

Supplemental Poverty Measure Thresholds: Imputing In-Kind Government Transfers from CPS Public Use Data to CE

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February 26, 2016

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Eastern Economic Association Annual Meetings

Washington, DC



Disclaimer

This paper reports the results of research and analysis undertaken by researchers within the Bureau of Labor Statistics (BLS) and Census Bureau.

Any views expressed are those of the authors and not necessarily those of the BLS or Census Bureau.

Supplemental Poverty Measure (SPM) Joint BLS-Census “Research” Project

Bureau of Labor Statistics

(Garner & Gudrais)

- Thresholds
- Research only
- No funding

Bureau of the Census

(Short)

- Resources & Poverty rates
- Publication quality
- Funded FY15 & FY16

Outline of Presentation

- Supplemental Poverty Measure
- Problem in current measure
- Imputation of In-Kind Benefits
 - ▶ CPS_PU ASEC Program Participation Method
- Results
 - ▶ Predicted probabilities of participation
 - CPS_PU Program Participation Method
 - CE Eligibility/Participation Method
 - ▶ SPM Thresholds for 2012
- Implications and next steps

Poverty Measures: Official and Supplemental

	Official Poverty Measure	Supplemental Poverty Measure (operational)
Measurement Unit	Families and unrelated individuals	Families, co-habitors, foster children = consumer unit
Resource Measure	Gross before-tax money income	Cash income PLUS federal government in-kind benefits to meet food, clothing, shelter, and utility (FCSU) needs MINUS taxes (or plus tax credits), work expenses, out-of-pocket expenditures for medical expenses
Poverty Threshold	Cost of minimum food diet in 1963	Range of the 30-36 th percentile of expenditures for FCUS plus "a little more" for other basic needs of all consumer units with exactly two children
Threshold Adjustments	Vary by family size and composition	3- parameter equivalence scale Geographic differences in housing costs using 5 years of ACS data
Updating Thresholds	Consumer Price Index: All items	5-year moving average of expenditures on FCSU

ITWG Guidelines for SPM Thresholds

➤ **ITWG stated ...**

*“so far as possible with available data, the calculation of FCSU should include any in-kind benefits that are counted on the resource side for food, shelter, clothing and utilities. **This is necessary for consistency of the threshold and resource definitions.**” (March 2010)*

FCSU = sum (food, clothing, shelter, utilities) at micro-level

SPM Threshold = FCSU + little bit more

Supplemental Nutrition Assistance Program (SNAP)

Housing Subsidies

Supplemental Nutrition Program for Women, Infants, and Children (WIC)

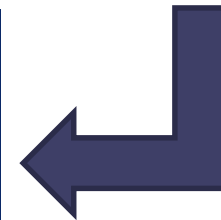
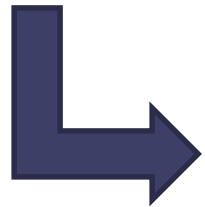
National School Lunch Program (NSLP)

Low-Income Home Energy Assistance (LIHEAP)

Underlying Assumption

- Resources to meet “needs”

- Thresholds represent “needs”




- For resources: cash + value of in-kind benefits for what in thresholds
- For thresholds: spending + value of in-kind benefits

