

**Joint Center for Housing Studies**  
**Harvard University**

**Method for Allocation:**  
**DIY & PRO Home Improvement Expenditures**  
**and Households Using the 1995-2001 AHS National File**

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## **Introduction**

Since 1995, the American Housing Survey (AHS) has provided detailed information on home improvement and remodeling projects undertaken by homeowners. The survey contains specific information on the estimated cost for each reported project as well as on the method of installation. Installation method in turn is divided into two groups: whether someone in the household completed the project (do-it-yourself) or whether the work was done by a professional contractor (hereafter DIY and PRO respectively).

Missing data have been an issue since the U.S. Census Bureau started gathering information on home improvements, making it difficult to draw assumptions on the volume of DIY or PRO segments of the market. In a small number of cases, the installation method for the project was not reported either as DIY or as PRO (hereafter *missing doer*), and in a greater number of observations (approximately 10% in AHS 2001) project expenditures were not reported (hereafter *missing dollars*). The number of not reported cases, either *missing doers* or *missing dollars*, varies from one survey to the next with the 1995 AHS having the greatest share of missing records. To analyze the trends over time in the DIY and PRO segments of the market for remodeling, a systematic method of allocation is required.

To overcome the existing limitations in the estimation of these two segments of the market, this paper describes a two-step allocation method for the missing data. First, a Maximum Likelihood Probability Model (MLP) is used for the allocation of *missing doers* (either DIY or PRO). The model predicts the odds of a project to be either DIY or not (hence PRO). Once all observations are identified as either DIY or PRO, the second step of the process enhances the estimation of expenditures for projects with unreported costs, i.e. *missing dollars*, using a factor. The allocation method results in a systematic imputation of data for all AHS surveys since 1995 allowing over time comparison of the DIY and PRO segments of the market.

This paper is divided in two sections. The first part describes the two-step allocation process, including the MLP model estimation for *missing doers* and the description of the imputing procedure for *missing dollars*. The second section will discuss the results of the allocated data by comparing it with data generated by alternative procedures. At the end of the paper, three appendices illustrate the process, discussing certain data issues.

To allow cross-time comparison, the proposed allocation method was applied to all AHS surveys containing home remodeling information to date (2001, 1999, 1997 and 1995). However,

for analytical purposes this paper describes the allocation method for only the 2001 AHS public use file for home improvements and repairs (*thomimp.txt*).<sup>1</sup>

## Two Step Allocation Process

### **Allocating Projects as DIY or PRO Using a Maximum Likelihood Probability Model**

Out of the 44,671<sup>2</sup> remodeling projects reported in AHS 2001, the vast majority of homeowners reported whether the job was completed by someone in the household (DIY) or by a professional contractor (PRO). In only a small number of cases (516), the installation method is not included, hence *missing doers*. To allocate these “non reported” cases or *missing doers* a Maximum Likelihood Probability Model (MLP) is used to predict the odds of a remodeling project to be undertaken by someone in the household (DIY) or else by a professional contractor (PRO).<sup>3</sup>

The probability of undergoing a DIY project was estimated as a function of certain socioeconomic factors of the household such as age, income, home value, recent mover status and the type of remodeling job. Thus:

$$P_{DIY}(1|0) = \int [\text{age, moving date, income, home value, type of project}] \quad [1.0]$$

Considering the socioeconomic characteristics of the household, the function should result in a set of values for the probabilities of *missing doers* to undergo a DIY or a PRO project. The function [1.0] is best estimated through a non-linear probability, or a logistic regression model:

$$P_{DIY}(1|0) = \frac{\exp(\Sigma\beta X)}{[1+\exp(\Sigma\beta X)]} \quad [1.1]$$

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<sup>1</sup> It should be noted that *thomimp.txt* is not a flat file. Most homeowners report several different remodeling projects, so as opposed to other AHS files (i.e. *newhouse.txt*), the level of analysis or the record level is the remodeling project and not the household.

<sup>2</sup> This is the total number of observations (or records) once the projects with multiple jobs, such as “other interior projects” and “other exterior projects” had been collapsed into two job categories. The original total number of jobs for AHS 2001 is 45,041. For further details see Appendix A.

<sup>3</sup> It should be noted that all remodeling projects are either DIY or PRO due to the design of the questionnaire; the data does not allow intermediate situations, i.e. BIY (Buy-it-Yourself).

where the probability of a project to be undertaken by a household member, or DIY ( $P_{DIY}(1|0)$ ), is equal to the exponential of the odds of the vector composed with socio-economic factors of the household and the type of remodeling project, ( $\Sigma\beta X$ ). Logistic regressions are widely used in the literature for discrete choice models. Unlike the simple regression model, this approach limits the predicted values from 0 to 1.

The model in equation [1.1] allows the estimation of the likelihood of a household to undergo a DIY project. The reported results from the model is a range of values from 0 to 1 and provides the estimation of the odds of a job to be undertaken by someone in the household ( $DIY = P_{DIY}$ ) or else by a professional contractor ( $PRO = (1 - P_{DIY})$ ).

The dependent variable is measured in dichotomous terms, where the fulfillment of the condition, i.e. the project was undertaken by someone in the household, is equal to one ( $DIY=1$ ) or else a contractor undertook the project ( $PRO=0$ ). The socioeconomic explanatory variables and the type of remodeling project included in the model are also measured in dichotomous terms. Table 1 includes a description of the battery of dummy variables used in the MLP model.

**Table 1. MLP Explanatory Variables from AHS 2001**

<b>Socioeconomic Variables</b>		
	Variable Name	Def. Condition=1
Household Age	age2	35-44 years
	age3	45-54 years
	age4	55-64 years
	age5	Over 65 years
Household Annual Income <sup>4</sup>	income2	\$25-\$44.8k
	income3	\$44.8-\$67k
	income4	\$67-\$100
	income5	Over \$100k
Reported Home Value	value2	\$68.5-\$100k
	value3	\$100-\$150k
	value4	\$150-\$225k
	value5	Over \$225k
Moving date	recmov2	Move After 2000
<b>Remodeling Variables<sup>5</sup></b>		
rs3	Kitchen addition or alteration	
rs4	Bathroom Remodel	
rs6	Bathroom Addition or Alteration	
rs7	Add/Alteration/Create Bedroom	
rs8	Add/Alteration/Create Other Interior Room	
rs9	Add/Replace Deck Porch	
rs10	Other Interior Improvement	
rs11	Disaster Required Repairs	
rs12	Roofing	
rs13	Siding	
rs14	Plumbing/Pipes	
rs15	Add/Replace Electrical System	
rs16	Window/Door Replacements	
rs17	Plumbing Fixtures	
rs18	Insulation	
rs19	Flooring/Paneling/Ceiling	
rs20	HVAC	
rs21	Appliances/Major Equipment	
rs22	Add/Replace Garage/Carport	
rs23	Other Exterior Improvements	

<sup>4</sup> To allow comparison over time, the thresholds for the household's annual income and reported home value dummy variables shown in Table 1 correspond to the weighted quintiles for those variables. Some changes on the thresholds for those dummy variables should be expected for the previous years (1995, 1997 & 1999).

<sup>5</sup> These 20 categories are the result of aggregating 44 different types of jobs as reported in AHS 2001 & 1999 (70 types in AHS 1997 & 1995). For further details on grouping these categories see Appendix B, Table 1.

As specified in equation [1.1], the probability of a DIY remodeling project depends on socioeconomic conditions of the household as well as on the type of project, all expressed in categorical terms. Age thresholds identify five age cohorts, while the reported home value and household income thresholds correspond roughly to the quintiles of the home value and income distribution for remodeling homeowners from AHS 2001. Note that subsequent surveys (1999, 1997 & 1995) contain different income and value thresholds. The 20 variables for project type correspond to a widely used classification of home improvement categories and allow cross-time comparison. The coefficients and results for the weighted logistic model are presented in Table 2.

**Table 2. Results and Coefficients from MLP Model**

			Number of obs	=	1.12E+08	
			LR chi2(33)	=	1.24E+07	
			Prob > chi2	=	0	
			Pseudo R2	=	0.0817	
diy	Coef.	Std. Err.	Z	P>z	[95% Confidence Interval].	
age2	-0.11147	0.000611	-182.47	0	-0.1126702	-0.11028
age3	-0.41606	0.000637	-653.34	0	-0.4173089	-0.41481
age4	-0.70379	0.000727	-968.2	0	-0.7052135	-0.70236
age5	-1.18498	0.000791	-1497.75	0	-1.186529	-1.18343
inc2	0.045628	0.000708	64.45	0	0.0442401	0.047015
inc3	0.126592	0.000728	173.98	0	0.1251658	0.128018
inc4	0.070226	0.000749	93.71	0	0.0687568	0.071694
inc5	-0.22619	0.000793	-285.18	0	-0.2277404	-0.22463
mov1	0.262982	0.000602	436.63	0	0.2618015	0.264163
valu2	-0.30065	0.000686	-438.27	0	-0.3019963	-0.29931
valu3	-0.39899	0.000662	-602.68	0	-0.4002883	-0.39769
valu4	-0.5272	0.000688	-766.87	0	-0.5285428	-0.52585
valu5	-0.92542	0.00073	-1267.25	0	-0.926853	-0.92399
rs3	-0.475	0.007332	-64.78	0	-0.4893705	-0.46063
rs4	0.14947	0.001466	101.97	0	0.146597	0.152343
rs6	-0.01005	0.002401	-4.18	0	-0.0147538	-0.00534
rs7	0.237583	0.002072	114.69	0	0.233523	0.241644
rs8	0.286091	0.001575	181.6	0	0.2830028	0.289178
rs9	0.254291	0.001824	139.39	0	0.2507153	0.257866
rs10	-0.21693	0.001966	-110.33	0	-0.2207806	-0.21307
rs11	-1.34145	0.002524	-531.57	0	-1.346395	-1.3365
rs12	-1.02968	0.001417	-726.62	0	-1.032453	-1.0269
rs13	-0.84569	0.001824	-463.61	0	-0.8492622	-0.84211
rs14	-0.20046	0.00161	-124.52	0	-0.2036175	-0.19731
rs15	-0.43092	0.001469	-293.37	0	-0.4337949	-0.42804
rs16	-0.28078	0.001291	-217.57	0	-0.2833114	-0.27825
rs17	0.244725	0.00133	184.05	0	0.2421186	0.247331
rs18	0.286449	0.001637	175	0	0.2832412	0.289658
rs19	-0.51764	0.001188	-435.66	0	-0.5199641	-0.51531
rs20	-1.66323	0.001496	-1111.53	0	-1.666166	-1.6603
rs21	-0.36565	0.00122	-299.62	0	-0.3680425	-0.36326
rs22	-0.03602	0.003279	-10.99	0	-0.0424502	-0.0296
rs23	-0.01772	0.001196	-14.81	0	-0.0200623	-0.01537
Constant	0.575641	0.001365	421.8	0	0.5729662	0.578316

