

**Research into the Differences in Home Remodeling Data  
American Housing Survey and Consumer Expenditure Survey/C50 Report**

January 15, 2003

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The views expressed in this paper are those of the authors and do not necessarily reflect the positions or policies of the Census Bureau. The paper describes research by the authors and is issued to elicit comments and to further discussion.

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**Abstract**

Both the American Housing Survey (AHS) and the Consumer Expenditure Survey (CE) collect extensive data on expenditures for home remodeling. (The Census Bureau tabulates and publishes CE-based remodeling data in its C50 report *Expenditures for Residential Improvements and Repairs*.) A review of data for the years 2000-01 shows a sizeable discrepancy in the results. Research presented here suggests that the discrepancy originates from a number of sources.

This paper documents the sources we have identified and presents recommendations that will make the published data more comparable. Some of the recommendations can be quantitatively measured; we show that the total expenditure difference between the two surveys can be reduced by nearly half. The Census Bureau plans to follow through with these recommendations as soon as possible, most likely in early 2004.

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### **Introduction**

Normally, statisticians try not to ask the same questions in two surveys. Not only is this bad from the standpoint of respondent burden, but also from the standpoint of having to explain why the results are different. This principle cannot always be followed, however, and sometimes for good reason. A case in point is the home remodeling data collected in the American Housing Survey (AHS) and the Consumer Expenditure Survey (CE).

The analysis of the remodeling data collected in these surveys in relation to other survey variables is a justification for collecting the data in both surveys. The purpose of the CE is to capture all household expenditures, and those for remodeling work are as important as any other. The purpose of the AHS is to determine the characteristics and condition of housing, and remodeling work has an impact on both.

Still, for those interested in measuring the remodeling industry, the existence of two data sets showing differing estimates presents a challenge.<sup>1</sup> In this paper we investigate differences, work to explain them, and recommend changes to close the gaps where possible.

### **Survey Background**

The AHS is conducted in odd-numbered years by the Census Bureau for the Department of Housing and Urban Development (HUD). It is based on a probability sample of about 54,000 owner-occupied, rental, and vacant housing units. Remodeling expenditures collected in the AHS represent dollars spent in the prior two years. The CE is a quarterly survey sponsored by the Bureau of Labor Statistics (BLS), also conducted by Census. It is based on a probability sample of about 6,000 households living in owner-occupied and rental housing. A detailed description of how the AHS and CE collect remodeling data can be obtained from the authors.

The Census Bureau and HUD publish remodeling expenditure statistics from each AHS, but these are limited to medians and distributions rather than aggregate amounts. For this paper, 2001 AHS remodeling expenditures data were tabulated from Census' internal microdata files. These files differ from the AHS public-use files in several ways; for example, variables are not "top-coded" for confidentiality, and other information is available including "write-in" text entries. The AHS remodeling data shown here were edited for errors and outliers by the authors.

We obtained the CE-based remodeling data shown here from Census' quarterly C50 report, *Expenditures for Residential Improvements and Repairs*. There are two sources for the C50 data: (1) the CE household survey of a sample of owner-occupied housing units and (2) a mail survey of the owners of sampled units identified as rental or vacant. C50 data will differ from

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<sup>1</sup>Remodeling statistics from other federal government surveys (such as the Economic Census and Residential Construction Building Permits) do not provide comprehensive measures of remodeling activity, and are not addressed in this paper.

CE remodeling data published by the BLS due to differences in definition, editing, and imputation.

This paper focuses on remodeling expenditures for owner-occupied housing units. Data on expenditures by the owner's of rental and vacant housing units are not available from the AHS. We have also not included repair expenditures in our tabulations, though we do discuss repairs as a source of discrepancy between the two surveys. The CE collects detailed data on repair expenditures, but the AHS only collects an estimate of total repair spending in a typical year which is of limited analytical value.

