

**Joint Center for Housing Studies**

**Harvard University**

**Re-Weighting the Number of Households Undertaking Home Improvements in the  
2013 American Housing Survey to Correct for Shifting Data Collection Periods**

**Abbe Will**

**May 2015**

**N15-1**

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## **Background**

The Department of Housing and Urban Development (HUD) sponsors a biennial longitudinal survey of the U.S. housing stock and its inhabitants known as the [American Housing Survey](#) (AHS). One of the topics covered in the AHS is home improvement projects and spending by homeowners during the two years prior to the interview date. According to a [User Note](#) issued by the Census Bureau in December 2014, the home improvement estimates in the 2011 and 2013 American Housing Surveys (AHS) were adversely impacted by shifting data collection periods, which resulted in a likely overestimation of improvement spending in the 2011 survey and underestimation of spending in the 2013 survey. The Bureau warns that “researchers comparing remodeling data between 2009 and 2011, and between 2011 and 2013, need to exercise caution in their interpretation of trends” and “should not derive trends in home improvement project completions (or other associated measures) between 2009, 2011, and 2013 due to the shift in data collection periods.”<sup>1</sup>

The Census Bureau explains that in a typical survey year, the AHS interview period is from late April through September, and the 2013 data collection period was characteristic of a typical year. However, the 2011 AHS data collection period was delayed three months due to budgetary reasons, and data were collected from late July through December 2011. The implication of these shifting data collection periods is that the 2013 survey is likely not reflecting 24 months of remodeling activity, but probably closer to 18-21 months of activity.

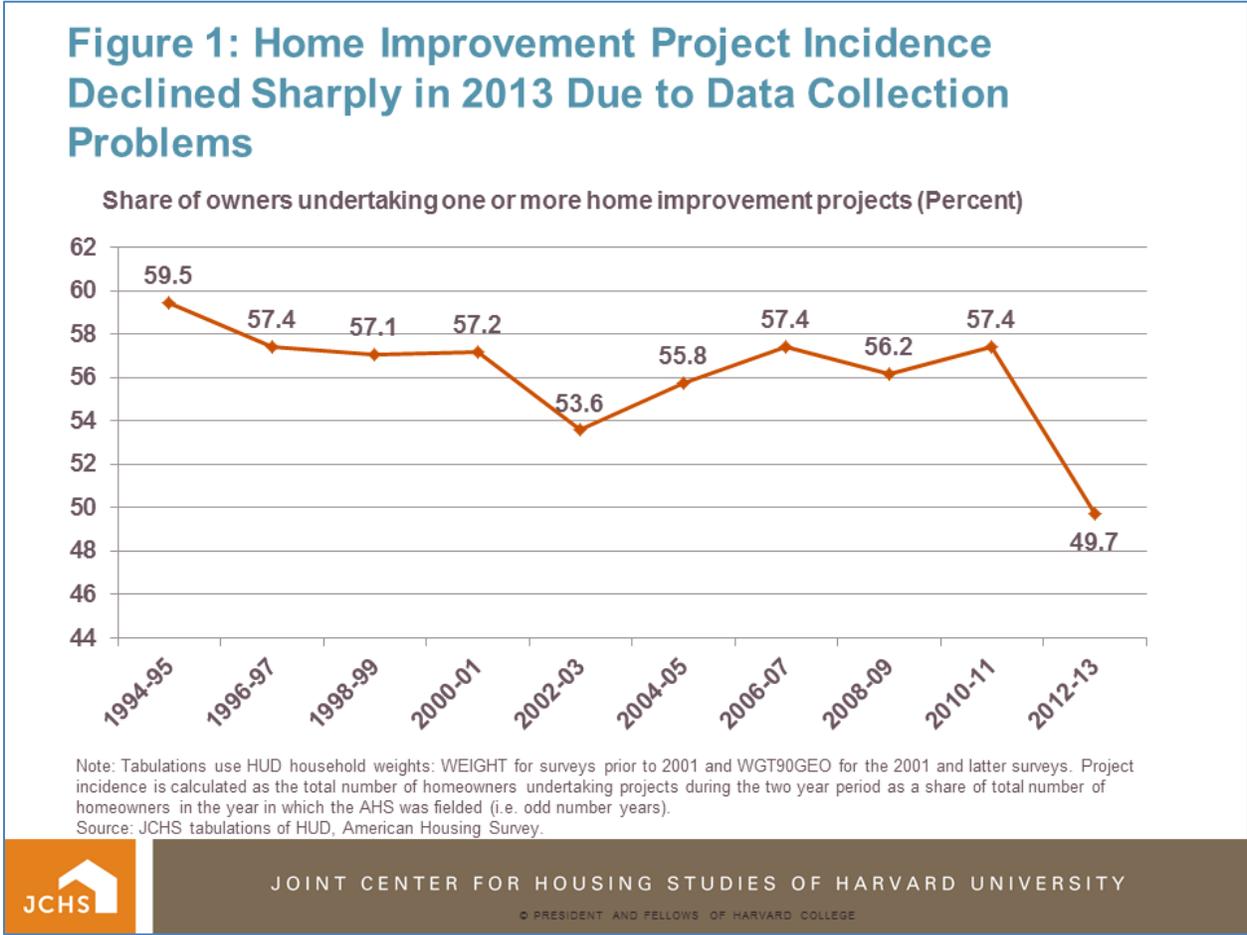
Indeed, analysis of the 2013 AHS home improvement module by the Joint Center found the data to be inconsistent with historical AHS trends, as well as other industry measures for remodeling activity during 2012-13.<sup>2</sup> Namely, the project incidence share, or share of homeowners undertaking one or more home improvement projects, in the survey is

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<sup>1</sup> US Census Bureau. December 2014. *2013 AHS: User Note Regarding Home Improvement Data*. Available: <http://www.census.gov/programs-surveys/ahs/tech-documentation/home-improvement-user-note--2013.html>.

<sup>2</sup> Although Census cautions that the 2011 AHS likely overestimated improvement activity, Joint Center analysis found no obvious inconsistencies with historical trends when the data was initially released, and at this time, no adjustments to the 2011 dataset are planned.

significantly lower than any previous survey since the remodeling module was last overhauled with the 1995 AHS (Figure 1).



**Comparison of Improvement Spending Growth in the AHS and C-30**

The large decline in project incidence together with a modest decline in average reported spending for improvement projects between the 2011 and 2013 surveys results in a 16.1 percent decline in two-year home improvement market spending from 2010-11 to 2012-13. In contrast, the Census Bureau’s alternative measure of homeowner improvement spending from the monthly Construction Spending Value Put in Place series (C-30) estimates national two-year home improvement spending *increased* 11.5 percent from 2010-11 to 2012-13 (Figure 2a).

**Figure 2a: The AHS and C-30 Show Opposite Trends in Recent Home Improvement Activity...**

	2010-11	2012-13	Percent Difference
<b>American Housing Survey:</b>			
Improvement Project Incidence (Mil.)	43.7	37.6	-13.9
Mean Improvement Spending (\$)	8,202	7,996	-2.5
Total Improvement Spending (\$Bil.)	358.4	300.8	<b>-16.1</b>
<b>C-30:</b>			
Total Improvement Spending (\$Bil.)	232.5	259.2	<b>+11.5</b>

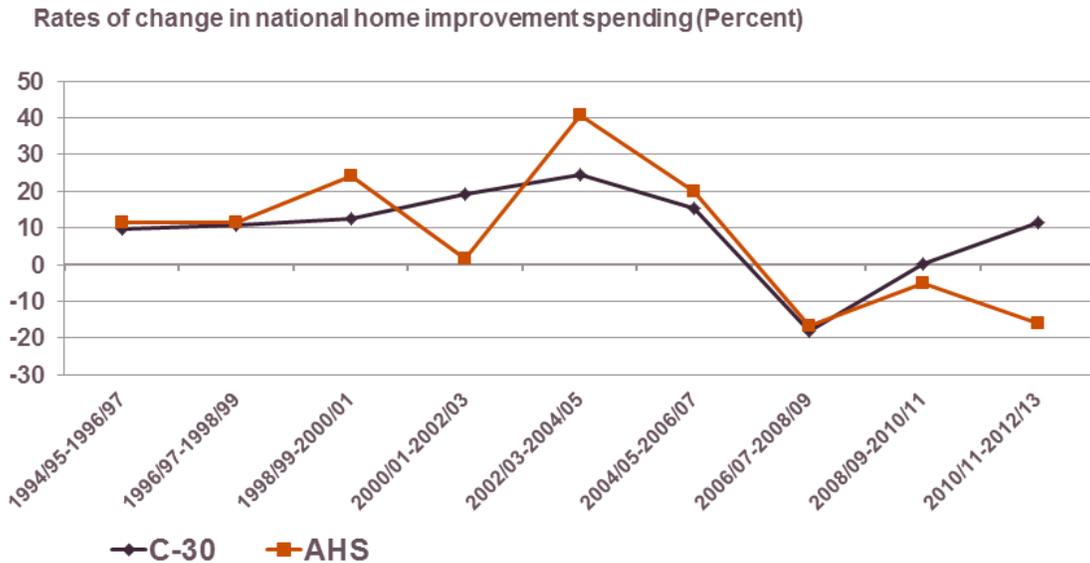
Notes: Project incidence is measured as the number of homeowners who undertook one or more home improvement projects during the reference period. Mean improvement spending is calculated only for homeowners undertaking projects.  
 Source: JCHS tabulations of HUD, American Housing Surveys and US Department of Commerce, Construction Spending Value Put in Place (C-30).