- Therefore: Thresholds are not arbitrary but have specific meaning

Problem: Thresholds and Resources Inconsistently Defined

Thresholds

Resources: Official



**Expenditures
for FCSU
(including
SNAP)**

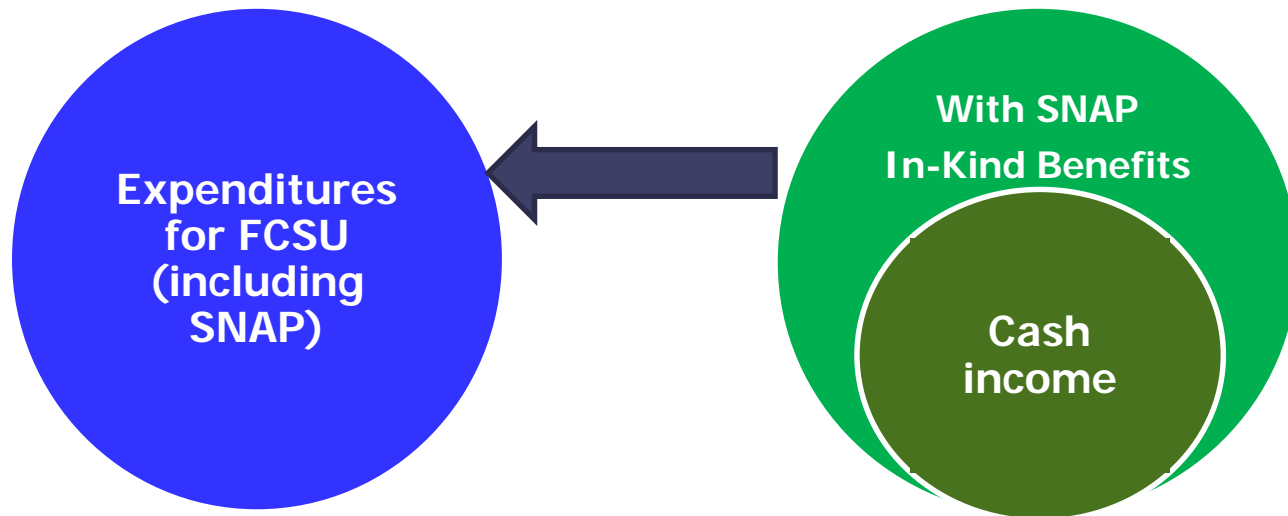


Cash income

Problem: Thresholds and Resources Consistently Defined

Thresholds

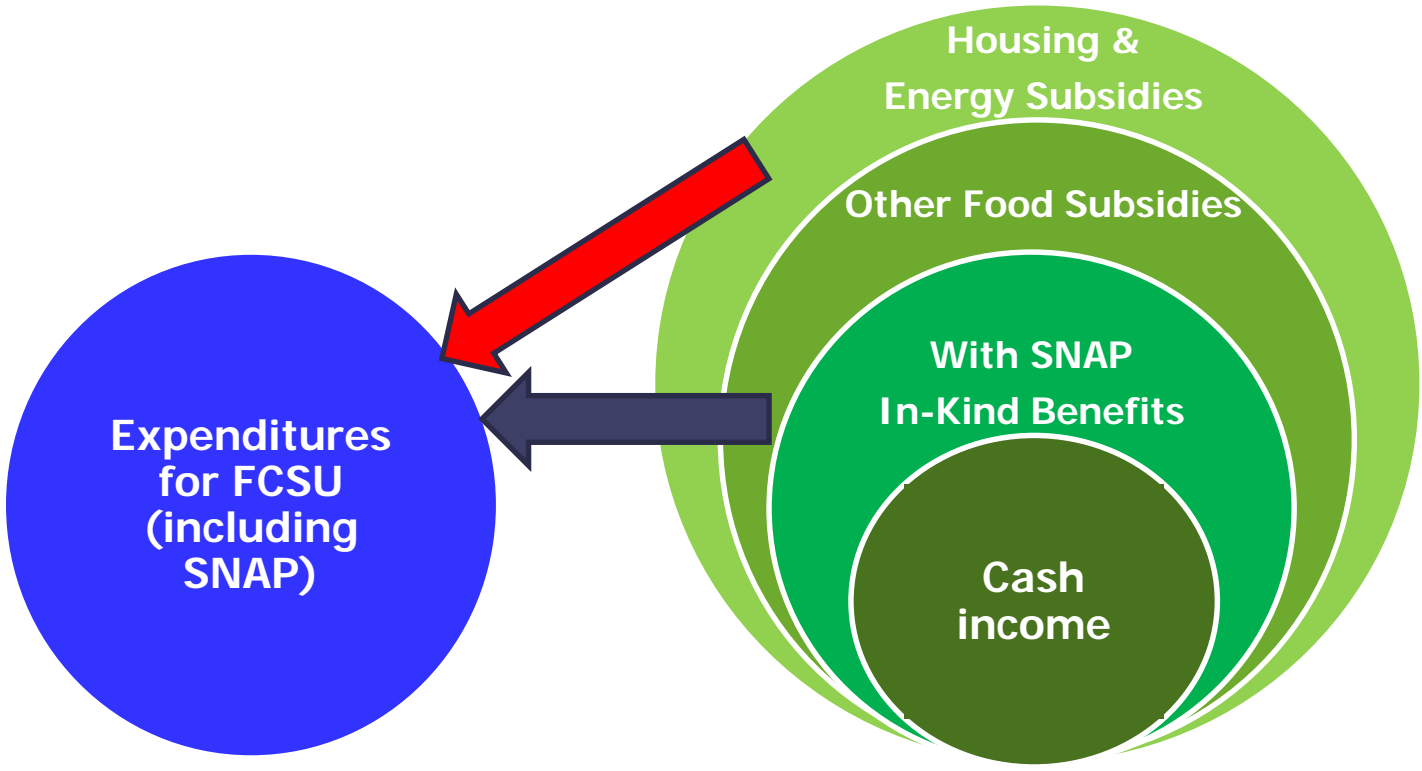
Resources



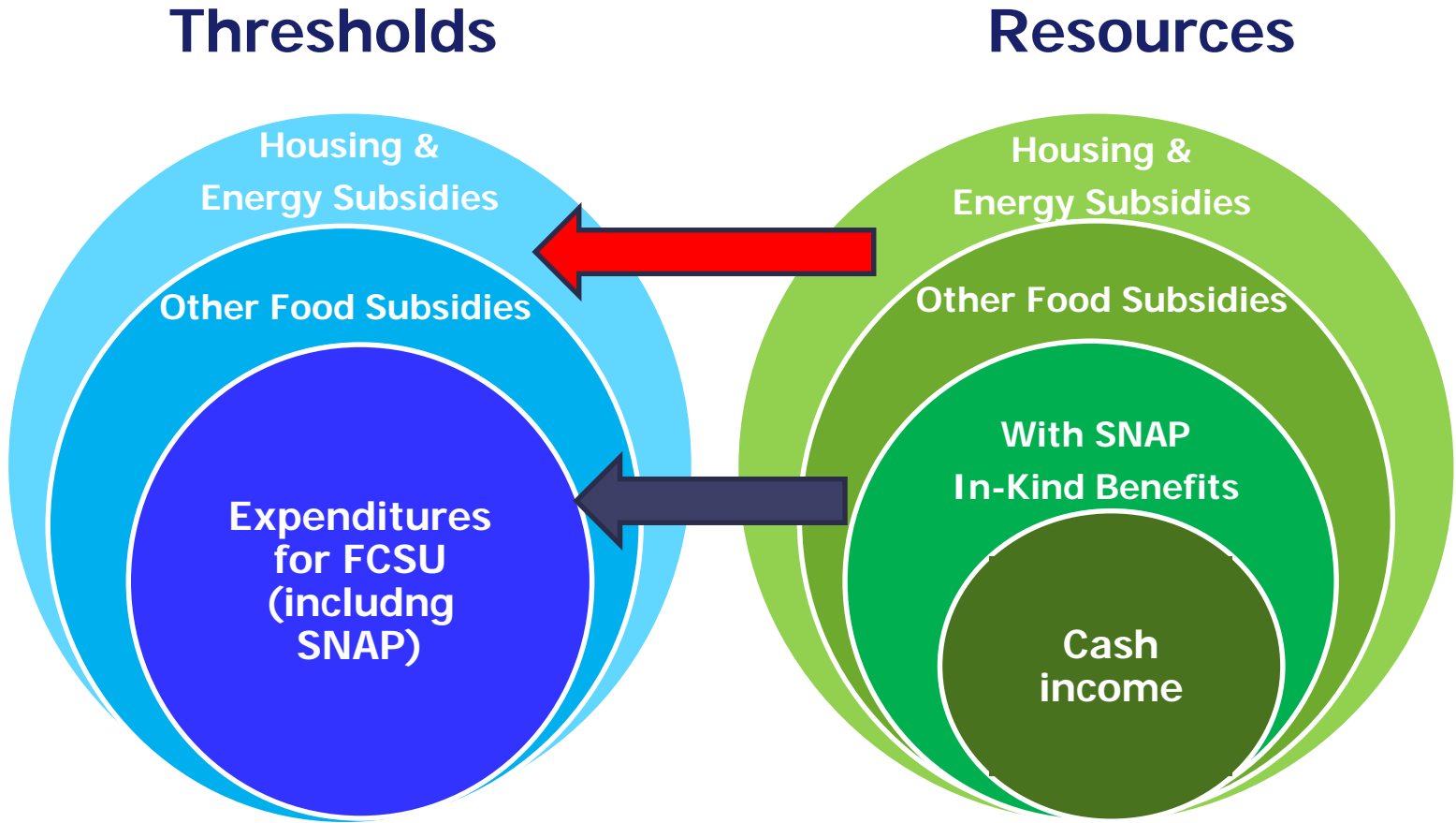
Problem: Thresholds and Resources Inconsistently Defined Thus Far

Thresholds

Resources



Problem: Thresholds and Resources Consistently Defined



Challenge: Data in the U.S. Consumer Expenditure Interview Survey

■ Limited data on Rental Assistance Programs

- ▶ Indicator variables for rented living quarters
 - Is this house a public housing project, that is, it is owned by a local housing authority or other local public agency? (CE variable: pub_hous)
 - Are your housing costs lower because the Federal, State, or local government is paying part of the cost? (CE variable: govtcost)
- ▶ Total rent payments for each of last 3 months (do not include direct payments by local, state, or federal agencies)
- ▶ Expenditures for utilities

■ No data on programs but data on potential participants

- ▶ National School Lunch Program (NSLP)
- ▶ Supplemental Nutrition Program for Women, Infants, and Children (WIC)
- ▶ Low income Home Energy Assistance (LIHEAP)

What Approach to Assign In-Kind Benefits to CUs in Consumer Expenditure Survey?

Program Assignment

- Use eligibility criteria
- Participation rates from administrative or other sources
- CU characteristics

Regression-based

- Use participation rates from from another survey
- CU characteristics



Market Value

