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Effects of Changes in Ownership on Repair and Remodeling Behavior in Owner-Occupied Housing

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The U.S. Department of Housing and Urban Development (HUD) funds the Census Bureau to conduct the American Housing Survey (AHS), a biennial record of the quality, use, and condition of the national housing stock combined with periodic examinations of the housing stock in 47 major metropolitan areas. In 2004, HUD contracted with Econometrica, Inc., and ICF Consulting to support the production and use of the AHS. As part of that contract, HUD commissioned this study of the relationship between the purchase and sale of a home and repair and remodeling behavior.

Housing economists believe that repair and remodeling behavior is important because it maintains the overall stock and modifies individual housing units to better provide housing services to their residents. From an economic perspective, the housing stock is the accumulation of past investments in the construction of homes and apartments; that is, in housing capital. All physical capital, including housing capital, depreciates through physical wear and tear and through obsolescence. In general, repairs and remodeling help maintain the physical soundness of the housing stock and enable the stock to meet modern needs. As applied to a specific unit, repair and remodeling activity can alter the existing capital embodied in that unit to better serve the needs and tastes of its household.

A number of factors influence the amount and types of repair and remodeling activity undertaken with respect to a particular unit. These factors include: the age and condition of the unit, the extent to which the unit fails to meet the needs or desires of its residents, the costs of needed or desired changes, the income and wealth of the household, the ability of the household to do the work associated with changes, the condition of the neighborhood, the expected time horizon over which the household can anticipate receiving the benefits from repairs and remodeling, and the prospects for recovering the costs at the time of sale. Outside events, such as fires and disasters or code enforcement, can also affect repair and remodeling behavior.

At HUD's request this study focuses on the relationship between the purchase and sale of a home and repair and remodeling activity. HUD's interests are twofold: to explore the issues involved in using the AHS for this purpose and to perform some preliminary analysis using the 1999 and 2001 AHS national data. The remainder of this report consists of five sections:

- A brief examination of the factors associated with the purchase and sale of a home that might influence repair and remodeling behavior.

- A discussion of the AHS data and conceptual issues involved in using the AHS to study repair and remodeling behavior.
- A discussion of practical difficulties in working with AHS data for this purpose.
- An analysis of AHS data on repair and remodeling activity before and after a change in ownership through a sale.
- A brief summary of findings and suggestions for further analysis.

Repair and Remodeling Incentives of Buyers and Sellers

This section focuses on the reasons buyers and sellers of homes might undertake repair or remodeling activities. The section pays attention to the timing of the repair and remodeling activity in relationship to the actual sales date because of the way the AHS collects data.

Buyers and Repair and Remodeling Activity

Households vary in what they are looking for in a home. During the search period, a household will consider many factors. Important location features include: nearness to current jobs or job opportunities, the convenience of shopping, the quality of local schools, the attractiveness of the neighborhood, and the availability of public transportation. Other considerations relate to the tangible features of the structure, such as style (colonial, ranch, contemporary, and so forth), square footage, the number of rooms, the number of bathrooms, lot size, type of heating equipment, basement or attic storage, and the presence or absence of amenities such as air conditioning, fireplace, patio, deck, and swimming pool. The quality and condition of the unit matter. Finally, cosmetic factors, such as the color of the house, the condition or color of the carpeting, or the choice of wallpaper, can influence the decision to buy a particular unit or keep looking. Unless a household contracts to have a home built to its unique specifications, it is unlikely that the household will find a unit, either newly constructed or existing, that satisfies all its needs and matches its tastes fully. In the end, the household makes certain compromises in selecting a unit.

Repair and remodeling activity gives a household the opportunity to retrofit a house to the household's needs and tastes. With this in mind, a household may select that house that comes closest to meeting its needs and tastes for the price of the house and the anticipated costs of any changes. Because location deficiencies cannot be remedied by repairs or remodeling, location considerations are likely to play a dominant role in choosing a unit. Physical features that would be expensive or impossible to change through repairs or remodeling, such as house style or the presence of a basement, also may play a dominant role. But many physical features, such as the number of bathrooms, and almost all cosmetic features can be altered through repairs and remodeling. Many households, therefore, may purchase a home fully intending to make changes to the unit.

Time complicates looking for a relationship between the purchase of a home and subsequent repair and remodeling activity. Certain repair and remodeling activities are involuntary and generally occur in response to events such as the breakdown of equipment or damage from fire, storms, or other disasters. Voluntary repairs and remodeling can take place anytime. With this in mind, one could group voluntary activities into three categories:

- Post-purchase immediate fix-up.
- More extensive work to reconfigure the unit to meet the household's needs as identified at the point of sale or move-in.
- Further modifications to meet new needs or newly recognized needs.

Regardless of the length of time a household has owned a unit, all repair and remodeling activity that is unrelated to the sale of the unit attempts to make a unit better fit the needs or tastes of its residents. For this reason, it is difficult to know which activities were intended at the point of purchase and which were conceived over time.