Yet, historically, the rates of change in two-year home improvement spending have matched very closely between the AHS and C-30, which further supports the need for re-weighting the national AHS improvement module to correct for the interviewing timing problem as described in the aforementioned Census User Note **(Figure 2b)**.<sup>3</sup>

<sup>3</sup> Preliminary Joint Center analysis suggests the 2001 and 2003 AHS also mismeasured improvement spending in similar ways as the 2011 and 2013 surveys.

**Figure 2b: ...Although Historically, the AHS and C-30 Have Estimated Similar Growth in Home Improvement Spending**



Sources: JCHS tabulations of HUD, 1995-2013 American Housing Surveys and US Census Bureau, Construction Spending Value Put in Place (C-30).



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### **Use of 2013 AHS Metropolitan Oversample to Re-Weight**

In order to correct for the reduced time period over which national home improvement activity was collected in the 2013 AHS, the Joint Center turned to a separate metropolitan oversample survey conducted by Census as part of the 2013 AHS to create a re-weighting methodology. The metropolitan oversample survey (referred to herein as the Metro Oversample) was conducted as a one-time survey in 20 metropolitan markets across the country. Unlike the longitudinal national survey, the Metro Oversample was not impacted by the issue of shifting interview periods since units in the metro sample were not previously interviewed.

As expected, the home improvement project incidence and average spending is significantly higher for households surveyed in the one-time 2013 Metro Oversample compared to

homeowners located within metropolitan areas who were surveyed as part of the longitudinal national AHS (Figure 3). Over 58 percent of homeowners in the 20 oversampled metro markets undertook one or more home improvement projects in 2012-13 compared to less than 51 percent of homeowners in metro areas in the national survey. Average improvement spending for these homeowners in the Metro Oversample survey was also almost 24 percent higher.

**Figure 3: Differences in Project Incidence Shares and Average Improvement Spending in the 2013 National and Metro AHS Are Striking**

	National AHS – Metro Areas	Metro Oversample	Percent Difference
Project Incidence Share (Percent)	50.9	58.6	15.1
Mean Improvement Spending (\$)	8,572	10,610	23.8

Notes: Project incidence is measured as the share of all homeowners who undertook one or more home improvement projects during the reference period. Mean improvement spending is calculated only for homeowners undertaking projects.  
 Source: JCHS tabulations of HUD, American Housing Survey.

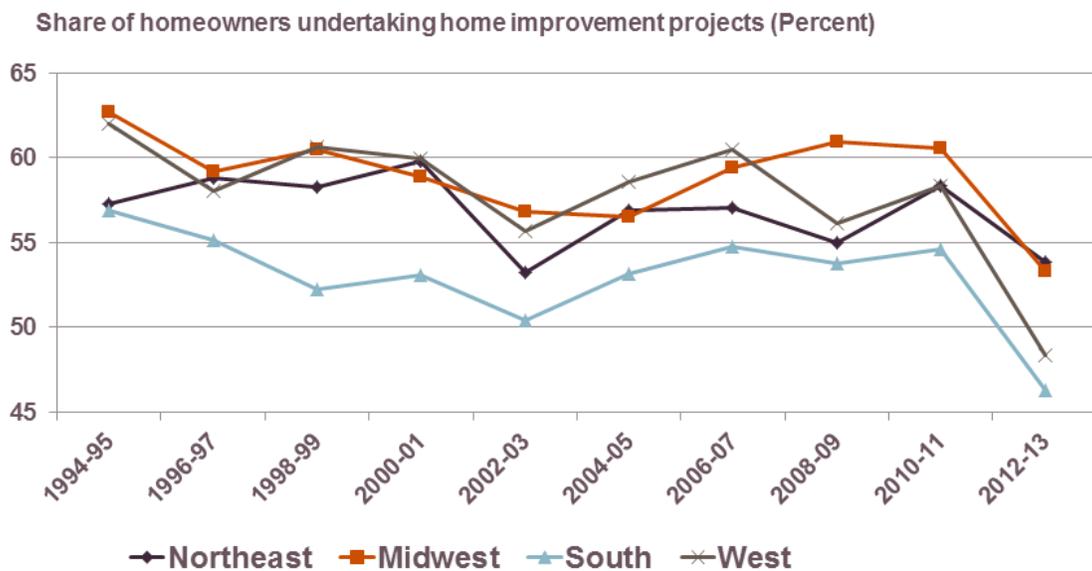


No meaningful difference was found in the weighted distributions of all homeowners and homeowners undertaking improvement projects along various demographic and socioeconomic measures (e.g. age, race/ethnicity, income, home value) between the pooled metro area oversample and owner households located in metro areas in the national sample. This finding provides some confidence that the metro oversamples are fairly representative of all metro areas in the nation even though the metros were not drawn randomly or to be nationally-representative.

However, the Metro Oversample does differ in one critical way for home improvement activity: regional geography. The metro areas included in the 2013 oversample survey are significantly

skewed toward southern metros, particularly in Florida (see Appendix A). This matters for improvement activity because, historically, owners in the South have had much lower project incidence shares and average improvement spending than owners in other regions of the country (**Figures 4a and 4b**). For these reasons, using the Metro Oversample to re-weight households in the national survey may result in more conservative project incidence shares and average spending than if the metro areas in the Metro Oversample had been more regionally representative of all metros in the nation.

**Figure 4a: Proportionally Fewer Owners in the South Make Home Improvements...**



Notes: Project incidence is measured as the share of all homeowners who undertook one or more home improvement projects during the reference period. Tabulations use HUD household weights: WEIGHT.  
 Source: JCHS tabulations of HUD, American Housing Surveys.

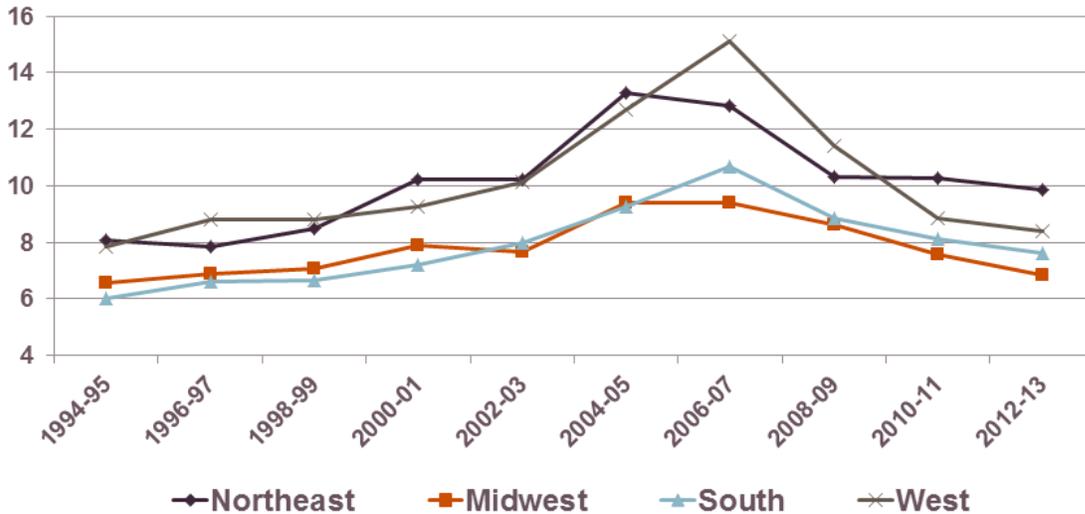


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## Figure 4b: ...And Southern Owners Typically Spend Less on Home Improvements

Average home improvement spending (Thousands of 2013 dollars)



Notes: Average improvement spending is calculated only for homeowners undertaking projects. Tabulations use HUD household weights: WEIGHT.  
Source: JCHS tabulations of HUD, American Housing Surveys.