The total number of reported jobs in the survey (44,155) represents an estimated weighted total number of cases of over 112 million remodeling projects (see Table 2). The variation of the socioeconomic factors and the type of remodeling job predicted approximately 8% (Mcfadden  $R^2$  of 0.0817) of the variation of the odd of undertaking a DIY project. All the coefficients for the function are statistically significant at the 95% confidence level.

The negative direction of some coefficients from the logit model gives the first idea of the characteristics of households undergoing DIY projects. The high negative coefficient among seniors confirms that older households are less likely than younger ones to complete their home improvements themselves. Likewise, the data also indicates that high-income households are less inclined to undertake DIY projects than lower income ones. The negative sign in the coefficients for certain home improvement projects also suggests that some projects are less likely to be undertaken by homeowners than others. The model shows that projects such as the installation or replacement of a heater, air conditioner or electrical system are unlikely to be completed by someone in the household while other improvement jobs such as remodeling a bathroom or adding a deck seem to be DIY oriented.

Having estimated equation [1.1] it is a simple matter to predict the odds that a given project will either be DIY or PRO. The distribution of the predicted probabilities is shown in Table 3.<sup>6</sup>

**Table 3. Predicted probabilities of DIY ( $P_{DIY}(1|0)$ )**

Percentiles	Smallest		
1%	0.083763	0.039241	
5%	0.144719	0.040652	
10%	0.19753	0.040652	Obs 44,155
25%	0.290305	0.040652	Sum of Wgt. 1.12E+08
50%	0.409974		Mean 0.409494
		Largest	Std. Dev. 0.159058
75%	0.529387	0.777588	
90%	0.620577	0.777588	
95%	0.668072	0.777588	
99%	0.734486	0.777588	

<sup>6</sup> The Stata command <predict> is capable of generating the predicted values  $P_{DIY}(1|0)$  for all cases.



On average, the predicted values from the model determine that the probability for someone in the household to undertake a do-it-yourself remodeling project is almost 41% (see Table 3). The odds of undergoing a DIY remodeling job, controlling for the type of project and socioeconomic characteristics of the homeowners, could range from less than 4% to over 77% (for the top 1% of the distribution).

**Table 4. Distribution of Predicted Probabilities  $P_{DIY}(1|0)$  for the Unallocated Observations**

Variable	N	Mean	sd	sd(mean)
$P_{DIY}(1 0)$	516	0.3793	0.1443	0.0063

The weighted average likelihood of a DIY for the sample of *missing doers* is slightly lower (37.3%) than the average odds for the entire data set (see Table 4). This suggests that there are more senior households reporting higher income and home values in the *missing doers* sample than in the rest of the data.

The allocation of *missing doers* as DIY or PRO is done randomly considering the predicted probabilities from equation [1.1]. For each of the 516 *missing doers*, a random number (range 0.0001 to 0.9999  $Random=(1|0)$ ) was generated and compared to the predicted probabilities from the MLP model ( $P_{DIY}$ ).<sup>7</sup> When the predicted probabilities for a DIY project are equal or greater than the random number ( $P_{DIY} \geq Random$ ), the *missing doer* will be imputed as DIY, otherwise the job will be considered PRO.<sup>8</sup> As a result, out of the 516 *missing doers*, 190 cases were imputed as DIY, while the remaining 326 cases were allocated as PRO. It should be noted that the share of DIY projects allocated (36.8%) lies within the 95% confidence interval.

### **Allocation of Remodeling Expenditures**

Once all projects had been allocated either as DIY or PRO the next step involves the allocation of the non-reported expenditures, or *missing dollars*. More than 10% of the projects in the 2001 AHS (4,434 cases) did not report a dollar amount. Allocating these *missing dollars* involves the estimation of a factor for the cost of the project through the combination of socioeconomic characteristics of the household. The estimated cost of a project with *missing*

<sup>7</sup> The Stata command `<uniform(>` allows the generation of a random four digit variable for values in the range from 0 to 1.

<sup>8</sup> Note that the random allocation changes from run to run, so repeating this process will give slightly different results each time.

*dollars* is the result of multiplying the average spending of each project (either DIY or PRO) by that factor. The factor is obtained from the ratio of the average spending on all DIY (or PRO) projects and the average expenditures on DIY (or PRO) for each household considering a clustered set of socioeconomic characteristics. The process can be observed more clearly through a matrix reporting the weighted average expenditures for DIY and PRO on Table 5.

**Table 5. Average DIY/PRO Remodeling Expenditures by Socioeconomic Characteristics**

Home Value	Household Income	Householder Age	DIY	PRO	DIY Ratio	PRO Ratio
\$1k-\$90k	\$0-\$30k	Under 35	\$ 450	\$ 939	0.3578	0.3127
\$1k-\$90k	\$0-\$30k	35-44	\$ 636	\$ 1,499	0.5060	0.4992
\$1k-\$90k	\$0-\$30k	45-54	\$ 580	\$ 1,462	0.4613	0.4870
\$1k-\$90k	\$0-\$30k	55-64	\$ 692	\$ 1,557	0.5506	0.5185
\$1k-\$90k	\$0-\$30k	Over 65	\$ 727	\$ 1,506	0.5787	0.5016
\$1k-\$90k	\$30-\$55k	Under 35	\$ 728	\$ 1,452	0.5791	0.4836
\$1k-\$90k	\$30-\$55k	35-44	\$ 754	\$ 1,636	0.5998	0.5450
\$1k-\$90k	\$30-\$55k	45-54	\$ 880	\$ 1,982	0.7002	0.6600
\$1k-\$90k	\$30-\$55k	55-64	\$ 706	\$ 1,627	0.5615	0.5418
\$1k-\$90k	\$30-\$55k	Over 65	\$ 1,050	\$ 1,906	0.8355	0.6348
\$1k-\$90k	\$55-\$90k	Under 35	\$ 678	\$ 2,149	0.5393	0.7156
\$1k-\$90k	\$55-\$90k	35-44	\$ 616	\$ 1,953	0.4903	0.6504
\$1k-\$90k	\$55-\$90k	45-54	\$ 708	\$ 1,922	0.5635	0.6402
\$1k-\$90k	\$55-\$90k	55-64	\$ 807	\$ 1,739	0.6422	0.5791
\$1k-\$90k	\$55-\$90k	Over 65	\$ 487	\$ 2,688	0.3877	0.8953
\$1k-\$90k	Over \$90k	Under 35	\$ 832	\$ 1,296	0.6619	0.4317
\$1k-\$90k	Over \$90k	35-44	\$ 1,013	\$ 2,327	0.8062	0.7749
\$1k-\$90k	Over \$90k	45-54	\$ 1,025	\$ 2,468	0.8156	0.8220
\$1k-\$90k	Over \$90k	55-64	\$ 940	\$ 2,351	0.7478	0.7829
\$1k-\$90k	Over \$90k	Over 65	\$ 784	\$ 1,701	0.6235	0.5664
\$90-\$165k	\$0-\$30k	Under 35	\$ 645	\$ 1,259	0.5134	0.4192
\$90-\$165k	\$0-\$30k	35-44	\$ 857	\$ 1,488	0.6816	0.4955
\$90-\$165k	\$0-\$30k	45-54	\$ 1,306	\$ 2,270	1.0392	0.7561
\$90-\$165k	\$0-\$30k	55-64	\$ 1,015	\$ 2,284	0.8076	0.7606
\$90-\$165k	\$0-\$30k	Over 65	\$ 946	\$ 2,247	0.7528	0.7483
\$90-\$165k	\$30-\$55k	Under 35	\$ 954	\$ 2,081	0.7587	0.6929
\$90-\$165k	\$30-\$55k	35-44	\$ 1,066	\$ 2,440	0.8483	0.8125
\$90-\$165k	\$30-\$55k	45-54	\$ 1,028	\$ 3,217	0.8180	1.0713
\$90-\$165k	\$30-\$55k	55-64	\$ 1,292	\$ 2,305	1.0276	0.7677
\$90-\$165k	\$30-\$55k	Over 65	\$ 977	\$ 2,479	0.7770	0.8257
\$90-\$165k	\$55-\$90k	Under 35	\$ 990	\$ 1,894	0.7876	0.6308
\$90-\$165k	\$55-\$90k	35-44	\$ 1,244	\$ 2,108	0.9898	0.7021
\$90-\$165k	\$55-\$90k	45-54	\$ 963	\$ 2,809	0.7659	0.9356
\$90-\$165k	\$55-\$90k	55-64	\$ 1,389	\$ 2,378	1.1046	0.7919

