



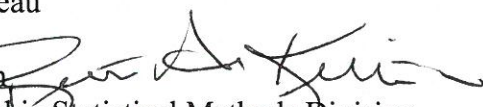
FEB 20 2015



February 11, 2015

MEMORANDUM FOR Jay Ryan  
Chief, Division of Consumer Expenditure Surveys  
Office of Prices and Living Conditions  
Bureau of Labor Statistics

Through: Richard Schwartz  
Survey Director, Consumer Expenditure Survey  
U.S. Census Bureau

From: Ruth Ann Killion   
Chief, Demographic Statistical Methods Division  
U.S. Census Bureau

Prepared by: Jacob Enriquez  
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U.S. Census Bureau

Subject: Consumer Expenditure Surveys Sample Allocation for Interview  
Year 2016

The Consumer Expenditure Surveys (CE) program budget allows for the selection of 12,000 unit frame addresses per year for the Interview survey and 12,000 unit frame addresses per year for the Diary survey. This memorandum gives the allocation of 12,000 addresses to the 91 primary sampling units (PSU) for both the Interview and Diary surveys in interview year 2016.

Attachment A shows the number of addresses and the expected number of usable interviews in the 41 index areas, Attachment B shows the sub-allocation to the individual PSUs in the index area, and Attachment C shows the participation rates.

## Background

Research by Consumer Expenditure Statistical Methods Division (CESMD) and Demographic Statistical Methods Division (DSMD) showed that allocating the nationwide sample of households to PSUs directly proportional to the populations they represent (i.e. their stratum populations) is a simple and effective way of producing expenditure estimates with small variances at the nationwide level (Swanson 2013). This allocation process is formalized in the language of mathematics by expressing the process as a constrained optimization problem. Details of this optimization problem, along with a thorough description of the allocation process can be found in Killion (2014).

## Changes from last year's allocation process

### 1. Inputs

DSMD updated the eligibility rates and response rates by using the most recent five years of data. The eligibility rates were computed from the 2009-2013 American Community Survey (ACS) control files, while the response rates were computed from 2009-2013 CE interview outcomes.

### 2. Program

DSMD modified the optimization SAS procedure (PROC NLP) by specifying that the constraints are linear. This change allows the optimization algorithm to:

- i. Produce the optimal solution.
- ii. Converge to the same solution every time.
- iii. Produce results consistent with changes to the input.

## Miscellaneous

This memorandum is stored in the directory "M:\ADC-SDE\VEB\CE\\_Final Memos" with the name of "2015-01 CE Sample Allocation.docx".

## References

Killion, R.A. (2014). U.S. Census Bureau memorandum, "Consumer Expenditure Surveys Sample Allocation for the 2010 Census-Based Sample Design," from Ruth Ann Killion to Jay Ryan, dated February 11, 2014.

Swanson, D. (2013). Bureau of Labor Statistics memorandum, "Allocating CE's Nationwide Sample to Individual PSUs," dated July 19, 2013.

## Attachments

cc:

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**Number of Sample Addresses and  
Expected Number of Usable Interviews in the 41 Index Areas**

This is the nationwide sample of 12,000 addresses allocated to the 41 index areas along with the expected number of usable interviews.