One might assume that households would choose to make inexpensive cosmetic changes soon after purchase, sometimes even before move-in. These cosmetic changes might include repainting, wallpapering, replacing carpet, refinishing wooden floors, or replacing vinyl floors. Households with an immediate need for more space might refinish a basement, convert another room into a bedroom, or construct a small addition. On the other hand, households that plan to grow might postpone such changes until later.

If the purchased unit meets a family's most essential needs, repairs and remodeling become discretionary activities dependent on household income and competing consumption needs. Sometimes households stretch financially to purchase a home and have little or no excess cash immediately after the purchase for discretionary activities. Depending upon the downpayment a household made, it might have insufficient equity to arrange a home equity loan immediately after purchase. In fact, the realities of financing a home suggest that if a feature is important to a household, the household will look for a house with the feature rather than attempt to add the feature later through repairs or remodeling. A feature already in the home can be fully financed with the purchase, whereas a feature added after purchase might have to be paid for out of current resources.

Sellers and Repair and Remodeling Activity

The seller has clear incentives for undertaking some repair or remodeling activity. The seller should be willing to do anything that maximizes the difference between the sales price and the costs of repairs and remodeling, taking into account the costs of his or her own efforts. The issue is the ability to recover the costs of any specific repair or remodeling activity.

The seller will likely perform inexpensive cosmetic fix-ups, such as keeping the lawn mowed and pulling weeds, repairing a broken shutter, removing clutter in the house, or

repainting the kid's purple bedroom. These activities are likely to increase the sales price by significantly more than the cost of performing them. The ability to recover the costs of expensive remodeling activities is doubtful. Refinishing a basement or remodeling the kitchen may increase the sales price by less than the cost of the work. The recovery potential for less costly activities such as repainting or recarpeting may be uncertain. Some buyers may be willing to undertake repainting or recarpeting in exchange for a slightly lower house price because they will control the color and quality of the work. However, the realities of how home purchases are financed create a bias in favor of seller-performed work. If it costs \$3,000 to recarpet a house, a buyer may be willing to pay \$4,000 more for the house because his or her out-of-pocket costs with a 10-percent downpayment are only \$400, while the out-of-pocket costs after purchase is \$3,000.

With respect to the timing of repairs and remodeling by sellers, one could break the time before sale into the following periods (some of which may not apply in all cases):

- Owners do not anticipate selling units.
- Owners anticipate a sale in the near future.
- Owners set approximate date for putting unit on market.
- Owners put unit on market.
- Sales contract signed.
- Owners vacate unit.
- Closing.

Presumably, any repairs and remodeling in the first period would be unrelated to the sale of the unit. However, except for involuntary repairs related to equipment breakdowns or damage from fires, storms, or other disasters, any repair or remodeling activity during the first three periods must take the impact of the activity on sales price into account. It is important to note that the seller may make repairs or undertake remodeling during the "sales contract signed" or "owners vacate unit" period that are directly related to the sale. As part of the sales contract, the buyer may have negotiated certain repairs or remodeling changes. In these cases, the seller bears the costs and efforts involved in the repair and remodeling activity, but the buyer determines what is to be done.

AHS Data and Repairs and Remodeling

The AHS is well suited to the analysis of repair and remodeling activity for several reasons:

- It is a large, nationally representative sample.
- It has a detailed home improvement module asked of all homeowners.
- It collects detailed information about the unit, the household, and the neighborhood.

- Its longitudinal structure (repeated interviews of the same unit at 2-year intervals) offers an interesting research possibility, comparing repair and remodeling by the buyer and seller.
- The biennial repetition of the survey offers future possibilities to expand the sample size by using earlier or later AHS's as well.

The AHS does have some drawbacks for studying repairs and remodeling related to a transfer of ownership through a market sale. The major problem is that the timing of the data collection is unrelated to the sale of the house. The national AHS collects data between August and November of odd-numbered years. In this study we use the 1999 and 2001 national surveys. Depending upon the timing of the sale, the 1999 AHS data for a given unit might cover all the pre-sale fix-up activity or only part of the pre-sale fix-up. Similarly, the 2001 AHS data for a given unit might cover all or only part of the post-sale fix-up. The coverage of the fix-up period will vary across units. A related problem deals with ascribing repair and remodeling activity to a sale. Because the data are collected independent of whether a sale occurs, sellers and buyers are not asked whether the activity was related to the sale.

As noted earlier, some repair and remodeling activity is involuntary. Some means must be found to control for this involuntary activity. We use the repairs and remodeling undertaken by owners who neither sold nor purchased their units between 1999 and 2001 as a control. Unfortunately, this is not a perfect control because it includes voluntary activity as well. From the perspective of the buyer, using the activity of other owners as a control underestimates the level of repairs and remodeling related to the sale because of the inclusion of voluntary activity. From the perspective of the seller, using this control also probably underestimates repair and remodeling activity as well for a different reason. As explained earlier, once an owner decides to sell his or her house, any repair or remodeling must take the impact on sales price into account. If a repair or remodeling activity does not improve sales price by more than the cost of the activity, then a rational seller would not undertake that activity unless it had an immediate payoff in terms of a better living environment. Owners who are not contemplating a sale have a longer horizon over which to evaluate the activity's benefits for themselves, and thus are more likely to undertake voluntary repair and remodeling activities.