What Approach to Assign In-Kind Benefits to CUs in Consumer Expenditure Survey?

Program Assignment

- Use eligibility criteria
 - Participation rates from administrative or other sources
 - CU characteristics
- ❖ Advantage
 - ❖ Administrative data
 - ❖ Disadvantages
 - ❖ Time lag
 - ❖ Admin probabilities are based on group participation

Regression-based

- Use participation rates from from another survey
 - CU characteristics
- ❖ Advantage
 - ❖ Available within year
 - ❖ Disadvantages
 - ❖ Underreporting in one household survey transferred to other survey

This Research

- **Regression-based approach to produce probabilities for In-kind benefits**
 - ▶ National School Lunch Program (NSLP)
 - ▶ Women, Infants, and Children Program (WIC)
 - ▶ Low-Income Housing Energy Assistance Program (LIHEAP)

- **Related research**
 - ▶ CE eligibility approach (all but LIHEAP (Garner 2010))
 - ▶ Regression based approach using internal CPS ASCE data, all but LIHEAP (Garner and Hokayem 2012)
 - ▶ CE eligibility plus participation (Garner, Gudrais, and Short - JSM 2015))
 - ▶ CPS multiple imputation to American Community Survey (Renwick 2015)

- **Contributions of this research**
 - ▶ Use of CPS ASEC public use data to produce probabilities
 - ▶ Ground work for multiple imputation and assignment of 0,1 outcomes

Data to Impute Program Participation

- U.S. Current Population Survey Annual Social and Economic Supplement (CPS ASEC) public use data accessed from NBER
 - ▶ Household level data
 - ▶ Household characteristics and NSLP, WIC, and LIHEAP participation
 - ▶ Data collected for each of 5 years: 2009-2013 (refers to 2008-2012)
 - ▶ Regression models run over pooled sample of 5 years