	Index Area	Population	# Addresses		# Usable Interviews	
			Interview	Diary	Interview	Diary
1	N110	9,239,719	324.29	298.94	190.64	191.59
2	N120	15,036,701	569.75	558.46	316.78	317.81
3	N230	28,676,810	1,037.29	991.29	614.47	616.39
4	N240	12,053,008	470.87	440.52	251.53	252.62
5	N350	33,959,783	1,269.56	1,258.51	729.52	731.59
6	N360	15,382,945	564.52	567.48	324.48	325.42
7	N370	21,047,585	862.39	924.52	447.50	448.43
8	N480	13,999,691	538.04	560.32	294.09	294.77
9	N490	19,359,051	663.22	662.47	411.51	412.70
10	R110	652,744	78.66	73.02	40.00	40.00
11	R120	825,870	104.31	98.08	40.00	40.00
12	R230	2,957,143	101.44	99.35	53.11	53.48
13	R240	3,385,874	120.41	121.20	62.41	62.65
14	R350	3,396,724	99.96	107.64	63.57	63.51
15	R360	2,974,706	127.78	106.23	52.07	53.53
16	R370	2,903,346	87.17	107.72	52.59	51.72
17	R480	1,328,391	78.38	99.99	40.00	40.00
18	R490	714,395	95.73	90.07	40.00	40.00
19	S11A	4,552,402	166.11	161.40	87.95	88.44
20	S12A	19,567,410	787.05	794.16	415.31	416.47
21	S12B	5,965,343	220.95	223.60	118.83	119.19
22	S23A	9,461,105	328.34	307.55	195.52	196.42
23	S23B	4,296,250	153.70	157.78	82.42	82.62
24	S24A	3,348,859	123.97	122.21	80.00	80.00
25	S24B	2,787,701	148.85	131.26	80.00	80.00
26	S35A	5,636,232	198.24	195.10	111.88	112.36
27	S35B	5,564,635	186.01	181.77	110.56	111.05
28	S35C	5,286,728	179.19	167.36	104.41	105.09
29	S35D	2,783,243	140.99	133.01	80.00	80.00
30	S35E	2,710,489	163.27	195.91	80.00	80.00
31	S37A	6,426,214	221.30	231.81	129.26	129.49
32	S37B	5,920,416	231.98	228.98	117.55	118.04
33	S48A	4,192,887	162.48	164.36	80.00	80.00
34	S48B	2,543,482	133.84	120.39	80.00	80.00
35	S49A	12,828,837	459.67	480.12	268.87	269.48
36	S49B	4,335,391	133.97	155.91	83.98	83.59
37	S49C	4,224,851	148.48	152.16	80.95	81.14
38	S49D	3,439,809	123.46	121.04	80.00	80.00
39	S49E	3,095,313	129.01	134.10	80.00	80.00
40	S49F	1,360,301	126.28	135.05	80.00	80.00
41	S49G	523,154	139.07	139.15	80.00	80.00
<b>Total</b>		<b>308,745,538</b>	<b>12,000.00</b>	<b>12,000.00</b>	<b>6,731.77</b>	<b>6,749.58</b>

**Number of Sample Addresses and  
Expected Number of Usable Interviews in the 91 PSUs**

This is the nationwide sample of 12,000 addresses allocated to the  
91 PSUs along with the expected number of usable interviews.