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### **Two-Step Re-Weighting Methodology: Applying Project Incidence Shares and Spending Distributions from the Metro Oversample Survey**

The following is a description of a two-step re-weighting methodology to adjust the 2013 National AHS for the reduced period over which improvement activity was collected. This methodology specifically makes use of the improvement project incidence shares and spending distributions from the 2013 Metro Oversample survey as benchmarks for adjusting the household weights of homeowners with improvement activity in the National Survey. The main goals of this re-weighting are to increase the household weights of (1) homeowners undertaking projects and (2) higher-spending owners in the National AHS to reflect the project incidence shares and spending level distributions found in the Metro Oversample. The first-step re-weighting shifts weight from non-remodeling homeowners to homeowners with remodeling

activity to reflect the increased share of homeowners undertaking home improvements in the Metro Oversample file by householder age, household income, mobility (i.e. recent mover) status and metro/non-metro status. The second-step re-weighting further shifts household weight from lower-spending homeowners to higher-spending homeowners according to the distribution of improvement spending levels in the Metro Oversample file.

**Household Weights Used:**

National File: WGT90GEO  
Metro Oversample File: WGTMETRO

**Household Weights Produced:**

National File: REWEIGHT1 (intermediary or first-step re-weight)  
REWEIGHT2 (second-step or final re-weight)

**STEP 1: INCREASING PROJECT INCIDENCE AND SHARE**

A. **In the National File:** Compare the weighted average project incidence share for homeowners located in the 18 metro areas that are included in the Metro Oversample File to homeowners in all metro areas and non-metro areas.<sup>4</sup> The difference in project incidence share among these three groups will roughly indicate how over- or under-representative the 18 oversampled metros are in the National File because they were not selected randomly to be part of the 2013 Metro Oversample or to be necessarily representative of all metro areas in the nation (**Table 1**).

- i. The collective project incidence share for the 18 metros included in the Metro Oversample File that are also identifiable in the National File (50.4%) was found to be under-representative of all metro areas (50.9%) by 0.87 percent and over-representative of all non-metro areas (46.4%) by 8.1 percent.

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<sup>4</sup> Louisville, KY-IN and Richmond-Petersburg, VA were oversampled as part of the 2013 Metro Oversample survey, but these metros are not identifiable in the 2013 National AHS and were therefore left out of the analysis.

**Table 1: Calculation of Improvement Project Incidence Shares in the 2013 National AHS for Units in Metro Areas Included in the Metro Oversample, All Metro Areas and Non-Metro Areas**

Metropolitan Areas Included in the Metro Oversample Survey	ALL OWNERS		OWNERS WITH PROJECTS		Project Incidence Share (Percent)
	Number	Percent	Number	Percent	
Austin, TX	132,599	2.28%	72,772	2.48%	54.9%
Baltimore, MD	377,555	6.49%	187,769	6.40%	49.7%
Boston, MA	634,870	10.91%	332,776	11.34%	52.4%
Hartford, CT	12,910	0.22%	10,002	0.34%	77.5%
Houston, TX	646,199	11.10%	310,683	10.58%	48.1%
Jacksonville, FL	164,821	2.83%	58,899	2.01%	35.7%
Las Vegas, NV	208,634	3.59%	108,066	3.68%	51.8%
<i>Louisville, KY-IN</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>
Miami Hialeah, FL	401,601	6.90%	104,727	3.57%	26.1%
Minneapolis St. Paul, MN	562,821	9.67%	342,170	11.66%	60.8%
Nashville, TN	125,385	2.15%	75,663	2.58%	60.3%
Oklahoma City, OK	205,121	3.52%	124,697	4.25%	60.8%
Orlando, FL	203,419	3.50%	77,417	2.64%	38.1%
<i>Richmond-Petersburg, VA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>
Rochester, NY	160,279	2.75%	78,034	2.66%	48.7%
San Antonio, TX	270,569	4.65%	135,970	4.63%	50.3%
Seattle, WA	433,522	7.45%	265,496	9.05%	61.2%
Tampa, FL	396,009	6.80%	185,132	6.31%	46.7%
Tucson, AZ	168,937	2.90%	81,193	2.77%	48.1%
Washington, DC MD VA	714,195	12.27%	383,749	13.07%	53.7%
<b>Metros in Oversample</b>	<b>5,819,444</b>	<b>100.00%</b>	<b>2,935,215</b>	<b>100.00%</b>	<b>50.4%</b>
<b>All Metro Areas in US</b>	<b>56,441,756</b>		<b>28,714,852</b>		<b>50.9%</b>
<b>All NonMetro Areas in US</b>	<b>19,208,517</b>		<b>8,903,641</b>		<b>46.4%</b>
<b>All Homeowners</b>	<b>75,650,274</b>		<b>37,618,494</b>		<b>49.7%</b>

	Percent Difference in Shares
<b>Under-representation of Project Incidence for Metros in Oversample Compared to All Metro Areas in US</b>	<b>0.87%</b>
<b>Over-representation of Project Incidence for Metros in Oversample Compared to All NonMetro Areas in US</b>	<b>-8.10%</b>

Note: Tabulations use WGT90GEO household weights.

- B. **In the Metro File:** Calculate the weighted average project incidence share by householder age categories, household income quartiles and mobility status (recent mover/non-recent mover),<sup>5</sup> excluding Louisville and Richmond metro areas since these oversampled metros are not identifiable in the national AHS. Household age, income and mobility status were chosen because these measures are historically strong drivers of remodeling activity and in particular the likelihood of homeowners to undertake a project.<sup>6</sup> Adjust the weighted project incidence share of the 18 metros that are also identifiable in the National File by +0.87 percent to be applied to metro area units in the National File and -8.1 percent to be applied to non-metro area units in the National File.
- C. **In the National File:** Calculate the weighted (using WGT90GEO) number of all owners, owners undertaking one or more improvement projects and project incidence share by the same householder age categories, household income quartiles, and mobility status as in part 2, as well as by metro/non-metro status. Apply the adjusted incidence shares from the Metro File (as calculated in step 1, part B) to the weighted number of homeowners by age, income, mobility and metro status to produce re-weighted numbers of owners undertaking projects. Calculate the ratio of the re-weighted number of owners undertaking projects to the original weighted number of owners undertaking projects. Then proportionally decrease the number of owners without projects by subtracting the re-weighted owners with projects from total owner counts. Finally, calculate the ratio of re-weighted owners with projects to original weighted owners without projects (**Appendix C**). Apply the calculated ratios of the number of owners with and without projects to the original household weights (WGT90GEO) for homeowners by age, income, mobility and metro status to produce adjusted household weights with a higher project incidence share. These adjusted household weights are the intermediary or first-step re-weighting (REWEIGHT1).

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<sup>5</sup> See Appendix B for a description of the variable categories used in the analysis.

<sup>6</sup> Peng, R. 1992. *A Comparison of the Determinants of Housing Improvement and the Determinants of Maintenance and Repair*. Joint Center for Housing Studies of Harvard University, Working Paper W92-12.