- U.S. Consumer Expenditure Survey Interview
 - ▶ Consumer unit (CU) level data
 - ▶ Subsamples selected based on CPS ASEC restrictions and matching CU characteristics
 - ▶ Quarterly data collected 2008Q2 – 2013Q1
 - ▶ CPS ASEC regression coefficients applied to CE pooled sample

Household Survey Samples

- CPS sample restricted to same states in which CE data collected (not surveyed: IA, ND, NM, OK, PR, RI, VT, WY)

- Sample restrictions based on demographics
 - ▶ NSLP: School age children (ages 5 through 18)
 - ▶ WIC
 - Women age ≥ 15 with child(ren) $0 < 5$
 - Women who could be pregnant (age equal to 15-45)
 - ▶ LIHEAP: none

- For each year representing 2008-2012, and pooled over 5 years for both CPS_PU and CE

Estimation Models

- NSLP Multinomial Logit ($y_i=1, 2, \text{ or } 3$)

$$\Pr(y_i = 1) = \frac{e^{X_i\beta^1}}{1+e^{X_i\beta^1}+e^{X_i\beta^2}} \quad \text{Subsidized Lunch Free or Reduced}$$

$$\Pr(y_i = 2) = \frac{e^{X_i\beta^2}}{1+e^{X_i\beta^1}+e^{X_i\beta^2}} \quad \text{Subsidized Lunch}$$

$$\Pr(y_i = 3) = \frac{1}{1+e^{X_i\beta^1}+e^{X_i\beta^2}} \quad \text{No Subsidized Lunch}$$

- WIC and LIHEAP Binomial Logits ($y_i=0, 1$)

$$\Pr(y_i = 1) = \frac{1}{1+e^{X_i\beta}} \quad \begin{array}{l} \text{WIC Participation} \\ \text{LIHEAP Participation} \end{array}$$

Independent Variables

- Household head/reference person characteristics like age, race/ethnicity, gender, education, marital status, employment status
- Household/consumer unit characteristics like household income, assistance, and residence type (urban or rural)
- Time dummy variables
- State dummy variables
- Models differ in age composition of children variables
 - ▶ *NSLP: ages 5-10, 11-13, 14-17*
 - ▶ *WIC and LIHEAP: ages 0-5*

Moving to the CE

- Compare CPS_PU results to CE results based on applying CPS_PU coefficients to CE samples
 - ▶ Predicted probabilities
 - ▶ Kernel density plots

- Use CPS_PU based predicted probabilities of program participation choices in CE in combination with program benefit values as reported by federal agencies

- 2012 SPM thresholds for 2 adults plus 2 children (2A+2C)
 - ▶ CPS_PU Program Participation Method
 - ▶ CE Eligibility/Participation Method (presented earlier at JSM 2015)
 - ▶ CE only accounting for SNAP (like BLS published thresholds)

Predicted Probabilities of Program Participation Using CPS_PU Model Estimation

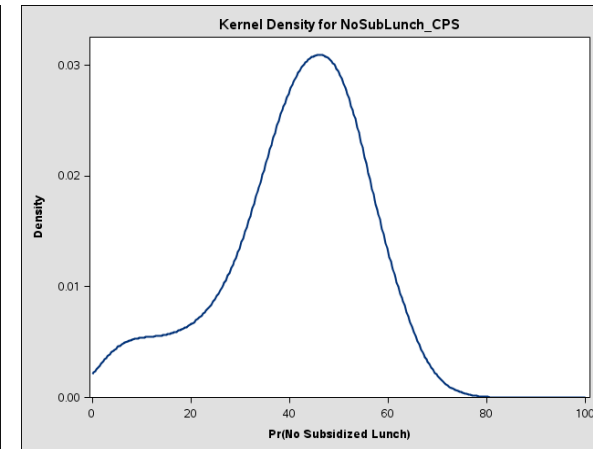
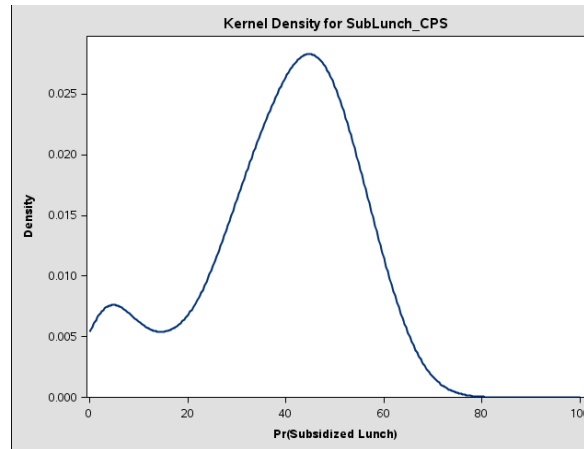
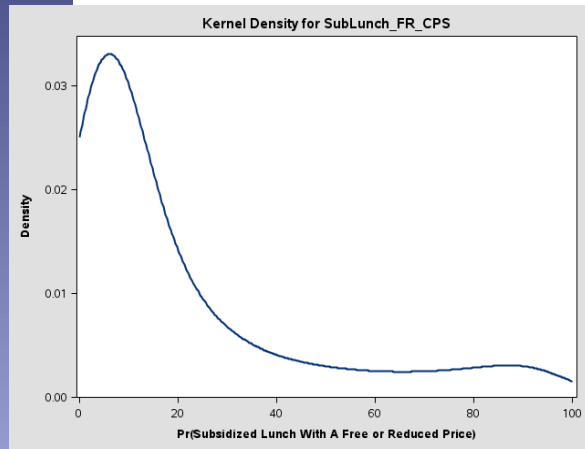
Source		CPS_PU ^a	CE with CPS_PU coefficients ^b
Data Collected		2009-2013	2008Q2-2013Q1
NSLP	Sample Size	121,843	38,497
	Free and Reduced	26.2%	23.7%
	Subsidized but not Free or Reduced	41.5%	40.4%
	Did not buy School Lunch	32.3%	35.9%
WIC	Sample Size	314,331	61,006
	Participated	3.7%	3.6%
LIHEAP	Sample Size	340,617	136,935
	Participated	3.4%	2.6%