The term “remodeling” is used here to cover all work done on a house which increases its value or extends its life, or in economic terms, are additions to the capital stock. Remodeling encompasses a number of descriptions used in the AHS and the CE: additions, alterations, improvements, major replacements, and rebuilding from a disaster. In contrast, “repairs” are routine maintenance which keeps a house in its normal working condition.

### **Quantitative Differences**

Table 1 shows a comparison of AHS and C50 owner-occupied remodeling expenditures by job type for 2000-01. The C50 figures are summations of quarterly data for the two years.

Table 1. 2000-01 AHS and C50 Remodeling Expenditures by Type of Job  
(in millions of dollars)

Categories	AHS	C50	Difference	Percent Difference
Room Additions	21,646	18,706	2,940	15.7
Decks and Porches	5,834	4,013	1,821	45.4
Other Additions	5,681	3,701	1,980	53.5
Kitchen/Bathroom Remodeling	39,009	16,686	22,323	73.9
Finished Space/Int. Restructuring	21,353	14,223	7,130	50.1
Roofing	21,959	11,586	10,373	89.5
Siding	9,616	4,417	5,199	117.7
Plumbing	11,294	4,763	6,531	137.1
Electrical	4,186	1,038	3,148	303.3
Windows and Doors	15,344	10,271	5,073	49.4
Flooring	23,560	8,998	14,562	161.8
HVAC	16,197	12,692	3,505	27.6
Other Inside Remodeling	12,907	24,500	-11,593	-47.3
Driveways and Walkways	8,544	4,699	3,845	81.8
Fencing and Walls	6,162	3,540	2,622	74.1
Patios and Terraces	4,604	3,101	1,503	48.5
Detached Buildings	8,374	5,182	3,192	61.6
Recreational Facilities	8,735	6,018	2,717	45.1
Other Outside Remodeling	695	7,982	-7,287	-91.3
<b>TOTAL REMODELING</b>	<b>245,700</b>	<b>166,116</b>	<b>79,584</b>	<b>47.9</b>

At the total level the AHS home remodeling expenditures are about 48 percent higher than expenditures published in the C50 report. The categories with the largest differences are: kitchen and bath remodeling, flooring, other inside remodeling, and roofing.

Many factors make the analysis of the differences especially challenging. For one, the collection of remodeling expenditures in any survey is inherently difficult due to uncertainty of meaning (especially distinguishing remodeling from repairs) and problems with recall. For another, we are dealing with the results of two large and complex surveys having (1) different objectives and thus different emphasis, and (2) broader purposes and priorities than the complete and consistent measurement of remodeling expenditures over time. A good example of this latter point is the indefinite timing of the AHS interviews. The 2001 AHS remodeling data shown here do not represent actual expenditures in the years 2000 and 2001. This is because interviews were conducted between July and November 2001 and respondents were asked to report expenditures in the prior two years.<sup>2</sup> For the 2003 AHS, the interview schedule has been pushed forward to between June and September of 2003.

With that said, we can do much to improve how things stand. We have identified several sources for the differences, other suspected and possible sources, and other comparison differences. We have recommended areas of improvement and have discussed these with the survey staffs.

## **Sources of Differences**

### **1. C50 Under-Reporting**

The C50 report excludes certain remodeling expenditures collected in CE. These expenditures are included in the AHS and should be included in the C50 as well. It is not clear why these items have been excluded in the past, though it may have been an effort to be consistent with the Bureau of Economic Analysis' definition of "residential fixed investment in structures" in the Gross Domestic Product (GDP).