Index Area	PSU Code	PSU Name	Population	# Addresses		# Usable Interviews		MAF HU counts	Take Every*	
				Interview	Diary	Interview	Diary			
1	N110	N11B	Hartford-West Hartford-East Hartford, CT	5,005,793	175.69	161.96	103.28	103.80	518,192	2,949.49
2	N110	N11C	Springfield, MA	4,233,926	148.60	136.98	87.36	87.79	259,041	1,743.23
3	N120	N12C	Pittsburgh, PA	4,065,877	154.06	151.00	85.66	85.94	1,131,820	7,346.63
4	N120	N12D	Buffalo-Cheektowaga-Niagara Falls, NY	3,483,174	131.98	129.36	73.38	73.62	531,882	4,030.00
5	N120	N12E	Rochester, NY	3,925,318	148.73	145.78	82.69	82.96	481,378	3,236.50
6	N120	N12F	Reading, PA	3,562,332	134.98	132.30	75.05	75.29	168,754	1,250.21
7	N230	N23C	Cincinnati, OH-KY-IN	3,395,853	122.83	117.39	72.76	72.99	938,912	7,643.77
8	N230	N23D	Cleveland-Elyria, OH	3,257,953	117.85	112.62	69.81	70.03	976,064	8,282.57
9	N230	N23E	Columbus, OH	3,758,510	135.95	129.92	80.54	80.79	855,602	6,293.44
10	N230	N23F	Milwaukee-Waukesha-West Allis, WI	3,256,494	117.79	112.57	69.78	70.00	684,907	5,814.51
11	N230	N23G	Dayton, OH	3,924,320	141.95	135.65	84.09	84.35	374,574	2,638.79
12	N230	N23H	Flint, MI	3,911,189	141.47	135.20	83.81	84.07	195,007	1,378.39
13	N230	N23I	Janesville-Beloit, WI	3,745,126	135.47	129.46	80.25	80.50	69,380	512.15
14	N230	N23J	Frankfort, IN	3,427,365	123.97	118.48	73.44	73.67	13,549	109.29
15	N240	N24C	Omaha-Council Bluffs, NE-IA	2,974,017	116.18	108.70	62.06	62.33	382,475	3,291.96
16	N240	N24D	Wichita, KS	2,842,770	111.06	103.90	59.32	59.58	277,938	2,502.66
17	N240	N24E	Lincoln, NE	3,288,318	128.46	120.18	68.62	68.92	134,413	1,046.32
18	N240	N24F	Wahpeton, ND-MN	2,947,903	115.16	107.74	61.52	61.79	10,841	94.14
19	N350	N35F	Charlotte-Concord-Gastonia, NC-SC	3,035,149	113.47	112.48	65.20	65.39	989,314	8,718.96
20	N350	N35G	Orlando-Kissimmee-Sanford, FL	2,642,941	98.80	97.94	56.78	56.94	991,424	10,034.20
21	N350	N35H	Richmond, VA	3,027,856	113.19	112.21	65.04	65.23	533,913	4,716.78
22	N350	N35I	Raleigh, NC	2,549,176	95.30	94.47	54.76	54.92	503,964	5,288.23
23	N350	N35J	Greenville-Anderson-Mauldin, SC	3,094,518	115.69	114.68	66.48	66.66	381,732	3,299.71
24	N350	N35K	Winston-Salem, NC	2,637,083	98.59	97.73	56.65	56.81	297,440	3,017.08