## **STEP 2: INCREASING IMPROVEMENT SPENDING LEVELS**

- A. **In the National File:** Compare the re-weighted (using REWEIGHT1) frequency distribution of owners undertaking projects by spending level categories for units located in the 18 metro areas that are included in the Metro Oversample File to units located in all metro areas and units in non-metro areas in the National File. The difference in frequency distributions among these three groups will roughly indicate how over- or under-representative the 18 oversampled metros might be along the spending levels measure because they were not selected randomly or to be representative of all metro areas in the nation **(Table 2)**.
- i. The frequency distribution of owners with projects by improvement spending levels for the 18 metros included in the Metro Oversample File that are also identifiable in the National File was found to be over/under-representative of owners in all metro and non-metro areas by the percentages in columns (F) and (I) in Table 2:

Table 2: Calculation of Distribution of Improvement Spending in 2013 National AHS for Units in Metro Areas Included in the Metro Oversample, All Metro Areas and Non-Metro Areas								
(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)
Per-Owner Improvement Spending	METROS IN METRO OVERSAMPLE		ALL METRO AREAS		Over/Under-Representation of Metro Areas (% Difference in Share)	ALL NONMETRO AREAS		Over/Under-Representation of NonMetro Areas (% Difference in Share)
	Number of Owners with Projects	Incidence Share (%)	Number of Owners with Projects	Incidence Share (%)		Number of Owners with Projects	Incidence Share (%)	
\$0-500	508,524	14.96	5,431,611	16.37	9.4	2,292,890	22.16	48.1
\$500-1,499	574,177	16.89	6,079,381	18.32	8.4	2,179,249	21.06	24.7
\$1,500-2,999	514,758	15.15	4,651,112	14.01	-7.5	1,568,346	15.16	0.1
\$3,000-4,999	411,944	12.12	3,859,277	11.63	-4.1	1,207,188	11.67	-3.7
\$5,000-9,999	575,606	16.94	5,650,879	17.03	0.5	1,556,423	15.04	-11.2
\$10,000-19,999	442,200	13.01	4,329,840	13.05	0.3	886,654	8.57	-34.1
\$20,000-34,999	202,504	5.96	1,759,857	5.30	-11.0	309,127	2.99	-49.9
\$35,000+	169,082	4.97	1,427,653	4.30	-13.5	348,110	3.36	-32.4
<b>Total</b>	<b>3,398,795</b>	<b>100.00</b>	<b>33,189,609</b>	<b>100.00</b>		<b>10,347,988</b>	<b>100.00</b>	

Notes: Tabulations use REWEIGHT1 (first-step re-weights based on WGT90GEO) household weights. Per-owner improvement spending is tabulated only for homeowners undertaking projects. See Table 1 for the list of metro areas that are included in the Metro Oversample file.

- B. **In the Metro File:** Calculate the weighted frequency distribution of spending by spending level categories and home value quartiles individually for each metro area (except Louisville and Richmond, which are not identifiable in the National File). Home value was chosen because it is historically a strong driver of remodeling spending, but also varies significantly across metro areas. Calculate the simple average of the frequency spending distributions for each spending level category. Adjust the simple average spending distributions by adjustment factors from step 2, part A. Proportionally redistribute the share of owners with projects by spending categories to equal 100 percent.
- C. **In the National File:** Apply the adjusted and re-distributed Metro File spending distributions to total number of owners with projects by per-owner spending categories, home value quartiles and metro/non-metro areas in the National File. Calculate the ratio of second-step re-weighted number of owners with projects by spending distribution to the first-step re-weighted number of owners with projects (**Appendix D**). Apply this ratio to the first-step re-weights (REWEIGHT1) to produce the final homeowner household weight to be used with the 2013 AHS remodeling module (REWEIGHT2).

### **Impact of the Re-Weighting Methodology**

The two-step re-weighting of homeowner households in the 2013 national AHS results in an increase of 5.9 million owners undertaking projects to 43.5 million and an increase in project incidence share from 49.7 to 57.6 percent (**Figure 5**). Average improvement spending by homeowners with projects increases 9.7 percent to \$8,767 and the total two year home improvement market size increases by \$80.9 billion or 26.9 percent. Whereas the original-weighted national AHS estimates that total two-year home improvement spending declined by 16.1 percent from 2010-11 to 2012-13, the JCHS re-weighted data estimates healthy market growth of 6.5 percent between the two survey periods.

## Figure 5: JCHS-Adjusted Household Weights Produce More Remodeling Activity in 2013

	Unadjusted 2013 AHS	JCHS Re- Weighted 2013 AHS	Percent Difference
Improvement Project Incidence (Mil.)	37.6	43.5	<b>15.7</b>
Project Incidence Share (%)	49.7	57.6	<b>7.8*</b>
Mean Improvement Spending (\$)	7,996	8,767	<b>9.7</b>
Total Two Year Improvement Spending (\$Bil.)	300.8	381.7	<b>26.9</b>

Notes: Project incidence is measured as the number of homeowners who undertook one or more home improvement projects during the reference period. Mean improvement spending is calculated only for homeowners undertaking projects. \*Percentage point difference.  
Source: JCHS tabulations of HUD, American Housing Survey.



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## **Appendix A: Metropolitan Areas Included in the 2013 AHS Metropolitan File By Region**

### **NORTHEAST**

Boston-Cambridge-Quincy, MA-NH  
Hartford-West Hartford-East Hartford, CT  
Rochester, NY

### **MIDWEST**

Minneapolis-St. Paul-Bloomington, MN-WI

### **SOUTH**

Austin-Round Rock, TX  
Baltimore-Towson, MD  
Houston-Sugar Land-Baytown, TX  
Jacksonville, FL  
Louisville-Jefferson County, KY-IN  
Miami-Fort Lauderdale-Miami Beach, FL  
Oklahoma City, OK  
Orlando-Kissimmee, FL  
Richmond, VA  
San Antonio, TX  
Tampa-St. Petersburg-Clearwater, FL  
Nashville-Davidson--Murfreesboro--Franklin, TN  
Washington-Arlington-Alexandria, DC-VA-MD-WV

### **WEST**

Las Vegas-Paradise, NV  
Seattle-Tacoma-Bellevue, WA  
Tucson, AZ

Note: Metropolitan boundaries match 2003 OMB metropolitan area definitions.

## Appendix B: Re-Weighting Variable Categories

### Used in Step 1:

<b>Householder Age</b> <i>Based on AHS Variable: HHAGE</i>	
Under 30	
30-34	
35-39	
40-44	
45-49	
50-54	
55-59	
60-64	
65+	
<b>Household Income Quartiles</b> <i>Based on AHS Variable: ZINC2</i>	
Bottom	
Lower	
Upper	
Top	
<b>Mobility Status</b> <i>Based on AHS Variable: HHMOVE</i>	
Recent Mover:	Moved to current home in 2011, 2012 or 2013
Non-Recent Mover:	Moved to current home before 2011
<b>Metro Status</b> <i>Based on AHS Variable: METRO3</i>	
Metro:	Central city of MSA
	Inside MSA, but not in central city - urban
	Inside MSA, but not in central city - rural
NonMetro:	Outside MSA, urban
	Outside MSA, rural

**Used in Step 2:**

<p><b>Per-Owner Home Improvement Spending, 2012-13</b> <i>Based on AHS Variable: RAD</i></p> <p>\$0-499 \$500-1,499 \$1,500-2,999 \$3,000-4,999 \$5,000-9,999 \$10,000-19,999 \$20,000-34,999 \$35,000+</p> <p><b>Home Value Quartiles</b> <i>Based on AHS Variable: VALUE</i></p> <p>Bottom Lower Upper Top</p>
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Appendix C: Calculation of First-Step Re-Weighting Ratios for Homeowners with and without Home Improvement Projects by Metro/Non-Metro Status, Recent/Non-Recent Mover Status, Household Income Quartiles, and Householder Age Categories