A second disadvantage of AHS data relates to the level of information obtained. Although the home improvement (HOMIMP) module contains detailed information on the level and types of repairs and remodeling, it does not contain information on some of the least expensive activities such as painting.

Working with AHS Data

We merged the 1999 and 2001 AHS public use files (PUF). The merged file contained 60,380 observations. When we restricted the data to observations that were (1) interviewed in both 1999 and 2001, and (2) owned in both 1999 and 2001 (tenure not

allocated), the number of observations dropped to 24,005. This might appear to be a large drop-off in sample size. Although rental units account for approximately one-third of the housing stock, the number of observations dropped by 60 percent. Further analysis, however, showed that the decline was reasonable. A large percentage of units (22 percent in each year) have no value for TENURE (owner/renter status of unit).¹ This percentage is consistent with the definition of TENURE in the codebook. Roughly 40 percent of the 22 percent were out of universe because they were either vacant or usual residence elsewhere (URE) units at the time of interview. In 1999, type B and type C non-interviews accounted for the other 60 percent of the 22 percent.² (There were only 232 allocations of TENURE in 1999 and only 314 in 2001.)³

We originally planned to use SAMEHH (same household members live in unit) to identify owner-occupied units that changed owners between the 1999 and 2001 surveys. We also planned to experiment with using MOVE1 (year householder moved in) as an alternative for identifying units that changed owners. During the analysis we discovered an inconsistency between SAMEHH and MOVE1.

We used both SAMEHH and MOVE1 to identify a set of owner-occupied properties that may have changed owners between the 1999 and 2001 surveys. We then looked at the distribution of WHNGET (year unit bought/obtained/received) for both sets of properties. The distribution of WHNGET was somewhat better for the set identified by MOVE1. So we were inclined to use MOVE1. However, approximately 50 percent of the properties identified by MOVE1 as having changed ownership were classified as "same household" by SAMEHH. To see if this problem was more general, we identified all observations, both owner-occupied and rental, in the 2001 survey with MOVE1 = 2000 or 2001. Thirty-six percent of these had SAMEHH = 1 (same household). When we identified all observations in the 1999 survey with MOVE1 = 1998 or 1999, the percentage with SAMEHH = 1 was 44 percent. Barbara Williams of the Census Bureau explained by e-mail that the Census Bureau has had problems with SAMEHH since the survey redesign in 1997. For this reason, we decided to rely entirely on MOVE1 and MOVMI (month householder moved in).

Using MOVE1 and MOVMI, we separated the owner-occupied units into three groups based on who occupied the unit in 1999 and 2001. We had two goals: first, to find units that changed owners between surveys so that we could study the repair and remodeling behavior of sellers prior to a sale and the repair and remodeling behavior of buyers after a purchase; and second, to find units that had the same owners in both surveys so that we could use them as a control group. The third group came about because we were unable

¹ Words or abbreviations in capital letters are the names of AHS variables or modules. We provide here a short definition of each variable. More information can be found in the most recent AHS codebook, which can be downloaded at http://www.huduser.org/intercept.asp?loc=/Datasets/ahs/AHS_Codebook.pdf.

² A type B non-interview is a unit that is temporarily out of the housing stock; for example, because it is being used solely for business purposes or it is unfit for habitation. A type C non-interview is a unit that is permanently out of the housing stock; for example, because it has been destroyed or demolished.

³ If respondents do not answer certain questions such as TENURE, the Census Bureau will assign an answer to that question. This process is called allocation. Allocations are explained in the codebook.

to determine in some cases whether a new owner had responded to both the 1999 and 2001 surveys. The three groups were defined as follows:

- Units that change ownership between surveys: We used the following code to identify this group, where the suffix IN2001 indicates that the variable was taken from the 2001 survey: IN2001_MOVE 1 > 1999 or (IN2001_MOVE1=1999 and IN2001_MOVM1=12[December]). We included this second condition to pick up households who had moved into a unit after the 1999 AHS survey concluded in November 1999.
- Units that did not change ownership between surveys: We used the following code to identify this group: IN2001_MOVE1<1999 or (IN2001_MOVE1=1999 and IN2001_MOVM1<8[August]). The second condition was based on the fact that the 1999 AHS survey did not begin until August 1999.
- Units that may or may not have changed ownership between surveys: We used the following code to identify the group that moved in during the period when the 1999 AHS survey occurred: IN2001_MOVE1=1999 and 8<IN2001_MOVM1 ≤11.

This approach yields 1,684 occupied units that appear to have changed owners between the 1999 and 2001 surveys, as shown in Table 1.

