American Housing Survey

Weighting Strategy for 2001-2003 CINCH Analysis

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WEIGHTING STRATEGY FOR 2001-2003 CINCH ANALYSIS

Econometrica, Inc. and ICF Consulting recently completed a components of inventory change (CINCH) analysis for the 13 metropolitan areas surveyed in 2002 by the American Housing Survey (AHS). This paper adapts the weighting strategy used in these studies for a CINCH analysis of changes in the national housing stock between 2001 and 2003.

The CINCH Objective

Figure 1 illustrates the question that CINCH analysis seeks to answer.

Figure 1: The CINCH Objective
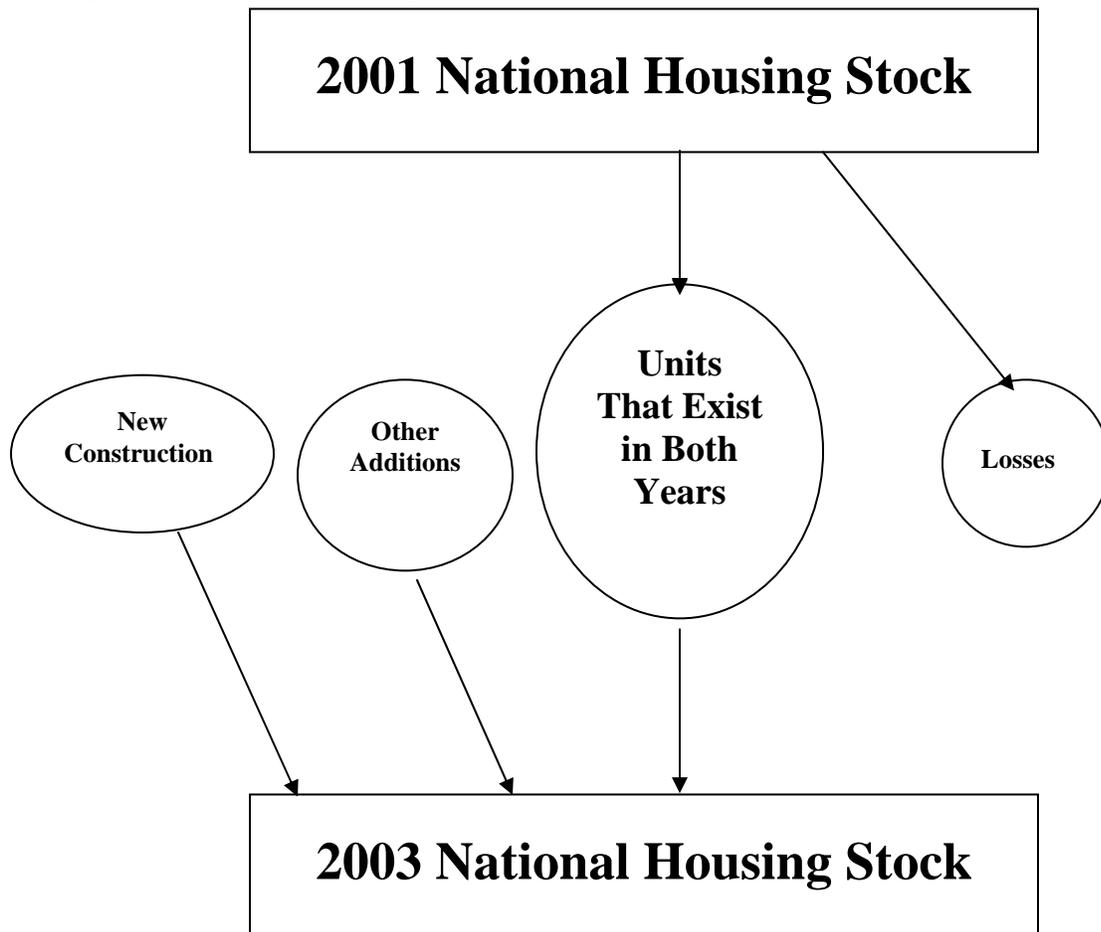
CINCH tries to explain how the housing stock evolves from one period to the next. Figure 1 contains four ovals and two rectangles. The Census Bureau provides estimates for both rectangles and one oval (units added through new construction between 2001

and 2003). No one estimates the other three ovals: the number of units that belong to both the 2001 and 2003 housing stock, units lost to the housing stock between 2001 and 2003, and other additions to the housing stock between 2001 and 2003.