The excluded expenditures are:

**Kitchen appliances** - CE captures expenditures for kitchen appliances in two ways. Some are contained in the expenditures for the larger kitchen remodeling work reported in Section 5 of the questionnaire, while kitchen appliances purchased alone are reported in Section 6. The current intent of the C50 is to exclude the cost of all appliances, although this effort is not entirely

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<sup>2</sup>Thus, it might be more accurate to compare the 2001 AHS remodeling data with C50 data from the fourth quarter of 1999 through the third quarter of 2001. If we had used C50 data for that time period, the C50 total would have been larger by \$1.4 billion, and the difference between the surveys reduced by that amount. One reason for not doing this was that while C50 total expenditures are published quarterly, the expenditures by job type data shown in Table 1 are only published annually.

successful. Questions are asked in Section 5 to obtain the costs of appliances included in the expenditures for larger kitchen remodeling jobs, but because respondents are often unable or unwilling to separately identify the costs, only a small amount are in fact reported and excluded. On the other hand, the expenditures for appliances purchased alone in Section 6 are excluded from the C50, and for 2000-01 these amounted to an estimated \$19 billion based on unpublished CE estimates.

We have recommended that the purchase and installation of kitchen appliances, whether installed as part of larger remodeling jobs or installed alone be included in the C50 report. These appliances include refrigerators, built-in dishwashers and microwave ovens, garbage disposals, cooking ovens/stoves, ranges, and range hoods.

**Wall-to-wall carpeting** - As with kitchen appliances, the CE captures expenditures for wall-to-wall carpeting installed as part of larger remodeling jobs (Section 5) and carpet purchased alone (Section 8). This time though, the C50 does not attempt to exclude the Section 5 expenditures. All Section 8 expenditures are excluded, however.

We have recommended that the Section 8 expenditures for wall-to-wall carpeting be included in the C50 data. These amounted to an estimated \$9 billion in 2000-01 based on unpublished CE estimates.

**Manufactured (mobile) homes** - We also recommended that the C50 include manufactured (mobile) home remodeling expenditures which are currently excluded. Our AHS tabulations show that remodeling expenditures for these housing units amounted to an estimated \$7 billion in 2000-01.

**Work as a business expense** - Currently, the C50 excludes remodeling expenditures where the homeowner reports that they can deduct more than 50 percent of the cost. An example of this would be the construction of a home office in an unfinished basement. We have recommended that the C50 include these expenditures which we estimate to be about \$1 billion in 2000-01 based on unpublished CE estimates.

## 2. Suspected C50 Under-Reporting

The following are areas of suspected C50 under-reporting. Currently available information are not sufficient to allow for definite conclusions.

**Insurance and other payments by others** - Both the AHS and the CE instruct respondents to report the total cost of remodeling jobs even if some or all of the costs were reimbursed or paid directly by insurance companies, manufacturer's warranty programs, government grants, etc.<sup>3</sup>

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<sup>3</sup>As to whether respondents know how much was paid if covered by insurance, we would think that in most cases they do, especially if the insurance payment went through them or could estimate if not. There may be a small number of cases where this is not true.

We believe these reimbursed expenditures may be under-reported in CE because of its focus on out-of-pocket payments. Andrew Kochera, formerly of the National Association of Home Builders, observes that “the very name Consumer Expenditure Survey implies that consumers will under-report non-household expenditures (e.g., insurance payments made directly to contractors or as a ‘pass-through’), even if the survey instructs them to do otherwise.” A respondent who does report something may only report the deductible amount paid.

Mr. Kochera tabulated CE reimbursements for remodeling expenditures for 1994 and found that these payments accounted for less than 1 percent of total remodeling expenses or about \$1 billion. This seems low to him in relation to the \$27 billion spent on homeowner’s insurance premiums in 1997 according to the Insurance Information Institute.

**Recent movers** - A substantial amount of remodeling occurs when a house is sold, both by buyers and sellers, and more than five million houses have been sold annually in recent years. A Joint Center for Housing Studies (JCHS) analysis of AHS data shows that recent buyers spent an additional \$2,000 on average in 1998-9 on remodeling compared with non-movers.