Table 1. Distribution of Matched 1999 and 2001 AHS Samples by Move Status

	Units	Percent
Change in owner	1,684	7
No change in owner	21,946	91
Change in owner uncertain	375	2
Units owner-occupied in both surveys	24,005	100

When we performed a frequency distribution of WHNGET by group, we found a good deal of consistency. Of the 1,684 “Change in Owner” units, WHNGET indicates that 739 were obtained in 2001, 810 in 2000, and 61 in 1999. Only 74 (4.4 percent) were obtained prior to 1999. Of the 21,946 “No Change in Owner” units, 48 (0.2 percent) were obtained in 2000 or 2001; another 924 (4.2 percent) were obtained in 1999.

We could have worked with the first two groups, but decided to refine them further. There are legitimate reasons why MOVE1 and WHNGET may not always agree. For example, a daughter who inherits a house that she has lived in for years with a parent would have a WHNGET much later than MOVE1. An owner who converts a weekend house into his permanent residence might have a WHNGET much earlier than his MOVE1, depending upon how he answered the MOVE question. While these examples and other cases represent legitimate changes in ownership, the context of the change is different from the sales and purchases we are studying in this task. In neither example would the owner be interested in making the property more attractive for other buyers. For this reason, we decided to drop these units. We eliminated the 74 pre-1999 units from

the change in ownership group and the 972 post-1998 units from the no change in ownership group.

As a further test of the groups, we looked at MARKET (unit currently for rent or sale) in both 1999 and 2001. In the 1999 survey, 10 percent of respondents in the units identified as having changed owners between 1999 and 2001 indicated that the unit was for sale or rent. Only 0.6 percent of the respondents in the units identified as not having changed owners indicated that the unit was for sale or rent. By 2001 when the first group's units had already changed hands, there was no difference in the percentage of units for sale or rent—1.7 percent in both groups.

For the analysis, we used 1,610 “change in owner” units to study the behavior of sellers in 1999 and of buyers in 2001. We refer to this group as “sellers” in the 1999 survey and “buyers” in the 2001 survey. We also have 20,974 “no change in owner” units to serve as a control group in both years. We created a new group, called “active sellers,” defined to include members of the change in owner group who indicated that their units were already on the market for sale or rent. Active sellers include 156 cases.

Analysis of Repair and Remodeling Behavior

Aggregate Measures

The home improvement (HOMIMP) module in the AHS contains a number of variables that record repair and remodeling activity over the previous 2 years. We chose seven measures to provide an aggregate picture of this activity. The AHS distinguishes between minor changes (alterations and repairs) and major changes (replacements and additions). We calculated the percent of units reporting each activity and the mean expenditures for each type of activity. (The means are based on units that reported non-zero expenditures.) We also looked at the mean number of replacements and additions. The last two variables focus on the most dramatic changes to a structure: the addition or subtraction of square footage. Because of a survey design error, the Census Bureau did not collect this information in the 1999 AHS.

Table 2 uses these seven measures to compare the repair and remodeling activity of “sellers” between 1997 and 1999 with that of other owners, and the repair and remodeling activity of buyers between 1999 and 2001 with that of other owners.

Table 2. Aggregate Measures of Repair and Remodeling Activity
(The name of the AHS variable used is in parenthesis.)

R & R Variable	1999 AHS Sellers	1999 AHS Long-Term Owners	2001 AHS Buyers	2001 AHS Long-Term Owners
Percent making alterations and repairs (RAD)	46.9%*	51.9%	50.1%*	55.0%
Mean cost of alterations and repairs (RAD)	\$2,250.01	\$2,526.39	\$2,125.57*	\$2,897.44
Percent making replacements and additions (RAC)	49.8%*	54.4%	54.0%	52.7%
Mean cost of replacements and additions (RAC)	\$4,932.48	\$5,318.42	\$5,848.16	\$5,965.80
Mean number of replacements and additions made (RAN)	2.87	2.72	3.15*	2.58
Percentage of units with change in square footage (USFCHG)	NA	NA	1.4%	1.9%
Mean increase in square footage (USFCAM)	NA	NA	909	696

*Statistically different from the control group at the 0.05 level of significance.

The two right-hand columns compare the repair and remodeling behavior of buyers and other owners between 1999 and 2001. Buyers were significantly less likely to make alterations and repairs than the long-term owners, and those who made alterations and repairs expended significantly less on them than long-term owners. There was no significant difference between buyers and long-term owners in the likelihood of undertaking replacements and additions or in expenditures on replacement and alterations. However, buyers who undertook replacement and alterations were more likely to carry out more replacement and addition projects. While a smaller percentage of new owners changed the square footage of their units than in the control group, the mean increase in square footage was larger. Neither difference was statistically significant. As noted earlier, the long-term owner estimates include voluntary repair and remodeling activities designed to improve the unit from the perspective of current owners. For this reason, comparing the difference between the buyer group and the control group underestimates the level of activity undertaken by the buyer group.