^a CPS_PU probabilities produced from coefficients estimated with population weights.

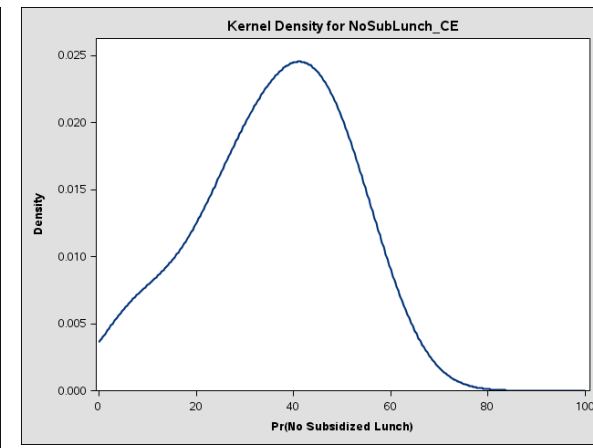
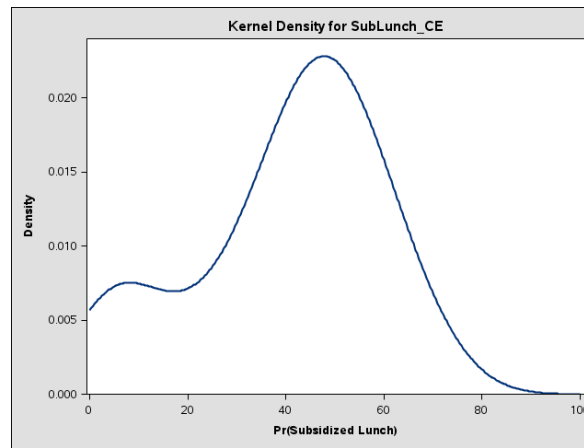
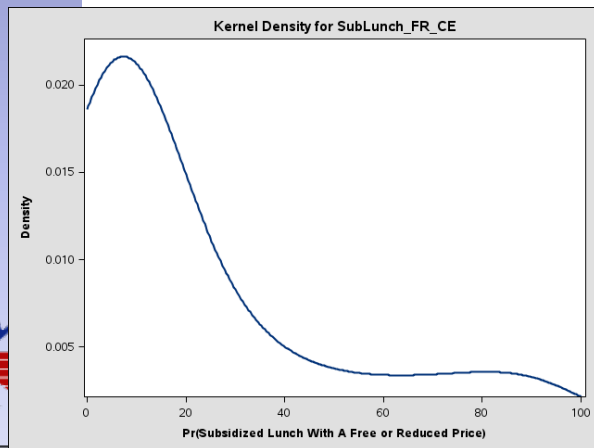
^b CE probabilities produced using coefficients and CU population weights and BRR.

Kernel Density Plots of NSLP Predicted Probabilities for Pooled to Represent 2008-2012

CPS_PU

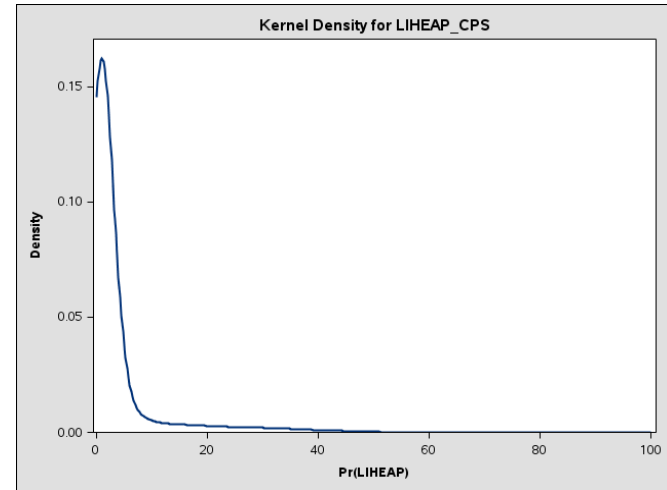
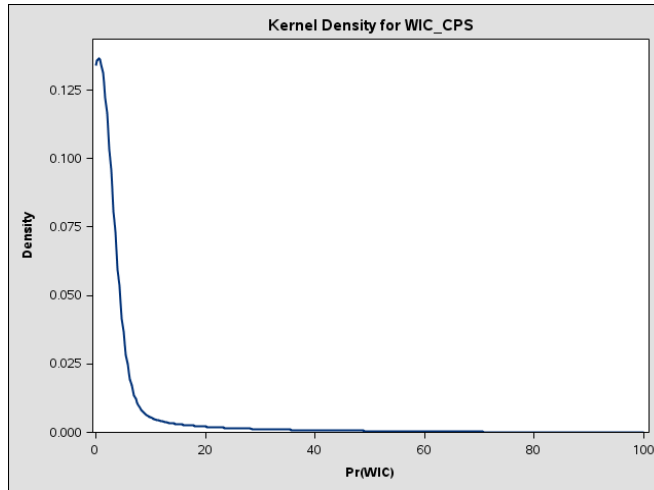