Home Value	Household Income	Householder Age	DIY	PRO	DIY Ratio	PRO Ratio
\$90-\$165k	\$55-\$90k	Over 65	\$ 781	\$ 2,886	0.6211	0.9613
\$90-\$165k	Over \$90k	Under 35	\$ 1,314	\$ 1,872	1.0451	0.6233
\$90-\$165k	Over \$90k	35-44	\$ 1,033	\$ 2,821	0.8214	0.9394
\$90-\$165k	Over \$90k	45-54	\$ 1,191	\$ 2,741	0.9473	0.9129
\$90-\$165k	Over \$90k	55-64	\$ 970	\$ 2,454	0.7717	0.8174
\$90-\$165k	Over \$90k	Over 65	\$ 1,265	\$ 2,511	1.0062	0.8362
Over \$165k	\$0-\$30k	Under 35	\$ 1,082	\$ 2,292	0.8609	0.7635
Over \$165k	\$0-\$30k	35-44	\$ 3,655	\$ 5,791	2.9081	1.9287
Over \$165k	\$0-\$30k	45-54	\$ 2,513	\$ 5,042	1.9993	1.6793
Over \$165k	\$0-\$30k	55-64	\$ 1,709	\$ 3,843	1.3593	1.2800
Over \$165k	\$0-\$30k	Over 65	\$ 1,546	\$ 2,949	1.2299	0.9821
Over \$165k	\$30-\$55k	Under 35	\$ 2,389	\$ 2,935	1.9004	0.9776
Over \$165k	\$30-\$55k	35-44	\$ 2,371	\$ 2,761	1.8859	0.9194
Over \$165k	\$30-\$55k	45-54	\$ 4,972	\$ 5,941	3.9556	1.9785
Over \$165k	\$30-\$55k	55-64	\$ 1,340	\$ 3,839	1.0659	1.2787
Over \$165k	\$30-\$55k	Over 65	\$ 1,189	\$ 2,675	0.9457	0.8909
Over \$165k	\$55-\$90k	Under 35	\$ 1,430	\$ 2,918	1.1377	0.9719
Over \$165k	\$55-\$90k	35-44	\$ 1,974	\$ 3,447	1.5706	1.1480
Over \$165k	\$55-\$90k	45-54	\$ 1,238	\$ 3,628	0.9851	1.2082
Over \$165k	\$55-\$90k	55-64	\$ 1,482	\$ 5,114	1.1787	1.7032
Over \$165k	\$55-\$90k	Over 65	\$ 1,370	\$ 3,917	1.0899	1.3047
Over \$165k	Over \$90k	Under 35	\$ 1,943	\$ 4,062	1.5455	1.3528
Over \$165k	Over \$90k	35-44	\$ 2,952	\$ 5,478	2.3481	1.8246
Over \$165k	Over \$90k	45-54	\$ 1,677	\$ 4,479	1.3341	1.4918
Over \$165k	Over \$90k	55-64	\$ 2,614	\$ 4,674	2.0794	1.5566
Over \$165k	Over \$90k	Over 65	\$ 3,257	\$ 4,405	2.5911	1.4671
Overall Average			\$ 1,257	\$ 3,003	1.0000	1.0000

All households were clustered into sixty socioeconomic characteristics considering a combination of (3) home value criteria, (4) household income characteristics<sup>9</sup> and (5) householder age cohorts (see Table 5). The first and second column of the table show the average DIY and PRO expenditures on remodeling for each group of households as well as the average overall expenditures in DIY and PRO. In 2001, the average household spending on a DIY and PRO was \$1,257 and \$3,003 respectively.<sup>10</sup> The factor, or DIY (or PRO) ratio, is the share of average expenditures for each socioeconomic cluster and the overall average spending on DIY (or PRO). For example, a young (under 35 years of age), low-income household (under

<sup>9</sup> Like some of the MLP model explanatory variables, the thresholds for home value and household income correspond roughly to the even division in thirds and quarters of the weighted distribution of owners in AHS 2001. Alternative thresholds apply to previous surveys.

<sup>10</sup> This average includes expenditures for all DIY and PRO projects reporting cost, including those that had been previously allocated using the MLP model.

\$30,000) living in an inexpensive home (under \$90,000) spent on average \$450 on DIY projects. The average expenditure from this type of homeowner represents approximately 35.7% of what an average DIY project would cost overall or, in other words, 64.3% less of what the average doer would spend in DIY.

**Table 6. Average Reported and Factorized Expenditures by DIY-PRO and Type of Project**

	Reported Cases <sup>11</sup>		Factorized Cases	
	Avg. DIY	Avg. PRO	Avg. DIY	Avg. PRO
Disaster required repairs	\$ 5,520	\$ 10,119	\$ 5,280	\$ 9,376
Created finished bathroom from unfinished space	\$ 5,028	\$ 17,497	\$ 5,563	\$ 18,434
Created finished bedroom from unfinished space	\$ 4,893	\$ 21,744	\$ 4,356	\$ 19,697
Created finished recreation room from unfinished space	\$ 3,005	\$ 14,041	\$ 3,317	\$ 14,528
Created other finished inside room from unfinished space	\$ 2,941	\$ 11,631	\$ 2,797	\$ 11,000
Added bathroom onto home	\$ 6,318	\$ 7,084	\$ 4,097	\$ 9,694
Added kitchen onto home	\$ 16,201	\$ 43,531	\$ 14,581	\$ 73,225
Added bedroom onto home	\$ 14,268	\$ 31,324	\$ 11,196	\$ 36,581
Added other inside room onto home	\$ 5,755	\$ 17,253	\$ 4,631	\$ 21,341
Added attached garage onto home	\$ 4,574	\$ 11,024	\$ 3,533	\$ 9,484
Added porch onto home	\$ 1,882	\$ 5,113	\$ 1,527	\$ 4,050
Added deck onto home	\$ 1,523	\$ 3,990	\$ 1,764	\$ 3,938
Added carport onto home	\$ 3,259	\$ 5,682	\$ 2,122	\$ 5,119
Added other outside structure onto home	\$ 3,312	\$ 5,626	\$ 3,581	\$ 5,625
Bedroom created through structural changes	\$ 1,758	\$ 5,306	\$ 1,436	\$ 4,676
Other room created through structural changes	\$ 1,706	\$ 4,687	\$ 1,329	\$ 5,538
Added/replaced roof over entire home	\$ 1,777	\$ 3,774	\$ 1,551	\$ 3,386
Added/replaced siding on home	\$ 1,556	\$ 5,091	\$ 1,552	\$ 4,774
Added/replaced internal water pipes in home	\$ 304	\$ 985	\$ 257	\$ 931
Added/replaced electrical wiring, fuse boxes, etc	\$ 341	\$ 1,000	\$ 394	\$ 985
Added/replaced doors or windows in home	\$ 815	\$ 2,361	\$ 783	\$ 2,295
Added/replaced plumbing fixtures in home	\$ 372	\$ 709	\$ 360	\$ 690
Added/replaced insulation in home	\$ 594	\$ 779	\$ 548	\$ 718
Added wall-to-wall carpeting over sub-flooring	\$ 838	\$ 1,808	\$ 897	\$ 1,747
Added wall-to-wall carpeting over finished floor	\$ 792	\$ 1,553	\$ 763	\$ 1,452
Added other types of flooring	\$ 639	\$ 1,636	\$ 602	\$ 1,569
Installed paneling or ceiling tiles	\$ 288	\$ 772	\$ 270	\$ 684
Added/replaced central air conditioning	\$ 1,694	\$ 2,868	\$ 1,711	\$ 2,717
Added/replaced built-in heating equipment	\$ 1,344	\$ 1,664	\$ 1,401	\$ 1,638
Added/replaced septic tank	\$ 1,658	\$ 3,905	\$ 1,244	\$ 3,188
Added/replaced water heater	\$ 236	\$ 421	\$ 227	\$ 425
Added/replaced built-in dishwasher	\$ 381	\$ 455	\$ 361	\$ 489
Added/replaced garbage disposal	\$ 133	\$ 237	\$ 176	\$ 235
Other major improvements or repairs inside home	\$ 1,398	\$ 2,606	\$ 781	\$ 2,096
Added/replaced driveways or walkways	\$ 881	\$ 2,732	\$ 807	\$ 3,004
Added/replaced fencing or walls	\$ 777	\$ 2,258	\$ 777	\$ 2,416
Added/replaced patio, terrace, or detached deck	\$ 989	\$ 3,929	\$ 997	\$ 4,269

<sup>11</sup> Reported expenditures include all allocated DIY and PRO projects.

	Reported Cases <sup>11</sup>		Factorized Cases	
	Avg. DIY	Avg. PRO	Avg. DIY	Avg. PRO
Added/replaced swimming pool/other recreational structure	\$ 2,207	\$ 11,618	\$ 2,433	\$ 13,983
Added/replaced shed, detached garage, or other building	\$ 1,805	\$ 5,217	\$ 1,631	\$ 4,726
Other major improvements or repairs to lot or yard	\$ 1,192	\$ 5,094	\$ 1,056	\$ 3,737
Remodeled bathroom	\$ 1,851	\$ 4,699	\$ 1,793	\$ 4,608
Remodeled kitchen	\$ 4,810	\$ 8,884	\$ 4,211	\$ 8,930
Bathroom created through structural changes	\$ 1,812	\$ 4,146	\$ 1,344	\$ 5,162
Added/replaced security system in home	\$ 483	\$ 513	\$ 361	\$ 441
<b>All Projects</b>	<b>\$ 1,257</b>	<b>\$ 3,003</b>	<b>\$ 1,283</b>	<b>\$ 3,362</b>

The expenditures on remodeling for cases with *missing dollars* are estimated by using the DIY (or PRO) ratio of each socioeconomic characteristic to each individual project. The factor is applied to the average expenditures for each of the 44 project categories. To illustrate more clearly the way these *missing dollars* are allocated, consider the aforementioned young, low-income household living in an inexpensive home. He or she reports 64.3% less spending on DIY than the average DIY doer and 68.7% less cost than the average PRO doer (see Table 5). When that household reports having undergone a bathroom project from unfinished space, the cost of his/her project is estimated at \$1,799 if the project was DIY ( $\$5,028 \times 0.3578$ ) and \$5,471 if it was reported as PRO. The average reported and allocated expenditures for DIY and PRO for each of the 44 projects are reported in Table 6.