The second and third columns compare the repair and remodeling activity of sellers and long-term owners between 1997 and 1999. Sellers were significantly less likely to make either alterations and repairs or additions and replacements. Sellers who undertook these activities expended less than long-term owners, but the differences are not statistically significant. Sellers who undertook replacements and additions did marginally more of those items than long-term owners, but the difference again is not statistically significant. As explained earlier, comparing sellers to other owners has two effects. First, it controls for involuntary activity resulting from the failure of a system or from damage sustained in a fire, severe storm, or other disaster. Second, it also compares voluntary activity undertaken by owners seeking to increase the benefits they receive from their units with the voluntary activity of sellers seeking to enhance their properties' value (and perhaps receive some short-term benefits). These aggregate measures would suggest that normal improvement or upgrade activity is greater than value-enhancing activity. This behavior

could indicate that sellers decide that they will not recover the costs of repairs and remodeling, or that they believe a more effective selling strategy is to keep the price lower and let the buyer make the changes he or she desires.

The seller group includes units sold at the end of 1999, in 2000, and in 2001. The 1999 AHS asked these owners about repair and remodeling activities that took place over the previous 2 years. It is possible that, for many of these owners, these activities took place before the owner had made a decision to sell the unit. For this reason, we focus on two subgroups of sellers who may have been more conscious in 1998 or 1999 of an upcoming sale. The two subgroups are the 156 cases in which 1999 owners indicated that their units were already on the market for sale or rent, and the owners of units that changed owners in 2000 or in December 1999.⁴ We call these groups “active sellers” and “2000 sellers,” respectively. Table 3 compares the repair and remodeling activities of these groups with the control group of long-term owners.

Table 3. Aggregate Repair and Remodeling Activity of Sellers of Units Already on the Market or Units Sold Before 2001

R & R Variable	1999 AHS Active Sellers	1999 AHS 2000 Sellers	1999 AHS Long-Term Owners
Percent making alterations and repairs (RAD)	56.4%	46.1%*	51.9%
Mean cost of alterations and repairs (RAD)	\$2,420.76	\$2,342.38	\$2,526.39
Percent making replacements and additions (RAC)	60.9%	48.9%*	54.4%
Mean cost of replacements and additions (RAC)	\$5,293.36	\$5,404.96	\$5,318.42
Mean number of replacements and additions made (RAN)	3.59*	3.04	2.72

*Statistically different from the control group at the 0.05 level of significance.

Despite having identified sellers whose repair and remodeling activities in 1998 and 1999 may have been more clearly motivated by an upcoming sale, the results are very similar to the results for all sellers. One difference is that active sellers were more likely to have undertaken both alterations and repairs and replacements and additions than long-term owners, but the differences are not statistically significant. When we expand the focus to 2000 sellers, the results are statistically significant, but now sellers are less likely to carry out either type of activity. There are no statistically significant differences between expenditures on alterations and repairs or on replacement and additions between either group of sellers and long-term owners. On average, active sellers, who do undertake replacement and addition activities, carry out more of these activities than long-term owners and the difference is statistically significant.

⁴ There were 863 units that changed ownership in 2000 or in December 1999.

Specific Replacements and Additions

Aggregate measures may not tell the whole story of repair and remodeling. Buyers and sellers might spend amounts equivalent to other owners for repairs and remodeling, but might chose to fix or change different features of their homes. The HOMIMP module asks respondents whether they undertook 44 different types of replacements or additions. Table 4 compares the percentages of respondents who indicated they carried out different replacements or additions.

**Table 4. Specific Repair and Remodeling Activities Carried Out by Sellers, Buyers, and Other Owners
(percent of owners performing each activity)**

R & R Variable	1999 AHS Sellers	1999 AHS Long-Term Owners	2001 AHS Buyers	2001 AHS Long-Term Owners
Percent disaster required repairs	1.5	2.1	1.2*	1.9
Percent created finished bathroom from unfinished space	0.8	0.5	0.6	0.5
Percent created finished bedroom from unfinished space	1.0	0.9	0.7	0.5
Percent created finished recreation room from unfinished space	0.9	1.0	1.7*	0.8
Percent created other finished inside room from unfinished space	1.4	1.7	2.1*	1.3
Percent added bathroom onto home	0.1*	0.4	0.2	0.3
Percent added kitchen onto home	0.1	0.1	0.1	0.1
Percent added bedroom onto home	0.3	0.5	0.4	0.4
Percent added other inside room onto home	0.5*	1.1	0.8	1.0
Percent added attached garage onto home	0.2	0.4	0.2	0.2
Percent added porch onto home	0.9	1.3	0.6	0.9
Percent added deck onto home	1.2*	2.0	1.7	1.5
Percent added carport onto home	0.1*	0.3	0.3	0.3
Percent added other outside structure onto home	0.6	0.8	0.8	0.8
Percent bedroom created through structural changes	1.0	0.8	1.1	0.6
Percent other room created through structural changes	1.1	1.3	2.2*	1.1
Percent added/replaced roof over entire home	8.5*	10.6	7.2*	9.8
Percent added/replaced siding on home	3.6	3.9	2.1*	3.5
Percent added/replaced internal water pipes in home	4.0	4.5	5.5*	3.9