Losses can be either permanent or temporary.   Units destroyed by natural disasters or intentionally demolished are permanent losses. Temporary losses include units that are merged into other units or units that are used for non-residential purposes.[1] Besides new construction, additions can include units resulting from splitting up larger units, mobile home move-ins, and units that had been used formerly for non-residential purposes.

In addition to determining the size of each oval, housing analysts find information about the characteristics of the units in the different ovals useful. Interesting characteristics include: structure type, age of the unit, size of the unit, location by region, location by metropolitan status, tenure, household size and composition, resident income, and resident race and ethnicity.

CINCH analysis has three goals:
- To provide estimate for all six components of Figure 1.
- To disaggregate losses and other additions into relevant component parts.
- To characterize the units that survive from one period to the next and the units that are added or lost between periods.

The AHS has three features that make CINCH analysis possible:
- Each unit has weights that can be used to estimate its share of the overall stock.
- The AHS tracks new construction and the various types of losses and other additions.
- The AHS has detailed information about the characteristics of each unit and its occupants.
- The AHS tracks the same unit from one period to the next so that changes in status and characteristics can be observed directly.

Weighting

Ideally, analysts would like to solve two simultaneous equations using CINCH analysis:[2]

(1) 2001 housing stock = units that exist in both years + losses.
(2) New construction + other additions + units that exist in both years = 2003 housing stock.

Unfortunately, previous experience with CINCH analysis has shown it is difficult to find satisfactory simultaneous solutions to the equations. For this reason, the Econometrica-

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[1] "Potentially reversible" might be a better term than "temporary" for these types of losses.
[2] The equations are "simultaneous" because the term "units that exist in both years" appears in each equation.

ICF CINCH studies of metropolitan areas and previous CINCH research by ICF chose to solve the two equations separately.

In the metropolitan studies, solving equation (1) was termed forward-looking analysis because it tracks what happens to the units in the 2001 housing stock. In terms of Figure 1, forward-looking analysis deals with the top rectangle and the two ovals on the right.

In the metropolitan studies, solving equation (2) was termed backward-looking analysis because it tracks where units in the 2003 housing stock came from. In terms of Figure 1, backward-looking analysis deals with the bottom rectangle and the three ovals on the left. In analytical terms, backward-looking analysis reverses the arrows at the bottom of Figure 1 by taking the 2003 housing stock as its starting point.

Separating the analysis into forward-looking and backward-looking components results in each observation having two weights, a weight for the forward-looking analysis (FLCINCHWT) and a weight for the backward-looking analysis (BLCINCHWT).

Solving the equations separately also results in two independent estimates of "units that exist in both years," one based on each set of weights. This paper develops algorithms to carry out the forward-looking and backward-looking analyses. Table 1 shows that the separate algorithms result in estimates of "units that exist in both years" that are remarkably close.

Table 1: Comparison of Estimates of "Units that Exist in Both Years"

Units that Exist in Both Years	
Forward-looking estimate	116,339,303
Backward-looking estimate	116,329,538
Difference	9,765
Percent Different	0.008%

The closeness of the estimates caused us to investigate a single-weight option. We concluded that the single-weight approach created other problems. Appendix B discusses the single-weight option and the problems we discovered in pursuing it.

Before proceeding to the weighting algorithms, we want to consider three issues:
- How our estimates of new construction compare to other estimates.
- How rebenchmarking for the 2000 census might affect the CINCH analysis.
- How our estimates of the flows into and out of the housing stock compare to estimates in previous national CINCH studies.

Independent estimates of new construction

This section compares our backward-looking estimate for new construction with three alternative estimates: the Census Bureau's series on completions, the estimates produced by the AHS final weights using our definition of new construction, and the estimates produced by the AHS's final weights using the AHS year-built variable.