UNITS IN METRO AREAS														UNITS IN METRO AREAS													
(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)						
Age of Householder	Bottom Income Quartile / Recent Movers		Adjusted Metro Doer Share: Metro Areas		Re-Weighted Doers (G)/(E)	Re-Weighted NonDoers (H)/(I)	Ratio for Doer Weights (J)/(C)	Ratio for NonDoer Weights (K)/(D)	Age of Householder	Bottom Income Quartile / Non-Recent Movers		Adjusted Metro Doer Share: Metro Areas		Re-Weighted Doers (G)/(E)	Re-Weighted NonDoers (H)/(I)	Ratio for Doer Weights (J)/(C)	Ratio for NonDoer Weights (K)/(D)										
	Owners	Doers	NonDoers (B)/(C)	Doer Share (C)/(B)	Metro Doer Share	Metro Doer Share	Doers	NonDoers		Owners	Doers	NonDoers (B)/(C)	Doer Share (C)/(B)	Metro Doer Share	Metro Doer Share	Doers	NonDoers										
<b>Bottom Income Quartile / Recent Movers</b>														<b>Bottom Income Quartile / Non-Recent Movers</b>													
Under 30	282,883	140,939	141,744	0.4988	0.4259	0.4296	121,435	161,248	0.861615730	1.137597864	Under 30	344,486	157,853	186,813	0.4577	0.4941	0.4984	171,889	172,777	1.089028882	0.924867611						
30-34	196,385	107,032	89,353	0.5450	0.4937	0.4980	97,803	99,589	0.913767844	1.103293517	30-34	376,800	178,376	198,424	0.4734	0.5337	0.5363	202,842	173,959	1.137163089	0.876695739						
35-39	133,080	70,350	62,732	0.5200	0.4711	0.4207	55,980	77,100	0.785703076	1.228024103	35-39	422,400	191,850	230,750	0.4537	0.5320	0.5375	227,020	195,362	1.194539037	0.846724434						
40-44	123,077	42,281	80,786	0.3436	0.5725	0.5775	71,977	52,000	1.680884887	0.843669385	40-44	541,170	221,845	319,526	0.4088	0.4882	0.4733	256,145	285,026	1.155654494	0.892027483						
45-49	127,585	43,703	83,882	0.3425	0.5542	0.5580	71,327	56,268	1.832077449	0.870719383	45-49	747,768	324,434	418,334	0.4368	0.5168	0.5212	387,188	355,602	1.193525732	0.850243808						
50-54	92,725	45,516	47,210	0.4909	0.5324	0.5370	49,782	42,933	1.093950152	0.909420448	50-54	907,397	421,634	485,763	0.4647	0.5374	0.5420	491,820	415,577	1.166482574	0.855513394						
55-59	115,878	54,221	81,357	0.4691	0.5123	0.5167	59,719	55,859	1.014015161	0.910391733	55-59	1,098,956	478,923	620,033	0.4358	0.5369	0.5408	594,069	504,887	1.240425842	0.814291242						
60-64	131,974	43,680	89,294	0.3310	0.5040	0.5083	67,098	64,898	1.535853119	0.734905992	60-64	1,418,873	562,797	856,876	0.3967	0.5261	0.5307	752,902	665,772	1.337785271	0.777898071						
65+	269,180	94,221	174,959	0.3500	0.3985	0.3989	107,847	181,533	1.142492583	0.923262814	65+	6,785,101	2,733,145	4,051,958	0.4028	0.4848	0.4890	3,317,708	3,467,393	1.213879078	0.865739223						
<b>Total</b>	<b>1,472,286</b>	<b>641,959</b>	<b>830,327</b>	<b>0.4360</b>	<b>0.4724</b>	<b>0.4765</b>	<b>701,597</b>	<b>770,889</b>	<b>1.092699523</b>	<b>0.928175827</b>	<b>Total</b>	<b>12,837,740</b>	<b>5,270,266</b>	<b>7,387,475</b>	<b>0.4170</b>	<b>0.5031</b>	<b>0.5074</b>	<b>6,412,931</b>	<b>6,224,809</b>	<b>1.216813731</b>	<b>0.844903986</b>						
<b>Lower Income Quartile / Recent Movers</b>														<b>Lower Income Quartile / Non-Recent Movers</b>													
Under 30	491,765	263,360	228,405	0.5355	0.5416	0.5463	268,628	223,137	1.020004756	0.978933778	Under 30	468,135	230,896	237,239	0.4932	0.5500	0.5547	259,687	208,448	1.124691976	0.878641786						
30-34	342,080	171,821	170,259	0.5023	0.5205	0.5251	179,609	162,470	1.045326465	0.954267513	30-34	719,527	342,895	376,832	0.4763	0.5668	0.5707	410,650	308,877	1.198298052	0.819666088						
35-39	205,736	117,982	87,755	0.5735	0.5647	0.5696	117,180	88,557	0.893203794	1.009137180	35-39	757,941	401,367	356,573	0.5295	0.5456	0.5503	417,115	340,826	1.039235355	0.956535753						
40-44	181,389	88,693	72,897	0.5498	0.5581	0.5630	90,859	70,531	1.024419125	0.970207815	40-44	1,026,177	482,110	544,550	0.4699	0.4924	0.4965	499,205	526,892	1.035608889	0.988446890						
45-49	160,103	67,285	82,808	0.4203	0.4548	0.4548	82,825	87,278	1.082178756	0.840411773	45-49	1,136,553	537,412	598,141	0.4728	0.5214	0.5258	587,701	538,851	1.112185370	0.888378481						
50-54	101,352	56,187	45,155	0.5545	0.3823	0.3856	38,082	62,278	0.695438838	1.379041773	50-54	1,406,100	650,508	754,592	0.4630	0.5548	0.5596	786,275	818,825	1.208708803	0.820078091						
55-59	118,028	65,892	52,136	0.5583	0.5238	0.5283	62,358	55,870	0.949362923	1.067798972	55-59	1,432,052	715,825	716,126	0.4999	0.5729	0.5778	827,554	604,487	1.155823010	0.844120936						
60-64	80,338	44,780	36,158	0.5533	0.6334	0.6389	51,710	29,228	1.154745737	0.808353238	60-64	1,417,529	698,063	721,466	0.4910	0.5723	0.5772	818,256	599,272	1.175549846	0.830631429						
65+	161,265	87,778	73,487	0.5443	0.4809	0.4851	78,225	83,040	0.891166837	1.128989420	65+	3,923,230	2,028,452	1,894,778	0.5170	0.5677	0.5726	2,246,420	1,676,810	1.107455558	0.894963634						