The result of allocating the average expenditures using this method increases the average expenditures for overall DIY and PRO by 2% and 12% respectively. The average spending for certain project categories change substantially between the reported and the allocated project. For example, while the allocated average cost of a kitchen addition onto the home done by a professional contractor is 68% higher than the reported one, the allocated average DIY carport addition is 35% lower than the reported cost. The dramatic effect of the ratio on the projects may have had a substantial impact on the variation of the average expenditures across improvement projects. While professional projects undertaken by a young, low-income household with an inexpensive property may reduce the average cost of the project by a third (31%), the average cost for a DIY project for a middle age householder (45-54) with a mid-range annual income (\$30-\$55,000) on a high-end property can almost quadruple (398%) (see Table 5). Even so the aggregate results of the described allocation method do not show significant differences with the results from other allocation procedures.

The final results for allocation of *missing doers* and *missing dollars* can be observed in Tables 1, 2 and 3 of Appendix C. On those tables, the allocated households and expenditures are grouped into 23 project categories to allow analysis over time. To enhance comparison with other allocation procedures, the tables also include previously used estimation methods of missing data allocation.<sup>12</sup>

## **Summary and Results**

Better data gathering techniques by Census have resulted in substantial reduction of the number of missing cases in the AHS remodeling file. The number of *missing doers* has substantially decreased since 1995 from almost 10% to barely 1.2% in 2001. Likewise, in 1995 one out of five projects did not include any dollar amount (*missing dollars*), while in 2001 that share was reduced by half (see Table 7).<sup>13</sup>

**Table 7. Weighted Number of Observations**

		<b>AHS 2001</b>	<b>AHS 1999</b>	<b>AHS 1997</b>	<b>AHS 1995</b>
	Weighed # Obs	113,565,892	107,508,153	117,230,543	117,807,510
	DIY	45,966,047	44,001,286	51,587,197	47,321,969
	PRO	66,284,939	62,709,400	62,151,804	58,908,473
	<i>Missing Doers</i>	1,314,906	797,467	3,491,542	11,577,068
	% of <i>Missing Doers</i>	1.2%	0.7%	3.0%	9.8%
Projects With Reported \$	Weighed Obs. Reported \$	102,548,138	98,378,424	101,594,959	94,008,604
	DIY	43,023,842	41,167,142	47,097,659	42,625,740
	PRO	59,524,296	57,211,282	54,497,300	51,382,864
	% DIY	42%	42%	46%	45%
Projects W/O Reported \$	Total	11,017,754	9,129,729	15,635,584	23,798,906
	DIY	3,430,218	3,152,162	5,939,713	9,863,330
	PRO	7,587,536	5,977,567	9,695,871	13,935,576
	% DIY	31%	35%	38%	41%
	% of <i>Missing Dollars</i>	10%	8%	13%	20%

<sup>12</sup> Results from previous allocation methods can also be found in the Appendix tables of the report “Measuring the Benefits of Home Remodeling,” Joint Center for Housing Studies, 2003.

<sup>13</sup> It should be noted that the reduction in the total number of cases from 1997 to 1999 has to do with changes in the questionnaire. AHS 1995 & 1997 included 70 potential remodeling project categories, while in 1999 & 2001 the number of categories was reduced to 44.

Comparing the aggregate results with previous processes of allocation,<sup>14</sup> the new method shows a small effect in the final estimation of the market and in the total expenditures for the DIY and PRO segments. The estimated volume of the remodeling market is less than 1% lower in 2001, 1999 and 1997 than in previous assessment (see Table 8) and the differences in the estimation of the DIY and PRO segments are also almost insignificant for those years. Contrary, in the 1995 survey the estimation of the market using the new method reduces the volume of expenditures by over 4%. This is probably the result of the significant reduction in the number of observations due to the collapsing of project categories “other interior/exterior projects” (RAS=64 & RAS=70).<sup>15</sup>

**Table 8. Estimated Volume of the Home Remodeling Market (Old and New Method)**

		<b>AHS 2001</b>	<b>AHS 1999</b>	<b>AHS 1997</b>	<b>AHS 1995</b>
Old Estimation Method	Weighted Expenditures (in \$ Mill.)	\$ 263,077	\$ 211,647	\$ 188,597	\$ 178,054
	DIY	\$ 58,925	\$ 50,286	\$ 45,685	\$ 41,750
	PRO	\$ 204,151	\$ 161,360	\$ 142,912	\$ 136,303
New Estimation Method	Weighted Expenditures (in \$ Mill.)	\$ 262,720	\$ 211,093	\$ 188,088	\$ 170,990
	DIY	\$ 58,484	\$ 50,335	\$ 45,459	\$ 40,499
	PRO	\$ 204,236	\$ 160,759	\$ 142,629	\$ 130,491
Difference		0.14%	0.26%	0.27%	4.13%
DIY		0.75%	-0.10%	0.50%	3.09%
PRO		-0.04%	0.37%	0.20%	4.45%

Consequently, with the improvement in the gathering of data, the volume of allocated dollars in home remodeling has substantially decreased in recent years. In 1995 the allocated *missing dollars* represented almost 20% of the market, while in 2001 that share only account for 11% of the market (see Table 9). The process of allocating *missing dollars* has become a more residual part in the estimation of the volume of the remodeling market strengthening the reliability of the AHS data. Detailed information and comparison with the old method for Total

<sup>14</sup> Using a different method to estimate the size of the market, missing data was allocated using the average project cost and the even share of missing doers. Results from using this method can be observed in Appendix C Tables 1-3 and in “Measuring the Benefits of Home Remodeling,” JCHS, 2003.

<sup>15</sup> For further details on the manipulation of the data, and the effect of certain project categories, such as “other interior/exterior” remodeling jobs (RAS=70 & RAS=64), see Appendix A.

Expenditures and DIY and PRO for the 23 job categories can be found in Appendix B, Tables 1, 2 and 3.

**Table 9. Weighed Volume of Expenditures in Remodeling, Reported and Allocated (in \$Mil.)**

	<b>AHS 2001</b>	<b>AHS 1999</b>	<b>AHS 1997</b>	<b>AHS 1995</b>
Total \$ Reported	\$ 232,808	\$ 190,850	\$ 161,907	\$ 136,930
Total \$ Allocated	\$ 29,913	\$ 20,243	\$ 26,181	\$ 34,060
Share Allocated/Total	11%	10%	14%	20%



## Appendix A

### Data Issues: Reporting Multiple Remodeling Jobs in the Public Use File.

Since 1995 the American Housing Survey (AHS) has expanded the scope on homeowner remodeling activity by including 44 different categories of home improvement projects (70 in 1997 & 1995) in the questionnaire. As mentioned before, the AHS also provides information on the cost and method of installation for reported home improvements.

The way the Census gathers and records remodeling information in the AHS allows homeowners to report only one project for each home improvement category. However, two out of the 44 (70 in 1997 & 1995) categories of home improvement allowed multiple responses. For home remodeling projects categorized as “other interior project” (RAS=64) and “other exterior project” (RAS=70) homeowners were allowed to report up to three jobs.

**Table 1. Number of Households Reporting Multiple "Other Interior or Exterior Jobs"**

	AHS 1995		AHS 1997	
	"Other Exterior"	"Other Interior"	"Other Exterior"	"Other Interior"
Reported 1 Job	32	24	773	648
Reported 2 Jobs	69	54	89	135
Reported 3 Jobs	1,265	1,079	75	60
Total # of HH reporting "Other"	1,366	1,157	937	843

**Table 2. Number of “Other Interior or Exterior Jobs” (RAS=70 | 64)**

	AHS 1995	AHS 1997	AHS 1999	AHS 2001
# DIY jobs	1,140	864	601	528
# PRO jobs	1,676	1,217	1,023	856
# <i>Missing Doers</i>	4,518	193	28	33
# Total "Other Interior/Exterior"	7,334	2,274	1,652	1,417
# All Non Reported jobs	9,679	1,549	353	516
Share of Non Reported Cases	62%	8%	2%	2%

There is evidence to suggest that the AHS 1995 data for “other interior/exterior” home improvements is inconsistent. Out of the 1,366 households that reported “other interior project” in AHS 1995, 95.3% reported multiple jobs, in contrast with the mere 17.5% in 1997 (see Table 1). Furthermore in 1995, 62% of “other interior/exterior” jobs were reported neither as DIY nor as PRO, i.e. *missing doers*, while in subsequent surveys that share did not reach 9% (see Table 2). The dramatic difference between AHS 1995 and 1997 on the amount of multiple “other interior and exterior” projects as well as the DIY/PRO distribution of “non-reported” jobs in

AHS 1995 in comparison with subsequent years, suggest some inconsistencies in the data gathering for that survey.