CE Interview Survey with CPI_PU Coefficients

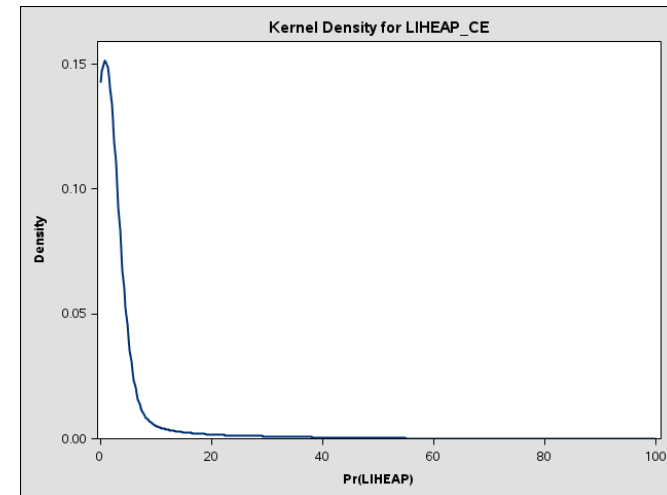
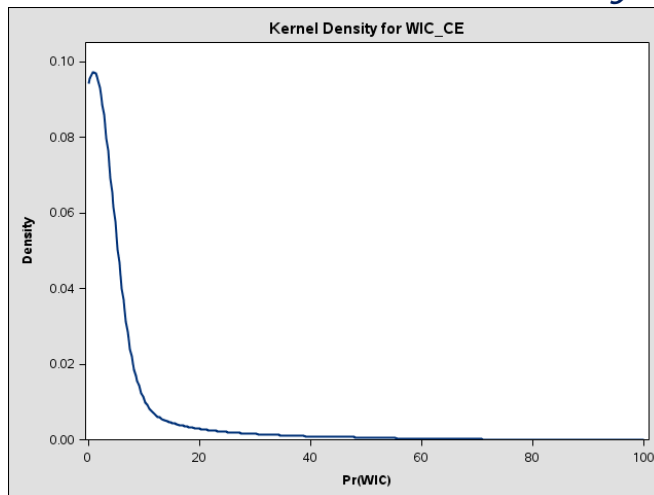


Kernel Density Plots of WIC and LIHEAP Predicted Probabilities for Pooled to Represent 2008-2012

CPS_PU



CE Interview Survey with CPI_PU Coefficients



ITWG Guidelines for SPM Thresholds

- Thresholds' production at Bureau of Labor Statistics
 - ▶ CE quarterly Interview data with expenditures in threshold year dollars
 - ▶ Estimation sample: consumer units (CUs) with 2 children
 - ▶ Reference units: CUs with 2 adults and 2 children
 - ▶ Basic bundle –food, clothing, shelter, utilities (FCSU)—plus 20% for other needs
 - ▶ Data updated to reflect real growth in consumption (5 years of CE data)
 - ▶ Account for differences in housing spending needs by producing separate thresholds by housing status

- Thresholds to be sent to U.S. Census Bureau for household size and geographic adjustments, and poverty analysis

Administrative Benefits Data

- NSLP: U.S. Department of Agriculture for 2008-2012
 - ▶ Average per school lunch payment rates
 - Over 48 contiguous states
 - Rates for schools in which less than 60% of lunches served were free or reduced priced
 - ▶ Different values
 - Free
 - Reduced
 - Student paid full price for lunch (but also subsidized by USDA)

- WIC: U.S. Department of Agriculture for 2008-2012
 - ▶ Average national monthly values per person

- LIHEAP: U.S. Department of Health and Human Services for 2009
 - ▶ Average annual benefit levels per household per state
 - ▶ Benefits
 - Heating
 - Cooling (not all states offer this benefit)

Threshold Estimation

- Add in-kind benefits to FCSU at CU level for 2 children, “*FCSU+*”
 - ▶ NSLP
 - ▶ WIC
 - ▶ LIHEAP
 - ▶ *Note: food stamp benefits implicitly already in food expenditures*
- Apply 3-parameter equivalence scale to convert to 2 adults with 2 children
- Convert all quarterly expenditures to annual \$2012
- Rank *FCSU+* to identify 33rd percentile represented by 30th to 36th percentile range
- Produce means of *FCSU+* and *SU* by housing status

Threshold Estimation

- Housing Status Groups, j
 - ▶ Owners with mortgages
 - ▶ Owners without mortgages
 - ▶ Renters

- *SPM Threshold_j*

$$= (1.2 * FCSU_A) - SU_A + SU_j$$

FCSU_A , SU_A , SU_j are means within 30th to 36th percentile range of FCSU_A for reference CUs

Predicted Probabilities of Program Participation Using CPS_PU Model Estimation: 2 Children

Source		CPS_PU ^a	CE with CPS_PU coefficients ^b
Data Collected		2009-2013	2008Q2-2013Q1
NSLP	Sample Size	16,298	15,064
	Free and Reduced	22.9%	21.1%
	Subsidized but not Free or Reduced	42.3%	42.0%
	Did not buy School Lunch	34.7%	36.9%
WIC	Sample Size	54,840	15,679
	Participated	2.5%	4.2%
LIHEAP	Sample Size	57,739	17,515
	Participated	3.2%	2.4%

^a CPS_PU probabilities produced from coefficients estimated with population weights.