25	N350	N35L	Cape Coral-Fort Myers, FL	3,091,153	115.56	114.55	66.40	66.59	384,712	3,329.09
26	N350	N35M	Ocala, FL	2,568,744	96.03	95.19	55.18	55.34	168,606	1,755.75
27	N350	N35N	Gainesville, FL	2,913,140	108.91	107.96	62.58	62.76	124,236	1,140.77
28	N350	N35O	Wilmington, NC	2,736,321	102.30	101.40	58.78	58.95	134,620	1,315.99
29	N350	N35P	Jacksonville, NC	3,100,604	115.91	114.90	66.61	66.80	81,469	702.84
30	N350	N35Q	Big Stone Gap, VA	2,563,098	95.82	94.99	55.06	55.22	28,969	302.33
31	N360	N36A	Louisville/Jefferson County, KY-IN	2,529,624	92.83	93.32	53.36	53.51	561,318	6,015.05
32	N360	N36B	Birmingham-Hoover, AL	2,483,606	91.14	91.62	52.39	52.54	528,127	5,764.24
33	N360	N36C	Chattanooga, TN-GA	2,620,595	96.17	96.67	55.28	55.44	244,621	2,530.35
34	N360	N36D	Huntsville, AL	2,801,399	102.80	103.34	59.09	59.26	198,894	1,924.57
35	N360	N36E	Florence-Muscle Shoals, AL	2,550,408	93.59	94.09	53.80	53.95	73,587	782.13
36	N360	N36F	Meridian, MS	2,397,313	87.98	88.44	50.57	50.71	49,736	562.38
37	N370	N37C	San Antonio-New Braunfels, TX	2,436,095	99.81	107.01	51.79	51.90	919,063	8,588.86
38	N370	N37D	Oklahoma City, OK	2,812,948	115.26	123.56	59.81	59.93	580,286	4,696.40
39	N370	N37E	Baton Rouge, LA	2,543,610	104.22	111.73	54.08	54.19	355,058	3,177.85
40	N370	N37F	Lafayette, LA	2,444,837	100.17	107.39	51.98	52.09	213,417	1,987.30
41	N370	N37G	Brownsville-Harlingen, TX	2,581,037	105.75	113.37	54.88	54.99	153,275	1,351.95
42	N370	N37H	Amarillo, TX	2,756,117	112.93	121.06	58.60	58.72	109,118	901.33
43	N370	N37I	Russellville, AR	2,620,998	107.39	115.13	55.73	55.84	37,090	322.16
44	N370	N37J	Paris, TX	2,851,943	116.85	125.27	60.64	60.76	23,749	189.58
45	N480	N48C	Las Vegas-Henderson-Paradise, NV	3,227,960	124.06	129.20	67.81	67.97	879,310	6,806.03
46	N480	N48D	Provo-Orem, UT	3,724,271	143.13	149.06	78.23	78.42	166,325	1,115.82
47	N480	N48E	Yuma, AZ	3,840,701	147.61	153.72	80.68	80.87	91,077	592.49
48	N480	N48F	St. George, UT	3,206,759	123.24	128.35	67.36	67.52	63,233	492.67
49	N490	N49H	Portland-Vancouver-Hillsboro, OR-WA	5,208,366	178.43	178.23	110.71	111.03	965,968	5,413.63
50	N490	N49I	Santa Rosa, CA	5,163,670	176.90	176.70	109.76	110.08	208,079	1,176.24