For this reason, and for the purpose of facilitating the allocation procedure, households that reported undergoing “other interior/exterior” projects will be recorded as having reported only one job “other interior” and/or one “other exterior” job, as opposed to the potential three allowed in the public use file. All the information regarding method of installation (DIY or PRO) and the expenditures for “other interior/exterior project” (RAS=70 | RAS=64) will be recreated in the following way:

	<b>DIY-PRO Classification</b>	<b>Expenditures in "Other Interior" and/or "Other Exterior Projects"</b>
Reported One Job	<i>As reported</i>	<i>As reported</i>
Reported Two Jobs	<i>DIY if One Job Reported DIY &amp; Other "Missing Doer"</i> <i>PRO if One Job Reported PRO &amp; Other "Missing Doer"</i> <i>Not Reported Project if One Job DIY &amp; Other PRO OR all missing</i>	
Reported Three Jobs	<i>DIY if One or Two DIY and the rest "Missing Doer"</i> <i>DIY if Two DIY and one PRO</i> <i>PRO if One or Two PRO and the rest "Missing Doer"</i> <i>PRO if Two PRO and one DIY</i> <i>Not Reported Project if One Job DIY &amp; Other PRO OR all "Missing Doers"</i>	<i>Aggregate of all reported expenditures (missing cases as zeros)</i>

Households reporting multiple “other interior” and/or “other exterior” jobs (two jobs or three jobs) will be considered DIY if the majority of the jobs reported are DIY. In the case that one of the jobs was reported as DIY and the other as PRO, the “other interior or exterior” project will be considered as “non-reported/missing doer.” The expenditures on multiple “other interior or exterior projects” will be the addition of the reported spending (considering missing data as zero). Despite the fact that the problem of reporting multiple jobs was most intense in the AHS 1995, to allow cross-time comparison the procedure will be applied to the four surveys (1995, 1997, 1999 & 2001).

## Appendix B

**Table 1. Consolidation of 44 (70) Remodeling Projects into 23 Categories**

**Consolidation of 44 (70) Project Categories into 23 for AHS 1995,97,99 & 2001<sup>16</sup>**

	Variables in AHS 1995 & 1997	Variables in AHS 1999 & 2001
<i>Minor Kitchen Remodel</i>	RAS=27 to RAS=34 (For DIY under \$4,000 & PRO under \$10,000)	RAS=72 (For DIY under \$4,000 & PRO under \$10,000)
<i>Major Kitchen Remodel</i>	RAS=27 to RAS=34 (For DIY \$4,000 or more & PRO \$10,000 or more)	RAS=72 (For DIY \$4,000 or more & PRO \$10,000 or more)
<i>Kitchen Additions Alterations</i>	RAS=4, RAS=8 & RAS=26	RAS=8 & RAS=26
<i>Minor Bath Remodel</i>	RAS=17 to RAS=25 (For DIY under \$2,000 & PRO under \$5,000)	RAS=71 (For DIY under \$2,000 & PRO under \$5,000)
<i>Major Bath Remodel</i>	RAS=17 to RAS=25 (For DIY \$2,000 or more & PRO \$5,000 or more)	RAS=71 (For DIY \$2,000 or more & PRO \$5,000 or more)
<i>Bath Addition Alterations</i>	RAS=2 RAS=7 RAS=16	RAS=2 RAS=7 RAS=73
<i>Add/Alter/Create Bedroom</i>	RAS=3 RAS=9 RAS=35	RAS=3 RAS=9 RAS=35
<i>Add/Alter/Create Other Room</i>	RAS=5 RAS=6 RAS=10 RAS=36	RAS=5 RAS=6 RAS=10 RAS=36
<i>Add/Replace Deck/Porch</i>	RAS=12 RAS=13	RAS=12 RAS=13
<i>Other Interior Improvement</i>	RAS=64	RAS=64
<i>Disaster Repairs</i>	RAS=1	RAS=1
<i>Roofing</i>	RAS=37	RAS=37
<i>Siding</i>	RAS=38-RAS=39	RAS=38
<i>Plumbing/Pipes</i>	RAS=40-RAS=41	RAS=40
<i>Add/Replace Electrical System</i>	RAS=42-RAS=44	RAS=42
<i>Window/Door</i>	RAS=45-RAS=46	RAS=45
<i>Plumbing Fixtures</i>	RAS=47-RAS=48	RAS=47
<i>Insulation</i>	RAS=49-RAS=50	RAS=49
<i>Flooring/Paneling Ceiling</i>	RAS=51-RAS=56	RAS=51 RAS=52 RAS=53 RAS=55
<i>HVAC</i>	RAS=57-RAS=59	RAS=57 RAS=58
<i>Appliances/Major Equipment</i>	RAS=61-RAS=63	RAS=61-RAS=63 RAS=74
<i>Add/Replace Garage/Carport</i>	RAS=11 RAS=14	RAS=11 RAS=14
<i>Other Improvements</i>	RAS=15 RAS=60 RAS=65-RAS=70	RAS=15 RAS=60 RAS=65-RAS=70

<sup>16</sup> The variable RAS determines the type of remodeling project and is a categorical variable from 1-70 (1-74 in AHS 1999 & 2001). For the definition of the 44 (70) values and more information about the AHS see “Codebook for the American Housing Survey, Public Use File: 1997 and later” at: [http://www.huduser.org/Datasets/ahs/AHS\\_Codebook\\_110.pdf](http://www.huduser.org/Datasets/ahs/AHS_Codebook_110.pdf)

**Table 2. Total Home Improvement Expenditures: 1998-2001**

	Old Allocation Method 2000-01			New Allocation Method 2000-01			Old Allocation Method 1998-99			New Allocation Method 1998-99		
	No. of Homeowners Reporting Projects (‘000)	Average Expd. (\$)	Total Expenditures (\$ Mil.)	No. of Homeowners Reporting Projects (‘000)	Average Expd. (\$)	Total Expenditures (\$ Mil.)	No. of Homeowners Reporting Projects (‘000)	Average Expd. (\$)	Total Expenditures (\$ Mil.)	No. of Homeowners Reporting Projects (‘000)	Average Expd. (\$)	Total Expenditures (\$ Mil.)
Minor Kitchen Remodel	2,646	\$ 2,718	\$ 7,192	2,632	\$ 2,377	\$ 6,256	2,855	\$ 2,660	\$ 7,595	2,807	\$ 2,535	\$ 7,116
Major Kitchen Remodel	1,017	\$ 17,738	\$ 18,045	1,031	\$ 18,350	\$ 18,921	599	\$ 16,439	\$ 9,842	646	\$ 15,884	\$ 10,268
Kitchen Additions Alterations	89	\$ 34,039	\$ 3,013	89	\$ 36,774	\$ 3,255	89	\$ 15,416	\$ 1,377	89	\$ 15,166	\$ 1,355
Minor Bath Remodel	3,320	\$ 1,334	\$ 4,430	3,203	\$ 1,157	\$ 3,705	3,508	\$ 1,325	\$ 4,647	3,448	\$ 1,261	\$ 4,348
Major Bath Remodel	1,107	\$ 8,807	\$ 9,749	1,224	\$ 8,537	\$ 10,449	645	\$ 9,352	\$ 6,036	705	\$ 8,941	\$ 6,305
Bath Addition Alterations	807	\$ 8,582	\$ 6,925	807	\$ 8,802	\$ 7,103	795	\$ 4,896	\$ 3,891	795	\$ 4,961	\$ 3,943
Add/Alter/Create Bedroom	1,216	\$ 13,327	\$ 16,211	1,216	\$ 13,420	\$ 16,324	1,313	\$ 9,934	\$ 13,045	1,313	\$ 10,060	\$ 13,210
Add/Alter/Create Other Room	2,783	\$ 8,262	\$ 22,993	2,783	\$ 8,333	\$ 23,191	2,851	\$ 7,233	\$ 20,619	2,851	\$ 7,266	\$ 20,715
Add/Replace Deck/Porch	1,936	\$ 2,985	\$ 5,781	1,936	\$ 2,965	\$ 5,740	2,261	\$ 2,486	\$ 5,620	2,261	\$ 2,457	\$ 5,555
Other Interior Improvement	1,660	\$ 2,152	\$ 3,572	1,660	\$ 2,076	\$ 3,446	1,629	\$ 1,966	\$ 3,203	1,629	\$ 1,956	\$ 3,186
Disaster Repairs	1,268	\$ 9,157	\$ 11,613	1,268	\$ 9,082	\$ 11,519	1,308	\$ 5,881	\$ 7,694	1,308	\$ 5,806	\$ 7,596
Roofing	6,811	\$ 3,274	\$ 22,302	6,811	\$ 3,234	\$ 22,026	6,958	\$ 2,868	\$ 19,957	6,958	\$ 2,841	\$ 19,770
Siding	2,453	\$ 4,041	\$ 9,914	2,453	\$ 4,013	\$ 9,845	2,573	\$ 4,078	\$ 10,495	2,573	\$ 4,052	\$ 10,427
Plumbing/Pipes	3,076	\$ 677	\$ 2,083	3,076	\$ 669	\$ 2,059	3,109	\$ 511	\$ 1,588	3,109	\$ 511	\$ 1,589
Add/Replace Electrical System	4,563	\$ 741	\$ 3,384	4,563	\$ 742	\$ 3,386	4,294	\$ 548	\$ 2,352	4,294	\$ 545	\$ 2,340
Window/Door	8,963	\$ 1,709	\$ 15,319	8,962	\$ 1,704	\$ 15,271	8,001	\$ 1,562	\$ 12,498	8,001	\$ 1,552	\$ 12,417
Plumbing Fixtures	7,304	\$ 525	\$ 3,836	7,304	\$ 524	\$ 3,826	6,424	\$ 457	\$ 2,939	6,424	\$ 457	\$ 2,939
Insulation	2,908	\$ 675	\$ 1,962	2,908	\$ 667	\$ 1,939	2,641	\$ 593	\$ 1,566	2,641	\$ 591	\$ 1,561
Flooring/Paneling Ceiling	15,033	\$ 1,651	\$ 24,816	15,033	\$ 1,639	\$ 24,644	13,955	\$ 1,536	\$ 21,433	13,955	\$ 1,530	\$ 21,357
HVAC	5,922	\$ 2,763	\$ 16,364	5,921	\$ 2,754	\$ 16,308	5,889	\$ 2,460	\$ 14,487	5,889	\$ 2,453	\$ 14,444
Appliances/Major Equipment	11,968	\$ 432	\$ 5,174	11,968	\$ 432	\$ 5,166	10,896	\$ 414	\$ 4,508	10,896	\$ 413	\$ 4,499
Add/Replace Garage/Carport	427	\$ 6,255	\$ 2,670	427	\$ 6,117	\$ 2,611	466	\$ 6,033	\$ 2,813	466	\$ 5,916	\$ 2,759
Other Improvements	12,531	\$ 3,649	\$ 45,730	12,531	\$ 3,649	\$ 45,729	11,754	\$ 2,845	\$ 33,442	11,754	\$ 2,841	\$ 33,396
<b>Total</b>			\$ 263,077			\$ 262,720			\$ 211,647			\$ 211,093