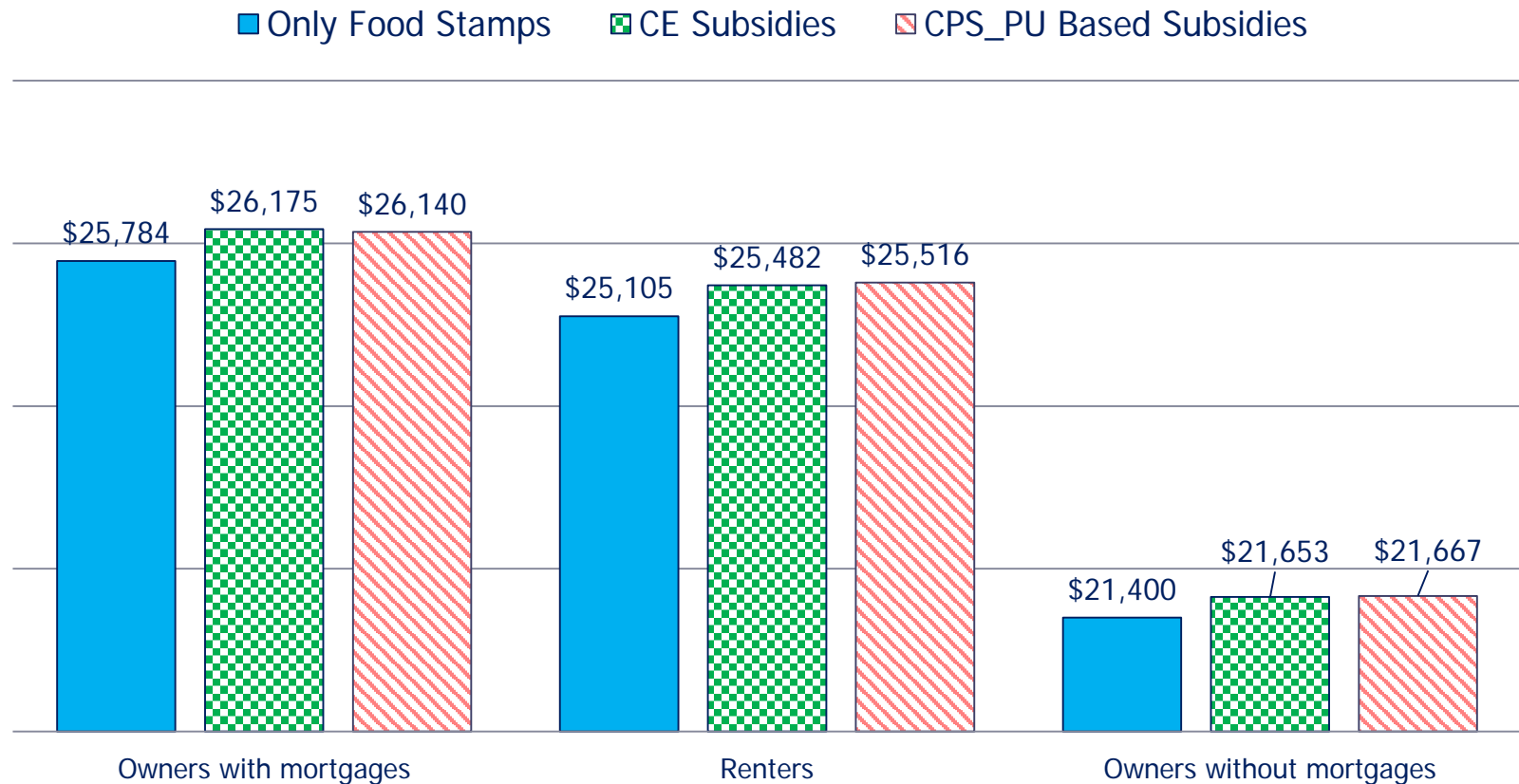
^b CE probabilities produced using coefficients and CU population weights and BRR.

Predicted Means by Program Participation within 30-36th Percentile of FCSU for 2 Adults with 2 Children: 2012 SPM Thresholds

Program		CE Using CPS_PU Participation Approach	CE Eligi./Parti. Approach
		Weighted Means^a	
NSLP	Average	\$219	\$256
WIC	Average	\$124	\$71
LIHEAP	Average	\$18	\$10

^a Means include zeroes; without means values range from \$400 to \$500.

2012 SPM Thresholds with and without In-Kind Imputed Benefits: 2A+2C



NOTE: Rental housing subsidies NOT included in thresholds.