<b>Total</b>	<b>1,822,857</b>	<b>963,798</b>	<b>858,858</b>	<b>0.5288</b>	<b>0.5164</b>	<b>0.5208</b>	<b>948,385</b>	<b>873,262</b>	<b>0.985055404</b>	<b>1.016770606</b>	<b>Total</b>	<b>12,286,241</b>	<b>6,085,435</b>	<b>6,200,806</b>	<b>0.4853</b>	<b>0.5528</b>	<b>0.5576</b>	<b>6,850,588</b>	<b>5,435,653</b>	<b>1.125735185</b>	<b>0.878604224</b>						
<b>Upper Income Quartile / Recent Movers</b>														<b>Upper Income Quartile / Non-Recent Movers</b>													
Under 30	378,552	191,556	188,996	0.5060	0.5481	0.5528	209,273	169,279	1.092485361	0.905258943	Under 30	363,011	219,835	143,378	0.6050	0.6940	0.7000	254,105	108,906	1.156940001	0.759586089						
30-34	380,102	200,782	179,320	0.5282	0.4567	0.4606	175,078	205,024	0.871981138	1.143341121	30-34	930,169	541,104	389,065	0.5817	0.6406	0.6461	601,010	329,159	1.110711776	0.846024358						
35-39	254,107	152,449	101,858	0.5999	0.5774	0.5825	148,005	106,102	0.970849479	1.043715015	35-39	1,012,784	539,187	473,817	0.5324	0.6320	0.6375	645,838	387,148	1.197472488	0.775196847						
40-44	187,359	110,234	77,125	0.5884	0.6127	0.6180	115,795	71,564	1.050462626	0.927897397	40-44	1,512,528	757,846	754,682	0.5010	0.6037	0.6089	821,041	591,487	1.215341653	0.775557557						
45-49	179,906	88,986	90,919	0.4946	0.3659	0.3690	66,390	113,516	0.748070285	1.248529846	45-49	1,516,076	788,412	747,064	0.5068	0.6441	0.6497	984,966	531,110	1.281820213	0.710359171						
50-54	118,894	71,321	47,574	0.5989	0.5882	0.6034	71,737	47,157	1.005836948	0.881249455	50-54	1,661,385	854,824	806,560	0.5145	0.5954	0.6005	897,708	663,676	1.167150573	0.822847315						
55-59	105,155	58,912	46,243	0.5602	0.4374	0.4374	45,995	59,160	0.780751104	1.279311404	55-59	1,558,899	845,324	713,575	0.5423	0.6129	0.6182	963,744	595,155	1.140087476	0.834047672						
60-64	108,541	57,954	48,587	0.5440	0.5281	0.5327	56,757	49,784	0.979345909	1.024635929	60-64	1,349,489	715,768	693,721	0.5304	0.6400	0.6455	871,110	476,380	1.210271147	0.754874374						
65+	124,972	80,536	64,436	0.4844	0.4533	0.4572	57,139	87,893	0.943877139	1.052726228	65+	2,371,839	1,244,470	1,127,369	0.5247	0.6582	0.6639	1,574,588	797,250	1.265268750	0.707177879						
<b>Total</b>	<b>1,835,587</b>	<b>992,730</b>	<b>842,857</b>	<b>0.5408</b>	<b>0.5187</b>	<b>0.5232</b>	<b>960,399</b>	<b>875,189</b>	<b>0.967432167</b>	<b>1.038358899</b>	<b>Total</b>	<b>12,276,181</b>	<b>6,486,551</b>	<b>5,789,630</b>	<b>0.5284</b>	<b>0.6300</b>	<b>0.6354</b>	<b>7,800,417</b>	<b>4,475,764</b>	<b>1.202552333</b>	<b>0.773065644</b>						
<b>Top Income Quartile / Recent Movers</b>														<b>Top Income Quartile / Non-Recent Movers</b>													
Under 30	204,823	111,835	92,789	0.5485	0.6864	0.6924	141,871	82,852	1.266793800	0.878443754	Under 30	186,960	89,596	97,384	0.4792	0.5876	0.5725	107,044	79,916	1.194737144	0.820798974						
30-34	376,828	218,374	158,455	0.5795	0.5966	0.6018	226,777	150,051	1.038483884	0.946984355	30-34	717,821	456,321	281,500	0.6357	0.6461	0.6517	467,793	250,028	1.025140108	0.956130087						
35-39	353,846	219,633	134,014	0.6711	0.6500	0.6637	234,729	118,817	1.068973505	0.897350345	35-39	1,104,694	636,738	467,956	0.5764	0.6566	0.6623	731,827	373,086	1.149024174	0.797258086						
40-44	271,486	152,856	118,929	0.5623	0.6382	0.6438	174,768	86,716	1.144849612	0.819815177	40-44	1,527,828	825,631	692,086	0.6059	0.6887	0.6947	1,081,248	466,380	1.146638240	0.774593528						
45-49	227,148	127,857	98,481	0.5620	0.6193	0.6247	141,901	85,247	1.11572852	0.856839482	45-49	1,835,603	1,072,139	783,464	0.5841	0.6861	0.6921	1,270,360	565,243	1.194883137	0.740386851						
50-54	200,383	116,177	84,206	0.5798	0.6180	0.6214	124,509	75,874	1.071723691	0.901045283	50-54	2,118,733	1,255,810	892,923	0.5927	0.6804	0.6861	1,411,394	707,340	1.23891219	0.819701471						
55-59	102,977	81,884	41,313	0.5988	0.8207	0.8281	84,475	38,501	1.045594090	0.931945549	55-59	1,758,897	1,027,481	731,216	0.5842	0.7023	0.7083	1,245,770	512,927	1.212451183	0.701470801						
60-64	103,326	57,719	45,807	0.5586	0.5898	0.5899	60,844	42,482	1.054143566	0.931476842	60-64	1,389,348	833,684	565,663	0.5958	0.6768	0.6817	953,881	445,467	1.144174677	0.787512850						
65+	104,372	81,539	22,833	0.7812	0.5521	0.5589	58,125	46,247	0.712844876	2.025473023	65+	1,518,793	829,559	687,234	0.5489	0.6708	0.6764	1,025,950	490,842	1.236742145	0.714226847						
<b>Total</b>	<b>1,844,789</b>	<b>1,147,254</b>	<b>787,535</b>	<b>0.6889</b>	<b>0.6258</b>	<b>0.6313</b>	<b>1,227,764</b>	<b>717,024</b>	<b>1.070176847</b>	<b>0.898050615</b>	<b>Total</b>	<b>12,166,275</b>	<b>7,126,860</b>	<b>5,039,415</b>	<b>0.5858</b>	<b>0.6749</b>	<b>0.6808</b>	<b>8,282,761</b>	<b>3,883,514</b>								