**Table 2 (cont.). Total Home Improvement Expenditures: 1994-1997**

	Old Allocation Method 1996-97			New Allocation Method 1996-97			Old Allocation Method 1994-95			New Allocation Method 1994-95		
	No. of Reporting Projects ( <sup>'000</sup> )	Average Expd. (\$)	Total Expenditures (\$ Mil.)	No. of Reporting Projects ( <sup>'000</sup> )	Average Expd. (\$)	Total Expenditures (\$ Mil.)	No. of Reporting Projects ( <sup>'000</sup> )	Average Expd. (\$)	Total Expenditures (\$ Mil.)	No. of Reporting Projects ( <sup>'000</sup> )	Average Expd. (\$)	Total Expenditures (\$ Mil.)
Minor Kitchen Remodel	3,364	\$ 2,073	\$ 6,975	3,220	\$ 1,992	\$ 6,413	3,922	\$ 2,103	\$ 8,249	3,770	\$ 2,075	\$ 7,823
Major Kitchen Remodel	257	\$ 29,720	\$ 7,629	482	\$ 17,271	\$ 8,327	143	\$ 32,536	\$ 4,660	355	\$ 14,477	\$ 5,134
Kitchen Additions Alterations	519	\$ 8,762	\$ 4,546	519	\$ 9,210	\$ 4,778	657	\$ 6,058	\$ 3,980	657	\$ 6,094	\$ 4,003
Minor Bath Remodel	3,866	\$ 989	\$ 3,825	3,735	\$ 1,044	\$ 3,898	4,231	\$ 919	\$ 3,887	4,121	\$ 946	\$ 3,900
Major Bath Remodel	397	\$ 13,568	\$ 5,391	607	\$ 8,758	\$ 5,313	349	\$ 14,131	\$ 4,937	523	\$ 9,430	\$ 4,927
Bath Addition Alterations	978	\$ 10,186	\$ 9,958	978	\$ 10,465	\$ 10,231	1,143	\$ 9,577	\$ 10,944	1,143	\$ 9,800	\$ 11,199
Add/Alter/Create Bedroom	1,074	\$ 5,993	\$ 6,436	1,074	\$ 6,136	\$ 6,590	1,276	\$ 3,264	\$ 4,165	1,276	\$ 3,305	\$ 4,217
Add/Alter/Create Other Room	2,382	\$ 7,961	\$ 18,962	2,382	\$ 8,027	\$ 19,120	2,840	\$ 5,203	\$ 14,776	2,840	\$ 5,270	\$ 14,967
Add/Replace Deck/Porch	2,111	\$ 2,129	\$ 4,494	2,111	\$ 2,111	\$ 4,456	2,377	\$ 2,155	\$ 5,122	2,377	\$ 2,131	\$ 5,064
Other Interior Improvement	2,076	\$ 1,936	\$ 4,019	2,076	\$ 1,795	\$ 3,726	2,506	\$ 2,121	\$ 5,316	2,506	\$ 1,197	\$ 3,001
Disaster Repairs	1,271	\$ 6,883	\$ 8,749	1,271	\$ 6,660	\$ 8,465	1,458	\$ 7,113	\$ 10,371	1,458	\$ 7,049	\$ 10,277
Roofing	5,674	\$ 3,223	\$ 18,286	5,674	\$ 3,176	\$ 18,019	5,029	\$ 2,987	\$ 15,022	5,029	\$ 2,956	\$ 14,867
Siding	2,308	\$ 3,695	\$ 8,528	2,308	\$ 3,648	\$ 8,420	2,136	\$ 3,979	\$ 8,500	2,136	\$ 3,928	\$ 8,391
Plumbing/Pipes	2,880	\$ 545	\$ 1,568	2,880	\$ 539	\$ 1,551	2,710	\$ 641	\$ 1,739	2,710	\$ 614	\$ 1,663
Add/Replace Electrical System	4,320	\$ 736	\$ 3,181	4,320	\$ 734	\$ 3,170	4,073	\$ 478	\$ 1,948	4,073	\$ 473	\$ 1,926
Window/Door	7,865	\$ 1,287	\$ 10,119	7,865	\$ 1,284	\$ 10,100	8,356	\$ 1,314	\$ 10,982	8,356	\$ 1,300	\$ 10,863
Plumbing Fixtures	4,135	\$ 421	\$ 1,741	4,135	\$ 420	\$ 1,736	3,796	\$ 372	\$ 1,410	3,796	\$ 371	\$ 1,409
Insulation	2,393	\$ 366	\$ 876	2,393	\$ 365	\$ 874	2,642	\$ 407	\$ 1,075	2,642	\$ 399	\$ 1,055
Flooring/Paneling Ceiling	7,974	\$ 1,185	\$ 9,448	7,974	\$ 1,182	\$ 9,425	7,841	\$ 1,115	\$ 8,740	7,841	\$ 1,097	\$ 8,599
HVAC	5,378	\$ 2,532	\$ 13,615	5,378	\$ 2,529	\$ 13,603	5,113	\$ 2,469	\$ 12,624	5,113	\$ 2,451	\$ 12,530
Appliances/Major Equipment	9,584	\$ 370	\$ 3,550	9,584	\$ 371	\$ 3,552	9,786	\$ 330	\$ 3,233	9,786	\$ 330	\$ 3,229
Add/Replace Garage/Carport	334	\$ 5,431	\$ 1,817	334	\$ 5,380	\$ 1,800	447	\$ 5,167	\$ 2,310	447	\$ 5,310	\$ 2,374
Other Improvements	12,302	\$ 2,836	\$ 34,885	12,302	\$ 2,806	\$ 34,522	12,425	\$ 2,742	\$ 34,066	12,425	\$ 2,380	\$ 29,572
<b>Total</b>			\$ 188,598			\$ 188,088			\$ 178,054			\$ 170,990

**Table 3. Professional Home Improvement Expenditures: 1998-2001**

	Old Allocation Method 2000-01			New Allocation Method 2000-01			Old Allocation Method 1998-99			New Allocation Method 1998-99		
	No. of Homeowners Reporting Projects ( <sup>'000</sup> )	Average Expd. (\$)	Total Expenditures (\$ Mil.)	No. of Homeowners Reporting Projects ( <sup>'000</sup> )	Average Expd. (\$)	Total Expenditures (\$ Mil.)	No. of Homeowners Reporting Projects ( <sup>'000</sup> )	Average Expd. (\$)	Total Expenditures (\$ Mil.)	No. of Homeowners Reporting Projects ( <sup>'000</sup> )	Average Expd. (\$)	Total Expenditures (\$ Mil.)
Minor Kitchen Remodel	1,437	\$ 3,973	\$ 5,710	1,353	\$ 3,365	\$ 4,554	1,471	\$ 3,785	\$ 5,567	1,454	\$ 3,601	\$ 5,238
Major Kitchen Remodel	434	\$ 25,179	\$ 10,929	517	\$ 23,350	\$ 12,073	274	\$ 23,171	\$ 6,338	297	\$ 22,302	\$ 6,620
Kitchen Additions Alterations	58	\$ 43,533	\$ 2,515	58	\$ 47,856	\$ 2,764	57	\$ 19,055	\$ 1,080	57	\$ 18,720	\$ 1,061
Minor Bath Remodel	1,597	\$ 2,010	\$ 3,211	1,515	\$ 1,721	\$ 2,607	1,562	\$ 2,035	\$ 3,179	1,534	\$ 1,922	\$ 2,947
Major Bath Remodel	505	\$ 13,208	\$ 6,668	588	\$ 12,336	\$ 7,255	313	\$ 12,930	\$ 4,048	342	\$ 12,375	\$ 4,232
Bath Addition Alterations	404	\$ 12,152	\$ 4,912	407	\$ 12,610	\$ 5,133	416	\$ 6,671	\$ 2,778	418	\$ 6,661	\$ 2,782
Add/Alter/Create Bedroom	509	\$ 22,711	\$ 11,550	507	\$ 23,169	\$ 11,747	529	\$ 17,842	\$ 9,446	530	\$ 18,204	\$ 9,642
Add/Alter/Create Other Room	1,248	\$ 13,983	\$ 17,455	1,246	\$ 14,208	\$ 17,698	1,232	\$ 11,266	\$ 13,877	1,231	\$ 11,263	\$ 13,866
Add/Replace Deck/Porch	838	\$ 4,636	\$ 3,884	840	\$ 4,580	\$ 3,846	972	\$ 3,786	\$ 3,679	971	\$ 3,733	\$ 3,625
Other Interior Improvement	1,016	\$ 2,578	\$ 2,619	969	\$ 2,581	\$ 2,500	1,086	\$ 2,295	\$ 2,493	1,034	\$ 2,373	\$ 2,454
Disaster Repairs	1,002	\$ 10,121	\$ 10,146	1,005	\$ 10,024	\$ 10,076	935	\$ 6,690	\$ 6,258	939	\$ 6,605	\$ 6,206
Roofing	5,105	\$ 3,774	\$ 19,270	5,101	\$ 3,730	\$ 19,024	5,102	\$ 3,343	\$ 17,056	5,102	\$ 3,307	\$ 16,871
Siding	1,726	\$ 5,088	\$ 8,783	1,733	\$ 5,034	\$ 8,725	1,740	\$ 5,250	\$ 9,136	1,742	\$ 5,218	\$ 9,088
Plumbing/Pipes	1,688	\$ 984	\$ 1,661	1,679	\$ 977	\$ 1,640	1,634	\$ 742	\$ 1,212	1,633	\$ 744	\$ 1,215
Add/Replace Electrical System	2,774	\$ 1,000	\$ 2,773	2,775	\$ 998	\$ 2,769	2,644	\$ 743	\$ 1,963	2,645	\$ 739	\$ 1,953
Window/Door	5,186	\$ 2,360	\$ 12,238	5,178	\$ 2,355	\$ 12,193	4,677	\$ 2,092	\$ 9,784	4,673	\$ 2,076	\$ 9,703
Plumbing Fixtures	3,327	\$ 713	\$ 2,371	3,327	\$ 707	\$ 2,351	2,855	\$ 662	\$ 1,891	2,856	\$ 662	\$ 1,890
Insulation	1,270	\$ 779	\$ 989	1,271	\$ 767	\$ 974	1,150	\$ 689	\$ 793	1,148	\$ 686	\$ 788
Flooring/Paneling Ceiling	10,052	\$ 2,010	\$ 20,204	10,021	\$ 1,999	\$ 20,028	9,297	\$ 1,892	\$ 17,588	9,292	\$ 1,885	\$ 17,513
HVAC	5,013	\$ 2,919	\$ 14,632	5,012	\$ 2,907	\$ 14,568	4,931	\$ 2,602	\$ 12,831	4,927	\$ 2,593	\$ 12,774
Appliances/Major Equipment	7,465	\$ 494	\$ 3,689	7,465	\$ 494	\$ 3,688	6,985	\$ 471	\$ 3,288	6,983	\$ 470	\$ 3,280
Add/Replace Garage/Carport	217	\$ 8,458	\$ 1,836	217	\$ 8,321	\$ 1,806	252	\$ 5,831	\$ 1,472	252	\$ 5,742	\$ 1,449
Other Improvements	7,069	\$ 5,108	\$ 36,110	7,039	\$ 5,145	\$ 36,215	6,678	\$ 3,834	\$ 25,601	6,639	\$ 3,850	\$ 25,562
<b>Total PRO</b>			\$ 204,152			\$ 204,236			\$ 161,361			\$ 160,759