## Attachment B

	Index Area	PSU Code	PSU Name	Population	# Addresses		# Usable Interviews		MAF HU counts	Take Every*
					Interview	Diary	Interview	Diary		
51	N490	N49J	Chico, CA	4,623,339	158.39	158.21	98.28	98.56	97,960	618.47
52	N490	N49K	Moses Lake, WA	4,363,676	149.49	149.33	92.76	93.03	36,999	247.49
53	R110	R11D	Addison, VT	652,744	78.66	73.02	40.00	40.00	17,374	220.88
54	R120	R12G	Northeast Pennsylvania	825,870	104.31	98.08	40.00	40.00	57,003	546.49
55	R230	R23K	Northern Michigan	1,605,685	55.08	53.94	28.84	29.04	39,644	719.71
56	R230	R23L	Holmes, OH	1,351,458	46.36	45.40	24.27	24.44	14,399	310.58
57	R240	R24G	Northern Missouri	1,838,073	65.37	65.80	33.88	34.01	20,933	318.15
58	R240	R24H	Northeast Nebraska	1,547,801	55.04	55.41	28.53	28.64	9,340	168.58
59	R350	R35R	Southern Virginia	1,543,021	45.41	48.90	28.88	28.85	65,479	1,339.07
60	R350	R35S	Southwest West Virginia	1,853,703	54.55	58.74	34.69	34.66	37,302	634.99
61	R360	R36G	Eastern Kentucky	1,567,733	67.34	55.99	27.44	28.21	92,189	1,368.93
62	R360	R36H	Western Tennessee	1,406,973	60.44	50.25	24.63	25.32	50,007	827.41
63	R370	R37K	Northeast Texas	1,315,398	39.50	48.80	23.83	23.43	60,921	1,248.31
64	R370	R37L	Northern Arkansas	1,587,948	47.68	58.91	28.77	28.29	45,443	771.34
65	R480	R48G	Ravalli, MT	481,660	28.42	36.25	14.50	14.50	20,282	559.44
66	R480	R48H	Lincoln, NM	399,341	23.56	30.06	12.02	12.02	18,439	613.44
67	R480	R48I	Gooding, ID	447,390	26.40	33.67	13.47	13.47	6,253	185.69
68	R490	R49L	Tillamook, OR	714,395	95.73	90.07	40.00	40.00	21,203	221.48
69	S11A	S11A	Boston-Cambridge-Newton, MA-NH	4,552,402	166.11	161.40	87.95	88.44	1,938,530	11,669.91
70	S12A	S12A	New York-Newark-Jersey City, NY-NJ-PA	19,567,410	787.05	794.16	415.31	416.47	7,997,744	10,070.67
71	S12B	S12B	Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	5,965,343	220.95	223.60	118.83	119.19	2,506,815	11,210.92
72	S23A	S23A	Chicago-Naperville-Elgin, IL-IN-WI	9,461,105	328.34	307.55	195.52	196.42	3,879,639	11,815.88
73	S23B	S23B	Detroit-Warren-Dearborn, MI	4,296,250	153.70	157.78	82.42	82.62	1,926,831	12,212.15
74	S24A	S24A	Minneapolis-St. Paul-Bloomington, MN-WI	3,348,859	123.97	122.21	80.00	80.00	1,431,966	11,551.19
75	S24B	S24B	St. Louis, MO-IL	2,787,701	148.85	131.26	80.00	80.00	1,265,825	8,504.16
76	S35A	S35A	Washington-Arlington-Alexandria, DC-VA-MD-WV	5,636,232	198.24	195.10	111.88	112.36	2,338,233	11,795.08
77	S35B	S35B	Miami-Fort Lauderdale-West Palm Beach, FL	5,564,635	186.01	181.77	110.56	111.05	2,523,320	13,565.30
78	S35C	S35C	Atlanta-Sandy Springs-Roswell, GA	5,286,728	179.19	167.36	104.41	105.09	2,249,217	12,551.84
79	S35D	S35D	Tampa-St. Petersburg-Clearwater, FL	2,783,243	140.99	133.01	80.00	80.00	1,406,135	9,973.04
80	S35E	S35E	Baltimore-Columbia-Towson, MD	2,710,489	163.27	195.91	80.00	80.00	1,175,414	5,999.80
81	S37A	S37A	Dallas-Fort Worth-Arlington, TX	6,426,214	221.30	231.81	129.26	129.49	2,696,127	11,630.53
82	S37B	S37B	Houston-The Woodlands-Sugar Land, TX	5,920,416	231.98	228.98	117.55	118.04	2,487,900	10,724.57
83	S48A	S48A	Phoenix-Mesa-Scottsdale, AZ	4,192,887	162.48	164.36	80.00	80.00	1,872,660	11,393.78
84	S48B	S48B	Denver-Aurora-Lakewood, CO	2,543,482	133.84	120.39	80.00	80.00	1,127,494	8,424.33
85	S49A	S49A	Los Angeles-Long Beach-Anaheim, CA	12,828,837	459.67	480.12	268.87	269.48	4,566,917	9,511.96
86	S49B	S49B	San Francisco-Oakland-Hayward, CA	4,335,391	133.97	155.91	83.98	83.59	1,774,854	11,383.67
87	S49C	S49C	Riverside-San Bernardino-Ontario, CA	4,224,851	148.48	152.16	80.95	81.14	1,541,367	10,130.14
88	S49D	S49D	Seattle-Tacoma-Bellevue, WA	3,439,809	123.46	121.04	80.00	80.00	1,532,821	12,415.82
89	S49E	S49E	San Diego-Carlsbad, CA	3,095,313	129.01	134.10	80.00	80.00	1,186,559	8,848.35
90	S49F	S49F	Honolulu, HI	1,360,301	126.28	135.05	80.00	80.00	347,408	2,572.52
91	S49G	S49G	Anchorage, AK	523,154	139.07	139.15	80.00	80.00	160,225	1,151.45
			<b>Total</b>	<b>308,745,538</b>	<b>12,000.00</b>	<b>12,000.0</b>	<b>6,731.77</b>	<b>6,749.58</b>	<b>69,691,630</b>	<b>-</b>

\*The Take Every's will need to be divided by two in order to take twice as much sample to account for both CED and CEQ being selected at the same time.