The CE and AHS both capture buyer expenses provided the house is occupied by the buyer at the time of the survey interview. Expenses may be missed, however, if the house is not yet occupied. Kermit Baker of the JCHS suggests that remodeling often occurs before moving in and these may not be captured in CE if the house is vacant when the interviewer calls. (Conceptually, CE captures these remodeling expenditures as work done to a secondary residence while the buyer still lives at the current address. These expenditures would not be counted in the C50, however, since the report only includes remodeling done at primary residences.) Capturing buyer expenses is less of an issue for the AHS since they ask their respondents to report expenditures for the previous two years.

Most remodeling expenditures made by sellers may be missed by both surveys. CE may have some chance of including them if the seller had done the work and is interviewed prior to moving. The AHS will miss virtually all because of the two-year survey period.

**Remodeling misclassified as repairs** - In some situations, the CE/C50 will classify or tend to classify work as a repair when it should be remodeling:

Purchased materials - If a CE respondent reports in Section 5, Part A that materials or supplies were purchased ahead of time for a specific job not yet started, he or she is asked for the amount of the purchases and the type of work intended. Depending on the job-type reported, the C50 adds these amounts to either the specific job-type indicated or to the “materials to have on hand” category which is classified under repairs. We have recommended that those purchases added to “materials to have on hand” be placed in more appropriate categories under remodeling. Furthermore, the C50 includes all purchases of materials **not** for a specific job to the “materials to have on hand” category under repairs. Further research is needed to learn more about these purchases. Some may be more appropriately counted as remodeling.

Disasters - The AHS specifically asks for the cost of disaster rebuilding work and all of it is considered remodeling. In CE, field interviewers may classify disaster work (see suspected under-reporting of insurance above) as repairs depending on how respondents describe it in Section 5, Part B. For example, interviewers will likely classify a description such as “tornado repairs” as a repair. We have recommended that the CE add a question specifically asking if repairs/rebuilding expenditures were made because of a disaster which would allow for better classification and comparison with the AHS.

Outside work - Many outside improvements may be coded in CE as repairs rather than remodeling because of the way Section 5, Part A is worded. The respondent is given a choice between “building” something or “repairing” something, with no choice for “improving” something. We would think that improvement work such as the resurfacing of driveways would tend to be incorrectly classified as a repair. We have suggested new questionnaire wording to BLS.

Complete replacements - For roofing, siding, and water pipes, the CE coding specifications require that a job be a “complete” replacement to be counted as remodeling. Presumably anything less (for example, the replacement of most of the siding) would be a repair. The AHS field interviewer would likely classify many less-than-complete replacements as remodeling, since the questionnaire simply asks, for example, “have you added or replaced siding?”

### 3. Possible AHS Over-Reporting

The AHS may have two important reporting problems which may result in the over-reporting of remodeling expenditures: (1) repairs misclassified as remodeling, and (2) problems with recall.

**Repairs reported as remodeling** - For three job types (disaster rebuilding, other inside work, and other outside work) the AHS obtains a text description of the work done. An examination of these AHS “write-in” descriptions showed a significant amount of repair work reported and other out-of-scope activities such as landscaping and decorating. These expenditures amounted to about \$3 billion in the 2000-01 AHS and were excluded from the data shown in Table 1. Determining the extent of this problem in any of the other job types is not possible, however, since descriptions were not collected.

**Recall** - Recall problems are presumably a greater issue for the AHS with its two year recall period than it is for the CE (three month recall).

AHS respondents may duplicate expenditures in two survey periods. This double reporting is often due to “telescoping” or the reporting of work the respondent thinks occurred more recently than it actually did. To counter this, the AHS is “bounded.” This means that field interviewers are prompted to verify responses if reported jobs in the current survey were also reported in the prior one. An examination of the 2000-01 AHS shows that a significant number of remodeling responses (10.4 percent or twelve million weighted jobs) were deleted because they matched prior survey responses. Nevertheless, bounding does not identify jobs reported differently in the



subsequent survey. For example, adding a bathroom may be reported as “bathroom addition” one survey year and “bathroom remodeling” in another.