Conclusion and Future Research

- Valuing in-kind benefits to be included in thresholds estimation critically important for consistency with resources
- Similar results with regard to 2012 SPM thresholds (similar finding for 2009 and internal CPS to Garner and Hokayem, 2012)
 - CPS Program Participation Regression approach
 - CE Eligibility/Participation approach
- Problem with both approaches: produce probabilities when what we want are 0,1 outcomes – *FCSU+* distributions to reflect actual in-kind benefits “values” for those receiving benefits otherwise distributions will be distorted
- Future Research
 - Refine logit models
 - Use multiple imputation methods to assign 0,1 outcomes
 - Produce market rents and compare to FMRs

HUD FMRs by CE Imputes: 2012 DC Metro Area

	<u>Efficiency</u>	<u>One- Bedroom</u>	<u>Two- Bedroom</u>	<u>Three- Bedroom</u>	<u>Four- Bedroom</u>
50 th Percentile					
FMR	\$1,166	\$1,328	\$1,506	\$1,943	\$2,542
CE Imputed					
40 th Percentile					
	\$1,078	\$1,228	\$1,393	\$1,797	\$2,351
CE Imputed					

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The President's 2016 Budget and SPM

- Proposes funds for BLS to produce spending measures that would help the U.S. Census Bureau measure poverty more accurately
- If Congress funds this proposal, it would allow BLS to:
 - ▶ Release consumer spending data more quickly to help the Census Bureau produce alternative poverty measures each year.
 - ▶ Add questions to the Consumer Expenditure Survey on topics such as school breakfasts and lunches and help paying for home heating and other household expenses.
 - ▶ Continue research to improve how federal agencies measure poverty.
- Without the funding, our ability to be a full participant in development and maintenance of the supplemental poverty measure is not possible.

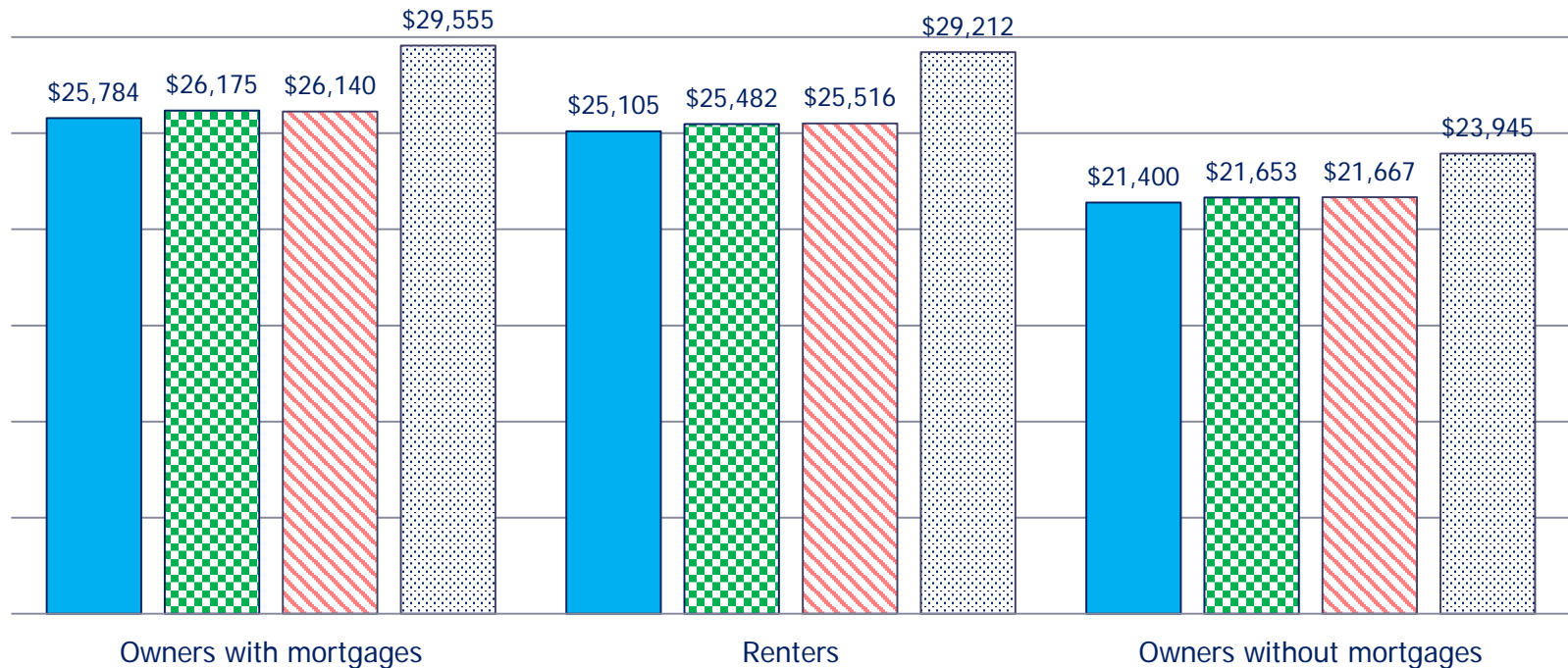
President's 2016 budget would fund data on export prices and poverty measures

March 13, 2015 [BLS Commissioner](#)

<http://blogs.bls.gov/blog/2015/03/13/presidents-2016-budget-would-fund-data-on-export-prices-and-poverty-measures/>

2012 SPM Thresholds with and without In-Kind Imputed Benefits: 2A+2C

■ Only Food Stamps
 ■ CE Subsidies
 ■ CPS-Based Subsidies
 ■ Unsubsidized



NOTE: Rental housing subsidies NOT included in thresholds.