	SNAPNOWREPORT	SNAPNOWHH
Group A	0.043	0.060***	0.226***	0.223***
	(0.029)	(0.020)	(0.031)	(0.025)
Group B	0.049	0.068***	0.230***	0.194***
	(0.030)	(0.021)	(0.034)	(0.028)
Group C	0.05	0.047	0.185***	0.204***
	(0.044)	(0.037)	(0.039)	(0.045)
	SBP		NSLP	
IV	SNAPNOWREPORT	SNAPNOWHH	SNAPNOWREPORT	SNAPNOWHH
Group A	0.279*	0.215*	0.501**	0.423**
	(0.142)	(0.126)	(0.202)	(0.171)
Group B	0.266**	0.242**	0.348**	0.355***
	(0.106)	(0.091)	(0.129)	(0.121)
Group C	0.155	0.126	0.073	0.093
	(0.137)	(0.123)	(0.206)	(0.228)

Conclusions

- Measurement error is very small in FoodAPS, both false negatives and false positives,although it depends slightly on what sample is used
- We find that the measurement error is correlated with only a few observable characteristics and is correlated with the outcome variables but correlations are generally small
- But bottom line is that it makes no difference whatsoever to the estimated effects of SNAP participation on outcomes whether one uses the survey report or the administrative report
- Same result whether one uses IV or OLS

- IV estimates more frequently yield estimates in the unexpected direction: may be due to weakness in the instruments or the cross-sectional nature of the FoodAPS.
- Have taken admin report as true, but if they have error, then the true measurement error is even smaller than what we have estimated and hence the effect on SNAP estimates is even smaller
- Turning to SBP and NSLP, no significant effect of these programs on health-related measures, positive and signitficant effect of SNAP receipt on participation in these programs.

Table: Summary Statistics

	Sample A	Sample B	Sample C
LFS	0.135	0.137	0.148
	(0.013)	(0.013)	(0.020)
HEI-2010	48.154	48.099	48.255
	(0.439)	(0.490)	(0.652)
Vegetables	2.603	2.614	2.587
	(0.055)	(0.047)	(0.051)
Greens and Beans	1.396	1.378	1.392
	(0.060)	(0.072)	(0.111)
Total Fruit	1.958	1.949	1.933
	(0.065)	(0.059)	(0.075)
Whole Fruit	2.259	2.251	2.25
	(0.080)	(0.081)	(0.079)
Whole Grain	1.729	1.74	1.741
	(0.133)	(0.122)	(0.121)
Dairy	5.777	5.735	5.614
	(0.133)	(0.159)	(0.165)
Total Protein	4.058	4.094	4.137
	(0.051)	(0.050)	(0.072)
Seafood, Plant Protein	1.672	1.71	1.768
	(0.066)	(0.074)	(0.111)
Fatty Acid	4.895	4.966	5.081
	(0.156)	(0.155)	(0.147)
Sodium	5.956	5.817	5.754
	(0.161)	(0.176)	(0.272)
Refined Grain	5.812	5.651	5.37
	(0.177)	(0.192)	(0.244)
SOFAAS	10.222	10.233	10.567
	(0.286)	(0.299)	(0.429)
FAFH Expenditure	50.244	52.252	54.437
	(2.093)	(2.214)	(3.073)
FAH Expenditure	117.635	122.053	120.13
	(5.630)	(4.891)	(5.592)
Total Expenditure	167.879	174.305	174.568
	(6.176)	(5.738)	(8.039)

Table: Summary Statistics: Covariates

	Sample A	Sample B	Sample C
Male	0.156	0.141	0.122
	(0.015)	(0.014)	(0.017)
Age	38.281	38.226	38.506
	(0.465)	(0.499)	(0.744)
Black	0.268	0.245	0.149
	(0.049)	(0.049)	(0.027)
Hispanic	0.298	0.33	0.401
	(0.050)	(0.060)	(0.073)
Married	0.405	0.443	0.482
	(0.033)	(0.035)	(0.028)
Widowed	0.026	0.022	0.033
	(0.004)	(0.005)	(0.008)
Less than HS	0.26	0.266	0.277
	(0.017)	(0.017)	(0.025)
HS only	0.293	0.28	0.289
	(0.017)	(0.018)	(0.023)
Household Size	4.314	4.353	4.401
	(0.082)	(0.095)	(0.132)
Children, 4 to 10	0.145	0.153	0.145
	(0.012)	(0.015)	(0.018)
Elder Present	0.051	0.057	0.066
	(0.010)	(0.010)	(0.013)
Metro	0.873	0.885	0.896
	(0.044)	(0.050)	(0.047)
Health	0.085	0.081	0.06
	(0.013)	(0.011)	(0.013)
Working	0.472	0.469	0.465
	(0.021)	(0.020)	(0.031)
log income	7.55	7.559	7.618
	(0.038)	(0.036)	(0.044)
Own Housing	0.324	0.318	0.331
	(0.027)	(0.030)	(0.040)
N	1230	1064	659