Of course, respondents may fail to remember other expenditures entirely and this may be a larger problem in the AHS. We have no way of evaluating this.

#### **4. Under-Reporting of Remodeling by Both Surveys**

Neither the AHS nor the CE surveys are designed to capture certain types of construction on the periphery of what we typically think of as residential remodeling.

**Condominiums** - Remodeling work done inside a condominium unit and paid for by the homeowner will probably be reported in both surveys. However, work done on the part of the building or grounds owned by the condominium association (and paid with condominium fees or special assessments) may be missed.

The AHS manual instructs field interviewers to include an expenditure in cases where the sample condominium unit was billed or assessed for the work even if the work did not directly involve the unit. However, the AHS does not ask questions about work done outside the structure if the respondent lives in an owner-occupied multi-unit building. Roofing and siding work may be included, but not outside work such as driveways or fencing. For the CE, all condominium payments and assessments are reported in Section 3 of the questionnaire, not Section 5. No questions are asked regarding the reason for the payments in Section 3.

**Splits, mergers, and conversions** - The AHS and the CE likely do not capture most of the remodeling work done on splits, mergers, and conversions. Neither survey has any field interviewer instructions on this subject nor refers to it in any remodeling questions. Examples of this work: (In the first two cases, the houses are already in sample.)

Split - A homeowner converts a basement into a separate apartment unit which they will rent. The new unit is likely added to the samples, but the AHS and the C50 probably miss the remodeling expenditures to create it since the unit will not be owner-occupied.

Merger - A homeowner on one side of a semi-detached house buys the unit next door and creates one large house. Whether the new house stays in sample and the expenditures captured depends on the resulting address of the unit and which of the original addresses was in sample.

Conversion - A person buys a small store and converts it to a house. Because the housing unit is not new construction it is likely not eligible to be added to either survey.

**Work done by renters** - Remodeling work done by renters is not collected in the AHS nor reflected in the owner-occupied C50 data shown here. CE data shows that about 1 percent of the total remodeling and repair dollars spent by consumer units were spent by the renters themselves.

## 5. Other Possible Sources of Differences and Other Comparison Issues

**Survey procedures** - Differences in survey procedures may lead to differences in remodeling estimates and varying degrees of nonsampling error.

The AHS is conducted by telephone about half the time and by personal interview the other half. The interviews last about forty minutes on average. The CE is done by personal interview all the time and the average length is about ninety minutes. AHS field interviewers work on the survey for a few months every two years. CE field interviewers work on the survey every month.

The AHS takes the respondent through the list of remodeling jobs rather quickly asking a minimum of questions. The CE respondent has to answer many more questions in Section 5, Part A and Part B (for each job). On the other hand, the CE is very thorough when it comes to collecting expenditures.

**Sample design and estimation** - Differences in the way the surveys are designed and samples selected, and the way estimates are produced, may lead to differences in the remodeling expenditures.

The AHS sample design is based on the 1980 Decennial Census and the CE on 1990.<sup>4</sup> As a result, there may be differences due to shifts in basic household characteristics, migration of population, etc. For 2001, the AHS shows 72,265,000 owner-occupied housing units while the CE shows 73,010,000 homeowner consumer units. By year-built, the AHS has a slightly higher proportion of older homes. There are also differences in the percentage shares of manufactured (mobile) homes and condominiums.

Both surveys are address-based, but stratification is different. The AHS is stratified to provide a cross-section of types of housing; the CE to provide a cross-section of income and spending. Neither survey is stratified to optimize the collection of remodeling expenditures. There are also unmeasurable effects from differences in weighting procedures, item nonresponse rates, and differences in imputation procedures. For example, it may be the case that the remodeling questions are completely skipped more often by CE respondents than AHS respondents. Unfortunately, we have no way to distinguish nonresponses from responses showing that no work was done.

**Classification** - There are classification differences besides remodeling versus repair which are important to note, although they will not affect the bottom-line comparisons shown in Table 1.