Appendix C (cont.): Calculation of First-Step Re-Weighting Ratios for Homeowners with and without Home Improvement Projects by Metro/Non-Metro Status, Recent/Non-Recent Mover Status, Household Income Quartiles, and Householder Age Categories

UNITS IN NON-METRO AREAS																					
(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)
Age of Householder	Owners	Deers	NonDeers (B)/(C)	Deer Share (C)/(B)	Metro Deer Share	Adjusted Metro Deer Share: NonMetro Areas	Re-Weighted Deers (G)/(B)	Re-Weighted NonDeers (H)/(I)	Ratio for Deer Weights (J)/(C)	Ratio for NonDeer Weights (I)/(D)	Age of Householder	Owners	Deers	NonDeers (B)/(C)	Deer Share (C)/(B)	Metro Deer Share	Adjusted Metro Deer Share: NonMetro Areas	Re-Weighted Deers (G)/(B)	Re-Weighted NonDeers (H)/(I)	Ratio for Deer Weights (J)/(C)	Ratio for NonDeer Weights (I)/(D)
<b>Bottom Income Quartile / Recent Movers</b>											<b>Bottom Income Quartile / Non-Recent Movers</b>										
Under 30	87,427	44,240	43,187	0.5060	0.4259	0.3914	34,218	53,209	0.773470877	1.232050878	Under 30	102,241	42,488	59,773	0.4154	0.4941	0.4541	46,429	55,812	1.093274098	0.933730424
30-34	60,326	28,294	32,032	0.4680	0.4937	0.4537	27,372	32,954	0.987423282	1.028754344	30-34	180,507	98,202	82,305	0.5440	0.5337	0.4905	88,534	91,973	0.901545232	1.117471941
35-39	24,890	16,486	8,494	0.6601	0.4171	0.3833	9,579	15,412	0.580653167	1.814368964	35-39	94,081	38,673	55,210	0.4181	0.5328	0.4897	46,466	49,425	1.171231798	0.876974079
40-44	33,196	9,469	23,728	0.2852	0.5725	0.5262	17,467	15,729	1.844701120	0.662920058	40-44	198,889	89,236	110,453	0.4441	0.4692	0.4312	85,893	113,007	0.971095959	1.023119340
45-49	23,489	15,778	7,711	0.6717	0.5542	0.5093	11,864	11,526	0.758212153	1.494778848	45-49	206,841	84,769	121,871	0.4102	0.5188	0.4749	88,136	108,505	1.157678805	0.890323474
50-54	38,163	22,591	15,572	0.5920	0.5324	0.4892	18,871	19,492	0.826489105	1.251718720	50-54	379,513	132,576	246,937	0.3493	0.5374	0.4938	187,415	192,099	1.413638863	0.777924866
55-59	21,801	13,775	7,825	0.6377	0.5123	0.4708	10,189	11,432	0.738203985	1.460038910	55-59	471,887	143,916	327,751	0.3051	0.5359	0.4925	232,306	239,381	1.814173383	0.730315033
60-64	34,726	18,331	18,395	0.4703	0.5040	0.4631	18,083	18,843	0.984839377	1.013458959	60-64	484,350	182,844	281,707	0.3933	0.5261	0.4835	224,527	239,823	1.229318811	0.851321705
65+	89,548	39,928	49,623	0.4459	0.3985	0.3644	32,828	56,921	0.817204862	1.147075898	65+	2,288,909	809,488	1,479,441	0.3538	0.4848	0.4455	1,019,713	1,289,195	1.259733106	0.857688535
Total	413,466	206,898	206,567	0.5004	0.4724	0.4342	178,516	233,850	0.867848820	1.132584547	Total	4,387,408	1,621,953	2,765,456	0.3687	0.5031	0.4623	2,028,444	2,358,965	1.250618458	0.853011128
<b>Lower Income Quartile / Recent Movers</b>											<b>Lower Income Quartile / Non-Recent Movers</b>										
Under 30	142,274	80,686	61,588	0.5671	0.5418	0.4977	70,809	71,465	0.877583089	1.150378178	Under 30	170,541	90,349	80,193	0.5298	0.5500	0.5054	86,184	84,349	0.954012819	1.051811352
30-34	45,780	23,872	21,888	0.5217	0.5705	0.4784	21,891	23,870	0.918985151	1.090541336	30-34	207,295	114,334	92,381	0.5518	0.5858	0.5200	107,791	99,504	0.942787414	1.070381107
35-39	37,731	17,231	20,500	0.4567	0.5847	0.5189	18,580	18,151	1.136328542	0.885413283	35-39	167,790	88,782	79,008	0.5281	0.5456	0.5014	84,131	83,858	0.847610142	1.058870938
40-44	37,285	22,778	14,517	0.6108	0.5581	0.5129	19,129	19,165	0.839833891	1.251308753	40-44	279,982	115,445	164,517	0.4124	0.4824	0.4433	124,106	155,856	0.75019783	0.947356705
45-49	34,749	22,347	12,402	0.6431	0.4510	0.4144	14,401	20,348	0.844425066	1.640706158	45-49	240,528	105,156	135,381	0.4372	0.5214	0.4781	115,251	125,288	0.98000336	0.925432730
50-54	28,465	9,038	17,427	0.3415	0.3823	0.3513	9,298	17,187	1.028722269	0.985078813	50-54	389,098	154,705	214,391	0.4191	0.5548	0.5098	188,180	180,915	1.218380564	0.843858984
55-59	45,996	19,778	26,218	0.4300	0.5238	0.4814	22,141	23,855	1.119459878	0.909881825	55-59	410,037	174,112	231,925	0.4344	0.5729	0.5265	215,888	194,149	1.21090160	0.837120279
60-64	41,032	8,144	34,888	0.1987	0.8334	0.5821	23,884	17,148	3.887271193	0.491515129	60-64	529,779	228,444	300,334	0.4331	0.5723	0.5259	278,825	251,154	1.214348309	0.838247481
65+	84,533	64,508	30,025	0.6624	0.4809	0.4420	41,778	52,754	0.847649894	1.757030827	65+	1,920,085	809,488	1,037,201	0.4588	0.5677	0.5217	1,001,895	918,390	1.134571148	0.857688535
Total	505,835	268,383	238,452	0.5266	0.5164	0.4746	240,058	285,776	0.801181431	1.108932517	Total	4,285,122	1,859,212	2,335,910	0.4561	0.5528	0.5080	2,181,887	2,113,136	1.113706065	0.804630602
<b>Upper Income Quartile / Recent Movers</b>											<b>Upper Income Quartile / Non-Recent Movers</b>										
Under 30	111,754	84,093	26,781	0.7605	0.5481	0.5037	58,288	55,466	0.682268477	2.072658958	Under 30	161,793	80,911	80,882	0.5001	0.6940	0.6378	103,186	88,807	1.275304526	0.724598112
30-34	104,645	42,386	62,249	0.4051	0.4567	0.4197	43,916	60,730	0.358330664	0.755947898	30-34	254,801	104,047	150,755	0.4083	0.6406	0.5887	148,989	104,802	1.441654303	0.885182253
35-39	52,033	30,313	21,720	0.5826	0.5774	0.5307	27,813	24,420	0.910902738	1.124350614	35-39	317,053	164,170	152,883	0.5178	0.6320	0.5808	194,150	132,903	1.121700690	0.869313864
40-44	30,823	13,778	17,145	0.4456	0.6127	0.5631	17,413	13,510	1.283782778	0.788009400	40-44	375,486	186,894	178,792	0.5238	0.6037	0.5548	208,323	167,163	1.058122754	0.934857507
45-49	34,084	13,435	20,649	0.3942	0.3659	0.3362	11,460	22,824	0.852967768	1.095686487	45-49	421,357	190,776	230,581	0.4528	0.6441	0.5919	248,412	171,845	1.307354948	0.745702449
50-54	88,020	16,531	72,489	0.1857	0.5882	0.5497	48,837	40,083	2.960259022	0.552955344	50-54	507,793	239,410	268,383	0.4715	0.5954	0.5471	277,835	229,857	1.160502197	0.858824847
55-59	19,342	13,779	8,162	0.6910	0.4336	0.3885	7,947	11,994	0.578747109	1.948411779	55-59	515,492	244,854	270,838	0.4750	0.6129	0.5633	290,358	225,134	1.185839528	0.831865518
60-64	56,049	21,428	34,821	0.3823	0.5281	0.4854	27,204	28,045	1.269588164	0.833147560	60-64	481,531	205,082	276,469	0.4259	0.6400	0.5881	263,201	198,330	1.381055414	0.717365403
65+	50,098	23,322	26,774	0.4655	0.4533	0.4186	20,888	29,228	0.894803598	1.091831203	65+	1,220,418	613,784	608,835	0.5029	0.6582	0.6049	338,173	482,245	1.202680279	0.794951393
Total	548,546	259,976	288,589	0.4739	0.5187	0.4767	261,491	297,055	1.005827150	0.994750235	Total	4,255,724	2,039,707	2,216,017	0.4793	0.6300	0.5789	2,463,745	1,791,979	1.207891430	0.808648740
<b>Top Income Quartile / Recent Movers</b>											<b>Top Income Quartile / Non-Recent Movers</b>										
Under 30	75,458	53,888	21,772	0.7115	0.8864	0.8308	47,599	27,859	0.888818864	1.279583182	Under 30	105,274	88,215	37,059	0.8480	0.5876	0.5217	54,916	50,358	0.805052089	1.358838858
30-34	60,349	31,981	28,358	0.5301	0.5866	0.5483	33,090	27,250	0.34343180	0.981256776	30-34	286,818	170,252	120,386	0.5958	0.6481	0.6038	172,555	118,063	1.013529538	0.980883173
35-39	100,811	60,375	40,436	0.5989	0.6580	0.6047	60,964	39,847	1.009751130	0.985403933	35-39	336,722	186,129	150,593	0.5528	0.6566	0.6034	203,183	133,539	0.916123523	0.886755542
40-44	62,843	22,985	39,858	0.3669	0.6382	0.5865	36,742	25,902	1.598485548	0.653123836	40-44	446,910	234,651	212,259	0.5251	0.6887	0.6329	282,870	164,040	1.205494100	0.772828055
45-49	47,117	25,537	21,580	0.5420	0.6193	0.5692	26,818	20,289	1.050133862	0.940671590	45-49	610,781	273,522	337,258	0.4478	0.6861	0.6305	385,125	225,856	1.408021170	0.869089144
50-54	44,444	19,127	25,317	0.4304	0.6180	0.5661	25,161	19,283	1.315455159	0.761674754	50-54	713,577	381,803	331,774	0.5351	0.6604	0.6069	433,092	280,485	1.134333306	0.845409915
55-59	55,502	25,317	30,185	0.4561	0.6207	0.5705	31,881	23,840	1.250600425	0.789813254	55-59	818,925	342,221	274,704	0.5547	0.7023	0.6454	398,151	218,775	1.163431388	0.796400678
60-64	20,870	10,962	9,908	0.5253	0.5838	0.5385	11,197	9,673	0.21425646	0.976294663	60-64	481,662	261,420	220,241	0.5427	0.6758	0.6211	298,143	182,516	1.144297794	0.828722741
65+	39,149	26,104	12,985	0.6888	0.5521	0.5074	19,884	19,285	0.758841331	1.487424029	65+	693,804	355,134	338,471	0.5120	0.6706	0.6163	427,444	288,160	1.203815683	0.788380235
Total	506,343	276,165	230,178	0.5454	0.6258	0.5752	291,243	215,100	1.054597319	0.934448475	Total	4,296,073	2,273,346	2,022,727	0.5292	0.6749	0.6203	2,864,752	1,631,320	1.172171919	0.808495876
<b>Total Recent Movers</b>	<b>1,974,190</b>	<b>1,009,423</b>	<b>958,407</b>	<b>0.5101</b>	<b>0.5385</b>	<b>0.4949</b>	<b>960,783</b>	<b>995,494</b>	<b>0.982834193</b>	<b>1.038698094</b>	<b>Total Non-Movers</b>	<b>17,234,328</b>	<b>7,894,218</b>	<b>9,227,851</b>	<b>0.4585</b>	<b>0.5892</b>	<b>0.5415</b>	<b>9,156,896</b>	<b>7,883,113</b>	<b>1.172133974</b>	<b>0.854273997</b>

Notes: Deers are homeowners who undertook one or more home improvement projects and deer share is project incidence share. Columns B and C are tabulated from the 2013 National AHS using WGT90GEO household weights. Column F is tabulated from the 2013 Metro Oversample AHS. Columns J and K are the first-step re-weighting ratios to be applied to WGT90GEO for homeowner households in the National AHS.