The Census Bureau estimates the number of privately owned units completed each month. Data collection for the 2001 AHS occurred between August and November 2001, while data collection for the 2003 AHS occurred between late May and mid-September 2003. During the 22-month period beginning October 2001 and ending with July 2003, the Census Bureau reports that 3,023,000 privately owned housing units were completed (using seasonally adjusted monthly data).[3]

Using the backward-looking algorithm, we estimate that 3,135,379 units were completed between the two surveys. Our CINCH estimate is 3.7 percent higher than the estimate we derived from the published completions series. Some of this difference may relate to a small number of completed units (a) that are not privately owned or (b) that are in permit issuing areas and for which permits were not drawn.[4]

Our estimate sums units identified by the Census Bureau as new constructed since the last survey (IN03_REUAD = 3) and units interviewed in 2003 that were under construction in 2001 ($10 \leq$ IN01_NOINT ≤ 11). There were 1,536 units that meet these criteria and were interviewed in 2003. The sum of WGT90GEO for these units was 3,406,879. WGT90GEO is the final weight used for 1990 Census geography; it incorporates adjustments by the Census Bureau to better approximate external estimates of new construction. Our backward-looking estimate is closer to the published numbers for completion.

A third alternative is to use the 2003 AHS national estimate of housing units built since the 2001 survey as a new construction control. The sum of IN03_WGT90GEO for all units with 2001 LT IN03_BUILT is 2,272,370.

Of the three estimates, we favor using, as a benchmark, the estimate from the completions series. Our estimate of new construction is close to the Census Bureau data on housing completions and therefore we did not adjust these estimates.

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[3] Shifting the 22-month period either backward or forward changes the total only slightly. The totals for five 22-month periods are: August 2001-May 2003 (3,008,000); September 2001-June 2003 (3,012,000); October 2001-July 2003 (3,023,000); November 2001-August 2003 (3,021,000); and December 2001-September 2003 (3,033,000).

[4] The Census Bureau uses permits as its sampling frame in permit issuing areas. The AHS draws its sample from permits in permit issuing areas.

Rebenchmarking for the 2000 Census

The published report on the 2001 AHS used weights based on the 1990 census; the published report on the 2003 AHS used weights based on the 2000 census. Table 2 shows how this difference could create problems for a CINCH analysis comparing the 2001 and 2003 housing stocks.

The second and third columns of Table 2 contain the published estimates from the 2001 and 2003 national surveys. The published numbers indicate that the housing stock grew by only 1.4 percent between 2001 and 2003. This growth represents 1,660,000 units whereas housing completions totaled over 3 million units during this period. Moreover, the number of households (occupied housing units) declined by 419,000 (0.4 percent) over this period. The decline in occupied housing units is worrisome because many of characteristics that we propose to study in the CINCH analysis use occupied units as a baseline.

Table 2: Comparison of Key Published Totals from the 2001 and 2003 AHSs

	2001 AHS (weights based on 1990 census)	2003 AHS (weights based on 2000 census)	Percent Change	2001 AHS adjusted to 2000 Census	Percent Change
Housing Stock	119,117,000	120,777,000	1.4%	118,196,000	2.2%
Occupied	106,261,000	105,842,000	-0.4%	105,435,000	0.4%
Vacant	9,777,000	11,369,000	16.3%	9,705,000	17.1%
Seasonal	3,078,000	3,566,000	15.9%	3,055,000	16.7%

In the 2003 AHS publication, the Census Bureau presents alternative estimates of the 2001 housing stock using weights based on the 2000 census.[5] The fifth column of Table 2 contains these alternative estimates.   In the alternatives, the 2001 housing stock is 921,000 lower than in the original estimate and the number of households (occupied housing units) is 826,000 lower.

Using 2000-based weights for both 2001 and 2003 results in a growth of 2,581,000 in the housing stock over the period. This seems more consistent with the external evidence on new construction. The number of households also grew by 407,000 over the period.

The alternative estimates were developed with a different set of weights, WGT00_90, which are based on the 2000 census using 1990 census geography. We used WGT00_90 for the forward-looking analysis and compared the results to special tabulations available on the AHS website.[6]

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[5] See Table V on page C-22.
[6] http://www.census.gov/hhes/www/housing/ahs/ahs01_2000wts/ahs01_2000wts.html.

Comparison of Key Totals to Prior National CINCH Studies

Table 3 compares our estimates of losses, new construction, and other additions to estimates from previous national CINCH studies. Our estimates of losses and new construction are compatible with the estimates from recent CINCH studies. Our estimates of other additions are substantially higher. We are not sure why we are higher. We think there are three possibilities: (1) prior studies may not have made use of the information in REUAD, (2) prior studies used net conversions and mergers in both losses and other additions, and (3) prior studies used different current-year estimates in backward-looking analyses.