**Table 3 (cont.). Professional Home Improvement Expenditures: 1994-1997**

	Old Allocation Method 1996-97			New Allocation Method 1996-97			Old Allocation Method 1994-95			New Allocation Method 1994-95		
	No. of Homeowners Reporting Projects ( <sup>'000</sup> )	Average Expd. (\$)	Total Expenditures (\$ Mil.)	No. of Homeowners Reporting Projects ( <sup>'000</sup> )	Average Expd. (\$)	Total Expenditures (\$ Mil.)	No. of Homeowners Reporting Projects ( <sup>'000</sup> )	Average Expd. (\$)	Total Expenditures (\$ Mil.)	No. of Homeowners Reporting Projects ( <sup>'000</sup> )	Average Expd. (\$)	Total Expenditures (\$ Mil.)
Minor Kitchen Remodel	1,868	\$ 2,816	\$ 5,259	1,819	\$ 2,562	\$ 4,659	2,216	\$ 2,711	\$ 6,008	2,180	\$ 2,607	\$ 5,683
Major Kitchen Remodel	193	\$ 21,749	\$ 4,206	246	\$ 20,187	\$ 4,962	111	\$ 26,447	\$ 2,945	141	\$ 24,046	\$ 3,381
Kitchen Additions Alterations	230	\$ 14,189	\$ 3,268	231	\$ 15,059	\$ 3,477	309	\$ 9,404	\$ 2,901	307	\$ 9,391	\$ 2,883
Minor Bath Remodel	1,609	\$ 1,469	\$ 2,364	1,644	\$ 1,482	\$ 2,438	1,891	\$ 1,252	\$ 2,367	1,907	\$ 1,269	\$ 2,421
Major Bath Remodel	326	\$ 10,449	\$ 3,409	295	\$ 11,330	\$ 3,343	285	\$ 13,092	\$ 3,734	269	\$ 13,592	\$ 3,654
Bath Addition Alterations	427	\$ 14,963	\$ 6,384	422	\$ 15,696	\$ 6,630	542	\$ 14,129	\$ 7,662	541	\$ 14,510	\$ 7,851
Add/Alter/Create Bedroom	404	\$ 10,507	\$ 4,249	405	\$ 10,935	\$ 4,431	494	\$ 4,819	\$ 2,381	486	\$ 4,949	\$ 2,407
Add/Alter/Create Other Room	966	\$ 14,719	\$ 14,213	963	\$ 14,948	\$ 14,392	1,209	\$ 8,517	\$ 10,295	1,217	\$ 8,560	\$ 10,421
Add/Replace Deck/Porch	906	\$ 3,245	\$ 2,939	904	\$ 3,228	\$ 2,919	1,076	\$ 3,077	\$ 3,311	1,074	\$ 3,031	\$ 3,254
Other Interior Improvement	1,374	\$ 2,462	\$ 3,382	1,260	\$ 2,482	\$ 3,128	3,072	\$ 1,419	\$ 4,358	1,614	\$ 1,509	\$ 2,437
Disaster Repairs	964	\$ 7,288	\$ 7,022	964	\$ 7,014	\$ 6,763	1,141	\$ 7,844	\$ 8,952	1,146	\$ 7,767	\$ 8,902
Roofing	4,605	\$ 3,549	\$ 16,342	4,623	\$ 3,487	\$ 16,121	4,091	\$ 3,311	\$ 13,546	4,107	\$ 3,270	\$ 13,432
Siding	1,610	\$ 4,481	\$ 7,214	1,602	\$ 4,436	\$ 7,108	1,651	\$ 4,518	\$ 7,461	1,602	\$ 4,608	\$ 7,381
Plumbing/Pipes	1,557	\$ 812	\$ 1,264	1,555	\$ 806	\$ 1,254	1,632	\$ 865	\$ 1,411	1,566	\$ 862	\$ 1,350
Add/Replace Electrical System	3,051	\$ 818	\$ 2,495	2,789	\$ 864	\$ 2,410	2,653	\$ 588	\$ 1,561	2,649	\$ 581	\$ 1,540
Window/Door	4,432	\$ 1,837	\$ 8,139	4,434	\$ 1,833	\$ 8,130	5,073	\$ 1,671	\$ 8,480	4,814	\$ 1,728	\$ 8,317
Plumbing Fixtures	1,779	\$ 689	\$ 1,225	1,778	\$ 686	\$ 1,220	1,712	\$ 554	\$ 948	1,704	\$ 554	\$ 944
Insulation	957	\$ 562	\$ 538	951	\$ 561	\$ 533	1,152	\$ 569	\$ 655	1,114	\$ 568	\$ 633
Flooring/Paneling Ceiling	4,441	\$ 1,559	\$ 6,926	4,439	\$ 1,557	\$ 6,912	4,909	\$ 1,415	\$ 6,946	4,745	\$ 1,431	\$ 6,790
HVAC	4,650	\$ 2,649	\$ 12,318	4,653	\$ 2,646	\$ 12,312	4,569	\$ 2,537	\$ 11,592	4,467	\$ 2,567	\$ 11,468
Appliances/Major Equipment	5,601	\$ 444	\$ 2,485	5,610	\$ 445	\$ 2,495	5,725	\$ 371	\$ 2,123	5,718	\$ 370	\$ 2,116
Add/Replace Garage/Carport	171	\$ 6,550	\$ 1,119	172	\$ 6,441	\$ 1,109	227	\$ 6,678	\$ 1,518	227	\$ 6,766	\$ 1,539
Other Improvements	6,879	\$ 3,802	\$ 26,153	6,772	\$ 3,822	\$ 25,883	8,563	\$ 2,936	\$ 25,145	7,097	\$ 3,056	\$ 21,688
<b>Total PRO</b>			\$ 142,912			\$ 142,629			\$ 136,304	-	\$ -	\$ 130,491