R & R Variable	1999 AHS Sellers	1999 AHS Long-Term Owners	2001 AHS Buyers	2001 AHS Long-Term Owners
Percent added/replaced electrical wiring, fuse boxes, or breaker switches in home	5.7	6.3	10.9*	5.3
Percent added/replaced doors or windows in home	10.8	12.0	13.1	12.0
Percent added/replaced plumbing fixtures in home	9.3	9.3	12.5*	9.4
Percent added/replaced insulation in home	3.3	4.0	5.0*	3.7
Percent added wall-to-wall carpeting over subflooring	9.2*	6.3	12.2*	5.9
Percent added wall-to-wall carpeting over finished floor	5.2	6.0	7.5*	5.0
Percent added other types of flooring such as wood, tile, marble, or vinyl	14.0*	12.2	18.5*	11.8
Percent installed paneling or ceiling tiles	3.0	2.7	2.8	2.2
Percent added/replaced central air conditioning	5.5	5.9	4.7	5.4
Percent added/replaced built-in heating equipment	4.7	5.2	4.7	5.1
Percent added/replaced septic tank	0.6	0.6	0.5	0.5
Percent added/replaced water heater	7.5	7.6	6.0	8.4
Percent added/replaced built-in dishwasher	6.3*	5.0	8.5*	5.2
Percent added/replaced garbage disposal	4.6*	3.5	5.2*	3.4
Percent other major improvements or repairs inside home (up to three could be reported)	2.3	2.4	3.0	2.2
Percent added/replaced driveways or walkways	4.8*	6.2	6.0	5.3
Percent added/replaced fencing or walls	6.3	5.3	8.6*	5.3
Percent added/replaced patio, terrace, or detached deck	2.8	3.4	3.0	3.2
Percent added/replaced swimming pool, tennis court, or other recreational structure	0.9*	1.4	1.4	1.4
Percent added/replaced shed, detached garage, or other building	2.9*	3.9	3.7	3.3
Percent other major improvements or repairs to lot or yard (up to three could be reported)	1.9	1.6	2.1	1.3
Percent remodeled bathroom	6.6	5.6	7.9*	5.4
Percent remodeled kitchen	5.7	4.7	6.9*	4.3

R & R Variable	1999 AHS Sellers	1999 AHS Long-Term Owners	2001 AHS Buyers	2001 AHS Long-Term Owners
Percent bathroom created through structural changes	0.5	0.4	0.3	0.3
Percent added/replaced security system in home	2.4	2.7	5.0*	1.6

*Statistically different from the control group at the 0.05 level of significance.

What is interesting about this tally is the consistent pattern of sellers having lower percentages than other owners, and buyers having higher percentages than other owners. Excluding the disaster category (first row), sellers had lower percentages than other owners in 30 categories and higher percentages in 13 categories. Buyers had higher percentages in 27 categories, the same percentage in 2 categories, and lower percentages in 14 categories.

In general, the percentage of owners (sellers, buyers, or long-term owners) performing any given activity is small, and in most cases the differences between sellers and long-term owners and between buyers and long-term owners are small. However, the large sample sizes result in a number of statistically significant differences. Among the 12 statistically significant differences between sellers and long-term owners, sellers were less likely to perform the activity than long-term owners in eight cases. Sellers were more likely to install wall-to-wall carpeting, add vinyl or other types of flooring, add or replace a dishwasher, and add or replace a garbage disposal.

Excluding the disaster category (first row), there were 18 statistically significant differences between buyers and long-term owners. In 16 of the 18 cases, buyers were more likely to perform the activity. Many of these categories represent efforts to reconfigure the unit to better meet the needs of the new owners, such as transforming unfinished space into a recreation room or other room, or to improve the quality of the structure, such as adding carpeting or flooring or improving a kitchen or bathroom.

The 1999 AHS contained additional questions about selected repair and remodeling activities; these questions were not included in the 2001 AHS. Table 5 compares the activity of sellers and other owners on these activities.

Table 5. Selected Repair and Remodeling Activities by Sellers and Other Owners

R & R Variable	1999 AHS Sellers	1999 AHS Long-Term Owners
Percent replaced/repairs any cabinets in unit	6.0%	5.0%
Average number of doors replaced/repairs	2.14	2.08
Percent inside walls/ceilings repaired/replaced	6.1%	5.8%
Percent windows repaired or replaced	7.8%	7.2%

These additional variables record an interesting mix of activities, and for each of them sellers displayed a higher level of activity than other owners. Kitchen cabinets and windows are reputedly items that potential buyers notice when looking at homes for sales. Defects in doors, walls, or ceilings are both easily seen and, in general, easily repaired. However, none of the differences was statistically significant.

To investigate further whether these repair or remodeling activities are favored by sellers, we looked at the small group of active sellers; that is, those owners who acknowledged in the 1999 AHS that their units were on the market for sale or rent. Table 6 reports the results.