Appendix D: Calculation of Second-Step Re-Weighting Ratios for Homeowners with Home Improvement Projects by Metro/Non-Metro Status, Home Value Quartiles and Per-Owner Improvement Spending Level Categories

UNITS IN METRO AREAS							
(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
Per-Owner Improvement Spending, 2012-2013	1st Step Re-Weighted Doers	Doer Distribution	Metro Doer Distribution	Adjusted Metro Doer Dist: Metro Areas	Adjusted Metro Doer Dist: ReDist = 100%	2nd Step Re-Weighted Doers	Ratio for Doer Weights2 (G)/(B)
<b>Bottom Home Value Quartile</b>							
\$0-500	1,711,225	22.95%	19.72%	21.57%	21.29%	1,587,620	0.927768302
\$500-1,499	1,656,693	22.22%	19.75%	21.42%	21.14%	1,576,566	0.951634819
\$1,500-2,999	1,154,903	15.49%	14.63%	13.53%	13.36%	996,231	0.862610242
\$3,000-4,999	913,222	12.25%	14.49%	13.90%	13.72%	1,022,989	1.120198541
\$5,000-9,999	1,170,079	15.69%	16.20%	16.28%	16.08%	1,198,608	1.024382525
\$10,000-19,999	589,263	7.90%	9.78%	9.81%	9.69%	722,185	1.225574092
\$20,000-34,999	183,815	2.47%	3.26%	2.90%	2.87%	213,784	1.163035076
\$35,000+	76,866	1.03%	2.17%	1.88%	1.85%	138,081	1.796381493
Total	7,456,066	100.00%	100.00%	101.29%	100.00%	7,456,066	1.000000000
<b>Lower Home Value Quartile</b>							
\$0-500	1,682,264	19.65%	14.43%	15.79%	15.72%	1,345,458	0.799790409
\$500-1,499	1,630,249	19.04%	17.95%	19.47%	19.38%	1,658,832	1.017533016
\$1,500-2,999	1,190,674	13.91%	13.30%	12.31%	12.25%	1,048,862	0.880897938
\$3,000-4,999	1,067,701	12.47%	13.24%	12.71%	12.65%	1,082,768	1.014111471
\$5,000-9,999	1,539,258	17.98%	19.70%	19.81%	19.72%	1,688,016	1.096643202
\$10,000-19,999	987,617	11.54%	12.75%	12.79%	12.73%	1,089,631	1.103292986
\$20,000-34,999	290,516	3.39%	5.96%	5.31%	5.28%	452,126	1.556286705
\$35,000+	172,949	2.02%	2.65%	2.29%	2.28%	195,533	1.130582385
Total	8,561,227	100.00%	100.00%	100.46%	100.00%	8,561,227	1.000000000
<b>Upper Home Value Quartile</b>							
\$0-500	1,165,176	13.56%	12.03%	13.16%	13.22%	1,135,397	0.974442507
\$500-1,499	1,563,646	18.20%	15.13%	16.41%	16.48%	1,415,413	0.905200606
\$1,500-2,999	1,213,890	14.13%	11.85%	10.96%	11.01%	945,574	0.778961606
\$3,000-4,999	1,008,725	11.74%	13.34%	12.79%	12.85%	1,103,529	1.093983655
\$5,000-9,999	1,520,829	17.70%	18.99%	19.09%	19.17%	1,646,592	1.082693743
\$10,000-19,999	1,296,779	15.09%	15.94%	15.98%	16.05%	1,378,510	1.063025672
\$20,000-34,999	476,101	5.54%	7.93%	7.06%	7.09%	608,831	1.278785708
\$35,000+	345,723	4.02%	4.79%	4.14%	4.16%	357,024	1.032687029
Total	8,590,869	100.00%	100.00%	99.60%	100.00%	8,590,869	1.000000000
<b>Top Home Value Quartile</b>							
\$0-500	872,946	10.17%	8.53%	9.33%	9.52%	817,060	0.935980070
\$500-1,499	1,228,793	14.32%	12.18%	13.21%	13.48%	1,156,822	0.941429103
\$1,500-2,999	1,091,645	12.72%	10.69%	9.89%	10.10%	866,433	0.793696121
\$3,000-4,999	869,629	10.13%	10.20%	9.79%	9.99%	857,028	0.985509105
\$5,000-9,999	1,420,713	16.56%	18.97%	19.07%	19.46%	1,670,295	1.175673298
\$10,000-19,999	1,456,181	16.97%	17.05%	17.09%	17.44%	1,496,916	1.027973904
\$20,000-34,999	809,424	9.43%	10.39%	9.25%	9.44%	810,051	1.000774328
\$35,000+	832,114	9.70%	11.98%	10.36%	10.57%	906,842	1.089804470
Total	8,581,447	100.00%	100.00%	98.00%	100.00%	8,581,447	1.000000000

UNITS IN NON-METRO AREAS							
(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
Per-Owner Improvement Spending, 2012-2013	1st Step Re-Weighted Doers	Doer Distribution	Metro Doer Distribution	Adjusted Metro Doer Dist: NonMetro Areas	Adjusted Metro Doer Dist: ReDist = 100%	2nd Step Re-Weighted Doers	Ratio for Doer Weights2 (G)/(B)
<b>Bottom Home Value Quartile</b>							
\$0-500	754,370	31.07%	19.72%	29.20%	27.46%	666,695	0.883776784
\$500-1,499	559,179	23.03%	19.75%	24.63%	23.16%	562,193	1.005391106
\$1,500-2,999	378,774	15.60%	14.63%	14.64%	13.76%	334,173	0.882249094
\$3,000-4,999	290,234	11.95%	14.49%	13.94%	13.11%	318,321	1.096775097
\$5,000-9,999	266,511	10.98%	16.20%	14.38%	13.53%	328,409	1.232250767
\$10,000-19,999	134,827	5.55%	9.78%	6.44%	6.06%	147,115	1.091140579
\$20,000-34,999	22,646	0.93%	3.26%	1.64%	1.54%	37,356	1.649555606
\$35,000+	21,214	0.87%	2.17%	1.47%	1.38%	33,493	1.578797656
Total	2,427,755	100.00%	100.00%	106.34%	100.00%	2,427,755	1.000000000
<b>Lower Home Value Quartile</b>							
\$0-500	657,205	24.89%	14.43%	21.38%	21.27%	561,691	0.854665945
\$500-1,499	542,375	20.54%	17.95%	22.38%	22.27%	588,061	1.084232574
\$1,500-2,999	423,247	16.03%	13.30%	13.31%	13.25%	349,764	0.826383739
\$3,000-4,999	270,687	10.25%	13.24%	12.75%	12.68%	334,947	1.237396193
\$5,000-9,999	464,029	17.57%	19.70%	17.50%	17.41%	459,791	0.990867431
\$10,000-19,999	185,882	7.04%	12.75%	8.40%	8.36%	220,665	1.187123956
\$20,000-34,999	46,813	1.77%	5.96%	2.99%	2.97%	78,540	1.677744249
\$35,000+	50,372	1.91%	2.65%	1.79%	1.79%	47,151	0.936046274
Total	2,640,610	100.00%	100.00%	100.49%	100.00%	2,640,610	1.000000000
<b>Upper Home Value Quartile</b>							
\$0-500	494,514	18.61%	12.03%	17.82%	18.57%	493,663	0.998278400
\$500-1,499	575,740	21.66%	15.13%	18.87%	19.66%	522,587	0.907678710
\$1,500-2,999	412,031	15.50%	11.85%	11.86%	12.36%	328,404	0.797036305
\$3,000-4,999	338,994	12.75%	13.34%	12.84%	13.38%	355,534	1.048790475
\$5,000-9,999	423,276	15.93%	18.99%	16.86%	17.57%	467,117	1.103574840
\$10,000-19,999	230,380	8.67%	15.94%	10.50%	10.94%	290,750	1.262046750
\$20,000-34,999	94,278	3.55%	7.93%	3.98%	4.14%	110,150	1.168357143
\$35,000+	88,655	3.34%	4.79%	3.24%	3.37%	89,664	1.011378349
Total	2,657,869	100.00%	100.00%	95.96%	100.00%	2,657,869	1.000000000
<b>Top Home Value Quartile</b>							
\$0-500	386,801	14.75%	8.53%	12.63%	14.08%	369,118	0.954283813
\$500-1,499	501,955	19.15%	12.18%	15.19%	16.93%	443,783	0.884109209
\$1,500-2,999	354,294	13.51%	10.69%	10.70%	11.93%	312,663	0.882497406
\$3,000-4,999	307,273	11.72%	10.20%	9.82%	10.94%	286,893	0.933676483
\$5,000-9,999	402,607	15.36%	18.97%	16.85%	18.78%	492,336	1.222870814
\$10,000-19,999	335,565	12.80%	17.05%	11.23%	12.51%	328,048	0.977596963
\$20,000-34,999	145,390	5.55%	10.39%	5.21%	5.81%	152,275	1.047353795
\$35,000+	187,868	7.17%	11.98%	8.10%	9.03%	236,637	1.259588950
Total	2,621,754	100.00%	100.00%	89.73%	100.00%	2,621,754	1.000000000

Notes: Doers are homeowners who undertook one or more home improvement projects. Column B is tabulated from the 2013 National AHS using the first-step re-weighting of households weights WGT90GEO (REWEIGHT1). Column D is tabulated from the 2013 Metro Oversample AHS. Column H is the second-step reweighting ratios to be applied to REWEIGHT1 in the 2013 National AHS for homeowner households with improvement projects.

## References

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