**Table 4. Do-It-Yourself Home Improvement Expenditures: 1998-2001**

	Old Allocation Method 2000-01			New Allocation Method 2000-01			Old Allocation Method 1998-99			New Allocation Method 1998-99		
	No. of Homeowners Reporting Projects ( <sup>'000</sup> )	Average Expd. (\$)	Total Expenditures (\$ Mil.)	No. of Homeowners Reporting Projects ( <sup>'000</sup> )	Average Expd. (\$)	Total Expenditures (\$ Mil.)	No. of Homeowners Reporting Projects ( <sup>'000</sup> )	Average Expd. (\$)	Total Expenditures (\$ Mil.)	No. of Homeowners Reporting Projects ( <sup>'000</sup> )	Average Expd. (\$)	Total Expenditures (\$ Mil.)
Minor Kitchen Remodel	1,209	\$ 1,227	\$ 1,483	1,279	\$ 1,331	\$ 1,702	1,384	\$ 1,466	\$ 2,028	1,353	\$ 1,389	\$ 1,878
Major Kitchen Remodel	583	\$ 12,200	\$ 7,116	514	\$ 13,321	\$ 6,848	325	\$ 10,775	\$ 3,503	350	\$ 10,434	\$ 3,648
Kitchen Additions Alterations	31	\$ 16,200	\$ 498	31	\$ 15,947	\$ 490	33	\$ 9,097	\$ 297	33	\$ 8,995	\$ 294
Minor Bath Remodel	1,723	\$ 708	\$ 1,220	1,688	\$ 651	\$ 1,098	1,946	\$ 754	\$ 1,468	1,915	\$ 731	\$ 1,400
Major Bath Remodel	602	\$ 5,116	\$ 3,081	636	\$ 5,022	\$ 3,194	332	\$ 5,983	\$ 1,988	363	\$ 5,708	\$ 2,073
Bath Addition Alterations	405	\$ 4,967	\$ 2,014	403	\$ 4,893	\$ 1,970	391	\$ 2,846	\$ 1,113	390	\$ 2,978	\$ 1,161
Add/Alter/Create Bedroom	732	\$ 6,365	\$ 4,661	734	\$ 6,236	\$ 4,576	801	\$ 4,495	\$ 3,598	798	\$ 4,472	\$ 3,568
Add/Alter/Create Other Room	1,575	\$ 3,516	\$ 5,538	1,577	\$ 3,482	\$ 5,494	1,665	\$ 4,048	\$ 6,741	1,665	\$ 4,114	\$ 6,849
Add/Replace Deck/Porch	1,107	\$ 1,714	\$ 1,897	1,105	\$ 1,715	\$ 1,894	1,293	\$ 1,501	\$ 1,941	1,294	\$ 1,491	\$ 1,930
Other Interior Improvement	744	\$ 1,281	\$ 953	691	\$ 1,368	\$ 946	647	\$ 1,098	\$ 711	595	\$ 1,231	\$ 733
Disaster Repairs	266	\$ 5,521	\$ 1,468	263	\$ 5,483	\$ 1,442	373	\$ 3,850	\$ 1,435	369	\$ 3,771	\$ 1,391
Roofing	1,706	\$ 1,777	\$ 3,032	1,710	\$ 1,755	\$ 3,001	1,856	\$ 1,563	\$ 2,901	1,856	\$ 1,562	\$ 2,899
Siding	727	\$ 1,556	\$ 1,131	720	\$ 1,556	\$ 1,120	833	\$ 1,631	\$ 1,359	831	\$ 1,611	\$ 1,339
Plumbing/Pipes	1,388	\$ 304	\$ 422	1,398	\$ 299	\$ 418	1,475	\$ 255	\$ 377	1,476	\$ 254	\$ 374
Add/Replace Electrical System	1,789	\$ 341	\$ 611	1,789	\$ 345	\$ 617	1,650	\$ 236	\$ 389	1,649	\$ 235	\$ 387
Window/Door	3,776	\$ 816	\$ 3,081	3,784	\$ 813	\$ 3,078	3,324	\$ 816	\$ 2,713	3,328	\$ 816	\$ 2,714
Plumbing Fixtures	3,976	\$ 368	\$ 1,465	3,977	\$ 371	\$ 1,475	3,569	\$ 293	\$ 1,047	3,569	\$ 294	\$ 1,049
Insulation	1,638	\$ 594	\$ 974	1,637	\$ 590	\$ 965	1,491	\$ 519	\$ 773	1,493	\$ 518	\$ 774
Flooring/Paneling Ceiling	6,104	\$ 755	\$ 4,612	6,077	\$ 760	\$ 4,616	5,708	\$ 674	\$ 3,845	5,710	\$ 673	\$ 3,844
HVAC	1,025	\$ 1,691	\$ 1,732	1,025	\$ 1,697	\$ 1,739	1,117	\$ 1,483	\$ 1,656	1,116	\$ 1,495	\$ 1,669
Appliances/Major Equipment	4,887	\$ 304	\$ 1,485	4,880	\$ 303	\$ 1,479	4,300	\$ 284	\$ 1,219	4,303	\$ 283	\$ 1,219
Add/Replace Garage/Carport	210	\$ 3,977	\$ 835	210	\$ 3,838	\$ 806	214	\$ 6,270	\$ 1,341	214	\$ 6,121	\$ 1,310
Other Improvements	6,517	\$ 1,476	\$ 9,620	6,471	\$ 1,470	\$ 9,514	5,950	\$ 1,318	\$ 7,841	5,907	\$ 1,326	\$ 7,834
<b>Total DIY</b>			\$ 58,925			\$ 58,484			\$ 50,287			\$ 50,335



**Table 4 (cont.). Do-It-Yourself Home Improvement Expenditures: 1994-1997**

	Old Allocation Method 1996-97			New Allocation Method 1996-97			Old Allocation Method 1994-95			New Allocation Method 1994-95		
	No. of Reporting Projects ( <sup>'000</sup> )	Average Expd. (\$)	Total Expenditures (\$ Mil.)	No. of Reporting Projects ( <sup>'000</sup> )	Average Expd. (\$)	Total Expenditures (\$ Mil.)	No. of Reporting Projects ( <sup>'000</sup> )	Average Expd. (\$)	Total Expenditures (\$ Mil.)	No. of Reporting Projects ( <sup>'000</sup> )	Average Expd. (\$)	Total Expenditures (\$ Mil.)
Minor Kitchen Remodel	1,845	\$ 930	\$ 1,717	1,848	\$ 950	\$ 1,754	2,165	\$ 1,035	\$ 2,241	2,143	\$ 999	\$ 2,140
Major Kitchen Remodel	254	\$ 13,454	\$ 3,423	236	\$ 14,238	\$ 3,365	205	\$ 8,350	\$ 1,714	216	\$ 8,104	\$ 1,752
Kitchen Additions Alterations	289	\$ 4,429	\$ 1,278	288	\$ 4,519	\$ 1,301	352	\$ 3,059	\$ 1,078	354	\$ 3,164	\$ 1,120
Minor Bath Remodel	2,485	\$ 588	\$ 1,461	2,454	\$ 595	\$ 1,460	2,734	\$ 556	\$ 1,520	2,685	\$ 551	\$ 1,479
Major Bath Remodel	326	\$ 6,074	\$ 1,982	312	\$ 6,322	\$ 1,970	247	\$ 4,867	\$ 1,203	257	\$ 4,952	\$ 1,274
Bath Addition Alterations	556	\$ 6,426	\$ 3,574	560	\$ 6,426	\$ 3,601	606	\$ 5,414	\$ 3,282	602	\$ 5,565	\$ 3,349
Add/Alter/Create Bedroom	670	\$ 3,267	\$ 2,187	672	\$ 3,214	\$ 2,159	799	\$ 2,233	\$ 1,784	798	\$ 2,267	\$ 1,810
Add/Alter/Create Other Room	1,450	\$ 3,275	\$ 4,749	1,448	\$ 3,264	\$ 4,728	1,672	\$ 2,680	\$ 4,481	1,647	\$ 2,761	\$ 4,546
Add/Replace Deck/Porch	1,205	\$ 1,290	\$ 1,554	1,207	\$ 1,273	\$ 1,537	1,307	\$ 1,386	\$ 1,811	1,309	\$ 1,383	\$ 1,811
Other Interior Improvement	900	\$ 707	\$ 637	816	\$ 732	\$ 597	1,720	\$ 557	\$ 957	891	\$ 632	\$ 564
Disaster Repairs	307	\$ 5,615	\$ 1,726	307	\$ 5,547	\$ 1,702	317	\$ 4,478	\$ 1,419	312	\$ 4,408	\$ 1,375
Roofing	1,069	\$ 1,819	\$ 1,944	1,051	\$ 1,807	\$ 1,899	938	\$ 1,573	\$ 1,476	922	\$ 1,556	\$ 1,435
Siding	707	\$ 1,857	\$ 1,314	711	\$ 1,846	\$ 1,312	611	\$ 1,700	\$ 1,039	579	\$ 1,743	\$ 1,010
Plumbing/Pipes	1,329	\$ 229	\$ 304	1,328	\$ 224	\$ 298	1,196	\$ 273	\$ 327	1,185	\$ 264	\$ 313
Add/Replace Electrical System	2,054	\$ 334	\$ 686	1,972	\$ 385	\$ 759	1,519	\$ 255	\$ 388	1,505	\$ 257	\$ 387
Window/Door	3,447	\$ 575	\$ 1,981	3,445	\$ 572	\$ 1,970	4,006	\$ 625	\$ 2,502	3,905	\$ 652	\$ 2,545
Plumbing Fixtures	2,356	\$ 219	\$ 516	2,358	\$ 219	\$ 516	2,103	\$ 220	\$ 462	2,101	\$ 221	\$ 465
Insulation	1,447	\$ 234	\$ 338	1,451	\$ 235	\$ 340	1,750	\$ 240	\$ 420	1,642	\$ 257	\$ 423
Flooring/Paneling Ceiling	3,743	\$ 674	\$ 2,521	3,732	\$ 673	\$ 2,513	3,560	\$ 504	\$ 1,794	3,516	\$ 515	\$ 1,810
HVAC	791	\$ 1,640	\$ 1,298	784	\$ 1,648	\$ 1,291	719	\$ 1,435	\$ 1,031	731	\$ 1,452	\$ 1,061
Appliances/Major Equipment	4,207	\$ 253	\$ 1,065	4,184	\$ 253	\$ 1,057	4,340	\$ 256	\$ 1,110	4,315	\$ 258	\$ 1,113
Add/Replace Garage/Carport	164	\$ 4,263	\$ 697	162	\$ 4,254	\$ 690	222	\$ 3,567	\$ 791	222	\$ 3,765	\$ 835
Other Improvements	6,470	\$ 1,350	\$ 8,732	6,372	\$ 1,356	\$ 8,639	7,664	\$ 1,164	\$ 8,921	6,342	\$ 1,243	\$ 7,885
<b>Total DIY</b>			\$ 45,685			\$ 45,459			\$ 41,750			\$ 40,499