Table 6. Selected Repair and Remodeling Activities by Active Sellers and Other Owners

R & R Variable	1999 AHS Active Sellers	1999 AHS Long-Term Owners
Percent replaced/repaired any cabinets in unit	8.2%	5.0%
Average number of doors replaced/repaired	2.23	2.08
Percent inside walls/ceilings repaired/replaced	7.0%	5.8%
Percent windows repaired or replaced	12.2%	7.2%

Once again, sellers show more activity with respect to these items than do other owners. Limiting the analysis to active sellers increases the difference between sellers and other owners on all four items. However, none of the differences was statistically significant.

Repeat Activities

Because the AHS surveys the same units year after year, we can answer one more question: Do sellers and buyers often perform the same repair and remodeling activity on the same unit? Table 7 presents the results of an analysis in which we observed if any of the activities listed in Table 4 were identified in the 1999 AHS as having been performed on a unit by its seller, and then checked to see if the same activity had been identified in the 2001 AHS as performed on the same unit by the buyer. The entries in Table 7 are in measurement units of percent. For example, the percentage of units that reported adding or replacing a roof in both the 1999 and 2001 surveys was 0.4 percent for units that changed owners and 0.6 percent for units that did not change owners—representing 7 units out of 1,610 that changed owners and 126 units out of 20,974 that did not change owners.

**Table 7. Frequency of the Same Repair or Remodeling Activity on the Same Unit in the 2-Year Periods Prior to the 1999 AHS and the 2001 AHS
(percent of units reporting activity in both surveys)**

R & R Variable	1999 & 2001 AHS Seller/Buyer	1999 & 2001 AHS Long- Term Owners
Percent created finished bathroom from unfinished space	0.0	0.0
Percent created finished bedroom from unfinished space	0.0	0.0
Percent created finished recreation room from unfinished space	0.0	0.0
Percent created other finished inside room from unfinished space	0.0	0.0
Percent added bathroom onto home	0.0	0.0
Percent added kitchen onto home	0.0	0.0
Percent added bedroom onto home	0.0	0.0
Percent added other inside room onto home	0.0	0.0
Percent added attached garage onto home	0.0	0.0
Percent added porch onto home	0.0	0.0
Percent added deck onto home	0.0	0.1
Percent added carport onto home	0.0	0.0
Percent added other outside structure onto home	0.0	0.0
Percent bedroom created through structural changes	0.0	0.0
Percent other room created through structural changes	0.0	0.0
Percent added/replaced roof over entire home	0.4	0.6
Percent added/replaced siding on home	0.1	0.1
Percent added/replaced internal water pipes in home	0.4	0.3
Percent added/replaced electrical wiring, fuse boxes, or breaker switches in home	0.5	0.5
Percent added/replaced doors or windows in home	1.1	1.6
Percent added/replaced plumbing fixtures in home	1.0	0.8
Percent added/replaced insulation in home	0.2	0.3
Percent added wall-to-wall carpeting over subflooring	0.6	0.7
Percent added wall-to-wall carpeting over finished floor	0.3	0.3
Percent added other types of flooring such as wood, tile, marble, or vinyl	1.7	1.6
Percent installed paneling or ceiling tiles	0.2	0.2
Percent added/replaced central air conditioning	0.1	0.2
Percent added/replaced built-in heating equipment	0.0	0.1
Percent added/replaced septic tank	0.0	0.0
Percent added/replaced water heater	0.4	0.3
Percent added/replaced built-in dishwasher	0.3	0.1
Percent added/replaced garbage disposal	0.1	0.1
Percent other major improvements or repairs inside home(up to three could be reported)	0.1	0.1
Percent added/replaced driveways or walkways	0.4	0.5
Percent added/replaced fencing or walls	0.8	0.7
Percent added/replaced patio, terrace, or detached deck	0.0	0.2
Percent added/replaced swimming pool, tennis court, or other recreational structure	0.0	0.0
Percent added/replaced shed, detached garage, or other building	0.0	0.0

R & R Variable	1999 & 2001 AHS Seller/Buyer	1999 & 2001 AHS Long-Term Owners
Percent other major improvements or repairs to lot or yard (up to three could be reported)	0.1	0.1
Percent remodeled bathroom	0.4	0.4
Percent remodeled kitchen	0.2	0.2
Percent bathroom created through structural changes	0.0	0.0
Percent added/replaced security system in home	0.1	0.0

As might be expected, there was very little duplication. This was particularly true for the expensive items and for the items that once completed did not need redoing, such as creating rooms from unfinished space, adding rooms, or adding swimming pools. In categories where the same activity could have been performed on a different part of the house, some duplication did occur; for example, adding carpeting or other types of flooring. In general, when duplication occurred, there was little difference between the houses that changed ownership and other owner-occupied houses. (None of these differences was statistically significant.)⁵ The only exception was the observation that other owners replaced doors or windows in both periods more often than sellers/buyers.