By job type, one reason the C50 has much larger expenditures in the “other” categories than the AHS is due to the way combined jobs are handled. In the AHS, if the cost of remodeling work involving multiple jobs cannot be separated, the field interviewer is instructed to enter the total

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<sup>4</sup>Both surveys are continuously updated for new construction based on samples of building permits.

cost under the first job listed, and a “1” as the amount for all other jobs. (This procedure may distort expenditures in some job type categories.) In the CE/C50, the total cost of a job like this is most likely classified in one of the “other” remodeling categories.

There may be other differences in classification by type of job, especially in areas like adding rooms, finishing space, and restructuring rooms. Telling where these jobs may be classified is difficult. For example, it is conceivable that building a bathroom in the basement may be classified as any of the following: bathroom remodeling, finishing space, or adding a bathroom. The choice of the respondent will influence the classification.

Concerning who does the work, the AHS data for 2000-01 shows that 78 percent of remodeling expenditures were spent on professional contractors. The other 22 percent was do-it-yourself (DIY) work. The C50 data shows an 89 to 11 percent split. There are probably several reasons for the AHS showing more DIY work. We suggest two:

When a job involves both a professional and a DIYer, the CE asks the respondent to separate the costs, while the AHS classifies the total cost based on who does most of the work. If it is more often the case that for jobs involving both, that only the smaller, more difficult parts of the jobs are done by contractors, then the AHS will show more DIY work than the CE. A second reason the AHS shows more DIY may be the result of AHS respondents incorrectly reporting repair jobs, as seen in the “write-in” entries, which are often done by DIYers.

### **Summary**

Some recommendations we have made will have an important impact on the published data. With the addition of the missing C50 items (kitchen appliances, wall-to-wall carpeting, work on manufactured houses, and work deducted), the difference in remodeling expenditures between the surveys in 2000-01 will be reduced from about \$79 billion to about \$43 billion; the percentage difference will drop from 48 to about 21 percent. The kitchen/bath and flooring categories, in particular, should look much better. It is the plan of the Census Bureau to make these additions in the C50 as soon as possible, probably in early 2004.

We have also presented a list of suspected sources, possible sources, and other comparison issues. It is our intent to continue to work on these issues with the staffs responsible for the surveys. We would also like to work toward eliminating classification and tabulation differences. This would be a great help to data users and could be done by reducing as much as possible differences in questionnaire wording and instructions. In this interest, we have recommended to both surveys the attached remodeling job types for publication. We also especially need clear operational definitions to differentiate remodeling and repairs at the field interviewer level and for the public.

Finally, differences will always remain and there will continue to be gaps in remodeling coverage. Inherent problems like insurance payments and recent movers in CE, and the indefinite timing of the AHS will be difficult to overcome. While the intents of the surveys are quite valid, their primary focus is not remodeling expenditures.

**Residential Remodeling, Improvements, and Repairs**  
Proposed New Classification

1. Disaster rebuilding
2. Additions
  - a. Adds square footage (rooms)
  - b. Attached to the house (deck, porch, garage)
3. Remodeling
  - a. Kitchen remodeling
  - b. Bathroom remodeling
  - c. Finish unfinished rooms
  - d. Other interior remodeling
4. Other Improvements and Replacements to the Structure
  - a. Roofing
  - b. Siding
  - c. Doors and windows
  - d. Floors
  - e. Electrical
  - f. HVAC
  - g. Plumbing
  - h. Insulation
  - i. Other
5. Outside Improvements and Replacements
  - a. Driveways and walkways
  - b. Fencing and walls
  - c. Patios and terraces
  - d. Recreation
  - e. Detached buildings
  - f. Other
6. Repairs
  - a. Painting and papering
  - b. Roofing
  - c. Siding
  - d. Doors and windows
  - e. Floors
  - f. Electrical
  - g. HVAC
  - h. Plumbing
  - i. Insulation