### Response Rates and Eligibility Rates

The table below shows response rates and eligibility rates from the 5-year period 2009-2013 by index area. They range from 56.9% to 92.6% in the Interview survey, and from 51.4% to 86.3% in the Diary survey. Response rates have been decreasing over time, so the response rates used are the ones shown below minus 5 percentage points.

Index Area	2009-2013 Interview Survey			2009-2013 Diary Survey			ACS		
	Interviews	Type A	Response Rate	Interviews	Type A	Response Rate	Eligible Rate	Interviews + Type A	
1	N110	1,130	493	69.6	249	81	75.5	91.0	78,430
2	N120	3,847	1,814	68.0	793	349	69.4	88.3	278,415
3	N230	4,520	1,665	73.1	981	302	76.5	87.0	449,485
4	N240	1,037	543	65.6	232	99	70.1	88.1	99,140
5	N350	4,286	1,345	76.1	921	276	76.9	80.8	421,191
6	N360	2,562	895	74.1	562	198	73.9	83.2	177,063
7	N370	2,991	1,412	67.9	591	335	63.8	82.5	249,150
8	N480	3,006	1,079	73.6	583	238	71.0	79.7	122,833
9	N490	1,855	585	76.0	364	113	76.3	87.4	128,595
10	R110	64	32	66.7	15	6	71.4	82.5	4,627
11	R120	392	204	65.8	94	41	69.6	63.1	14,769
12	R230	452	119	79.2	91	21	81.3	70.6	13,275
13	R240	780	277	73.8	159	57	73.6	75.3	9,186
14	R350	213	17	92.6	44	7	86.3	72.6	13,974
15	R360	41	31	56.9	9	4	69.2	78.5	17,734
16	R370	82	9	90.1	16	6	72.7	70.9	13,711
17	R480	167	54	75.6	38	25	60.3	72.3	5,662
18	R490	169	39	81.3	37	6	86.0	54.8	3,374
19	S11A	2,361	1,393	62.9	494	267	64.9	91.5	184,026
20	S12A	10,908	5,911	64.9	2,315	1,275	64.5	88.2	856,551
21	S12B	3,756	1,975	65.5	793	427	65.0	88.8	268,322
22	S23A	5,824	2,161	72.9	1,442	410	77.9	87.7	403,438
23	S23B	2,470	1,142	68.4	501	248	66.9	84.6	226,858
24	S24A	1,851	614	75.1	363	114	76.1	92.1	169,423
25	S24B	1,571	760	67.4	350	112	75.8	86.1	133,549
26	S35A	2,888	1,428	66.9	602	281	68.2	91.2	226,330
27	S35B	2,012	519	79.5	487	110	81.6	79.8	234,776
28	S35C	2,213	743	74.9	493	121	80.3	83.4	201,377
29	S35D	1,610	512	75.9	375	93	80.1	80.1	134,275
30	S35E	1,485	962	60.7	310	293	51.4	88.0	118,369
31	S37A	2,671	1,066	71.5	528	242	68.6	87.9	260,030
32	S37B	2,147	1,177	64.6	441	231	65.6	85.0	226,306
33	S48A	1,448	767	65.4	304	166	64.7	81.6	177,925
34	S48B	1,336	560	70.5	308	88	77.8	91.3	111,077
35	S49A	7,416	3,420	68.4	1,469	761	65.9	92.2	492,999
36	S49B	2,561	932	73.3	444	256	63.4	91.8	172,095
37	S49C	1,845	765	70.7	374	166	69.3	83.0	163,066
38	S49D	1,832	573	76.2	381	110	77.6	91.0	144,816
39	S49E	2,043	739	73.4	379	156	70.8	90.6	116,813
40	S49F	1,949	577	77.2	366	139	72.5	87.8	40,803
41	S49G	1,452	550	72.5	303	115	72.5	85.2	18,623
<b>Total</b>	<b>93,243</b>	<b>39,859</b>	<b>70.1%</b>	<b>19,601</b>	<b>8,345</b>	<b>70.1%</b>	<b>86.9%</b>	<b>7,182,461</b>	