Summary and Recommendation for Further Analysis

The objectives of this report included both learning more about changes in ownership and repair and remodeling behavior and learning more about using the AHS to study this relationship. The main findings are:

- Because of the detailed home improvement module asked of owners (HOMIMP) and the detailed housing and household information collected from all respondents, the AHS is well suited to the study of repairs and remodeling activity undertaken by sellers and buyers.
- There is some difficulty in using the AHS to identify units that change owners between the time periods of surveys. The AHS has a variable to identify a change in household (SAMEHH), but this variable is unreliable for the 1999 and 2001 surveys. Other variables (MOVE and MOVEM) are effective in pinpointing purchases and sales.
- Another difficulty is that the AHS does not collect data on the less expensive, more cosmetic activities such as painting and landscaping.
- The evidence suggests that sellers are less likely than other owners to undertake repair and remodeling activity. Conceptually, this would occur if sellers believed

⁵ There were 14 items for which no duplication was recorded among units that changed owners and duplication was recorded for units that did not change hands. Because of the large number of units that did not change hands, 9 of these differences were statistically significant.

that they could not recover the costs of the activity in the sales price. The chances of recovering costs are higher for the less expensive cosmetic activities; but, because the AHS does not collect information on those activities, those activities cannot be tracked using the AHS.

- Evidence of lower repair and remodeling activity by sellers includes:
 - Compared with other owners, a statistically lower percentage of sellers make alterations and repairs. Among owners who make alterations and repairs, sellers spent less than other owners, but the difference is not significant.
 - Compared with other owners, a statistically lower percentage of sellers perform replacement and additions. Among owners who make replacements and additions, sellers spent less than other owners, but the difference is not significant.
 - We looked at 44 individual replacement and addition activities. In 12 cases, the differences between sellers and long-term owners were statistically significant. Sellers were less likely to perform the activity than long-term owners in 8 cases. Sellers were more likely to install wall-to-wall carpeting, add vinyl or other types of flooring, add or replace a dishwasher, and add or replace a garbage disposal.
- The comparison between sellers and other owners is based on repair and remodeling activities undertaken in the 2 years prior to the 1999 survey. To increase the probability that we are studying owners who anticipated a sale in the near future when undertaking these activities, we focused on two subgroups of sellers: those sellers who reported in the 1999 AHS that their unit was for sale (active sellers), and those sellers who sold in December 1999 or in 2000 (2000 sellers). In general, the results failed to show above-average repair and remodeling behavior on the part of sellers.
 - A higher proportion of active sellers made alterations and repairs than other owners, and a higher proportion of active sellers carried out replacements and additions. In both cases, active sellers who performed those activities spent less than other owners who performed them. Active sellers who carried out replacements and additions did more of these activities on average than other owners. Only the last difference was statistically significant.
 - Compared with other owners, a lower proportion of 2000 sellers made alterations and repairs, and a lower proportion carried out replacements and additions. These differences were statistically significant. 2000 sellers spent less on alterations and repairs, but spent slightly more on replacements and additions. The differences were not significant.

- Buyers appeared to be less likely to perform alterations and repairs, but more likely to undertake replacements and additions.
 - The proportion of buyers who made alterations and repairs was significantly lower than the proportion of other owners, and among these households buyers spent significantly less on repairs and alterations.
 - Buyers were slightly more likely to undertake replacements and additions, but spent slightly less on these activities. On average, buyers who made replacements or additions carried out more of these activities. Only the latter difference was significant.
 - Looking at individual replacements or additions, there were 18 statistically significant differences between buyers and long-term owners (excluding replacements related to disasters). In 16 of the 18 cases, buyers were more likely to perform the activity. Many of these categories represent efforts to reconfigure the unit to better meet the needs of the new owners, or to improve the quality of the structure.
- Sellers and buyers rarely undertook the same activity on the same unit. In categories where the same activity could have been performed on a different part of the house, some duplication did occur; for example, adding carpeting or other types of flooring.

This research and analysis was exploratory. The logical next step would be to develop a more complete model so that the relationship between changes in ownership and repair and remodeling activity could be examined in the context of other influences. One could envision a regression model to explain the level of repair and remodeling activity in terms of unit and household characteristics as well as ownership changes.⁶

The results in this report suggest two other avenues for further exploration using the AHS. First, one could determine if there is a time pattern regarding the observed difference in repair and remodeling activities between buyers and other owners. For example, one could combine the 1999, 2001, and 2003 AHS surveys and identify buyers who purchased in 1999, 2000, 2001, and 2002. For buyers who obtained their unit in 2000 or 2002, the 2001 and 2003 surveys could be used to compare the behavior of buyers with that of long-term owners 1 year and 3 years after purchase. For buyers who obtained their unit in 1999 or 2001, the 2001 and 2003 surveys could be used to compare the behavior of buyers with that of long-term owners 2 years and 4 years after purchase. Second, Table 4 identified 16 replacements or additions that buyers were statistically more likely to perform than other owners. In 8 of these cases, the 2001 survey contains over 100 buyers who made the replacement or addition. It might be interesting to see if

⁶ Related research by the authors has shown that units with severe physical problems in one year rarely have severe physical problems when surveyed 7 or 8 years later, suggesting that repair activity is triggered by severe problems.

other AHS variables could be used to determine which buyers were likely to carry out these specific replacements or additions. Among these items are remodeling bathrooms and remodeling kitchens.