Table 3: Comparison of Key Totals to Prior National CINCH Studies

	2001-2003	1999-2001	1997-1999	1995-1997	1993-1995
Base year stock	118,196,000	115,253,000	112,357,000	109,457,000	106,611,000
Losses	1,855,697	2,279,000	1,979,000	1,891,000	1,965,000
Losses as % of stock	1.6%	2.0%	1.8%	1.7%	1.8%
Current year stock	120,777,000	119,117,000	115,25,3000	112,357,000	109,457,000
New construction	3,135,379	3,622,000	1,175,000	3,587,000	3,293,000
New const as % of stock	2.6%	3.0%	1.0%	3.2%	3.0%
Other additions	1,312,082	225,000	150,000	282,000	560,000
Oth add as % of stock	1.1%	0.2%	0.1%	0.3%	0.5%

Attachments

The remainder of this report consists of two appendixes:

- Appendix A contains the algorithms used to derive the weights. We have annotated each step by including the results from implementing that step in italics.

- Appendix B explains why a single-weight approach would not have worked.

Appendix A: Algorithms for Computing Weights

Forward Looking: From 2001 to 2003

The following are the steps necessary to prepare the data to analyze what happened between 2001 and 2003 to units that existed in the 2001. AHS variables are given their codebook names and presented in capital letters. We refer to 2001 variables by the suffix IN01_; 2003 variables are labeled IN03_.

1. Merge the 2001 and 2003 files, using the flat files. *(N = 71,170)* Eliminate non-matches (8856)—this is important because of the expanded samples in Los Angeles, New York, Chicago, Philadelphia, Detroit, and Northern New Jersey in 2003. It will also eliminate new construction and other additions to the stock, but this is of no consequence for forward-looking analysis since newly constructed units and other additions were not part of the 2001 housing stock. *(N=62,314)*

2. For all units let MXPWT = max (IN03_PWT, IN01_PWT). (PWT is the pure weight). In general, the pure weights should not differ except in the six metropolitans areas with added sample in 2003. If there were an unusually low IN01_PWT for one or more observations, this step would adjust for that low value.

3. Compute an estimate of the 2001 stock (BASECOUNT) by summing IN01_WGT00_90 across all observations. (WGT00_90 is the final weight based on the 2000 census and adjusted for 1990 census geography.) *BASECOUNT = 118,196,031.*

4. Eliminate from subsequent analysis:

   a. All observations that were 2001 type B or type C losses (10 LE IN01_NOINT LE 38). These units were not part of the 2001 stock and therefore are not tracked in the forward-looking analysis. *(7880)*

   b. All observations that were deleted in the 2001 prelist subsampling (IN01_NOINT=39). *(722)*

5. Compute SMXPWT = sum of MXPWT after step 4; this sum is a first estimate of the size of the housing stock based on the units retained for analysis. *N=53,712, SMXPWT = 116,027,710*

6. Compute a FLCINCHWT = MXPWT*(BASECOUNT/SMXPWT). This computation ratios the weights up so that they sum to the 2001 stock.

7. Identify *sames*, *losses*, and *interviewed losses*:

   a. SAME=1 if IN01_ISTATUS = 1, 2, or 3 AND IN03_ISTATUS = 1, 2, OR 3   *N = 44,994*

   b. LOSS = 1 if IN01_ISTATUS=1, 2, 3, or 4 AND 10 LE IN03_NOINT LE 38   *N = 817*

   c. INTLOSS = 1 if IN01_ISTATUS=1, 2, or 3 AND 10 LE IN03_NOINT LE 38   *N = 731*

8. Calculate:

   a. SSAME = sum of FLCINCHWT for all SAME = 1 *(98,935,510)*

   b. SLOSS = sum of FLCINCHWT for all LOSS =1 *(1,961,772.75)*

   c. SINTLOSS = sum of FLCINCHWT for INTLOSS = 1 *(1,738,707.45)*

9. Eliminate from subsequent analysis all observations that were 2001 or 2003 type A noninterviews. We cannot use the noninterviews because there is no information on the characteristics of these units. However, we retain them until this point so that we can get good estimates of the number of losses (SLOSS).

10. Calculate:

    a. Ratio1 = (BASECOUNT – SLOSS)/SSAME (*1.17484873*)

    b. Ratio2 = SLOSS/SINTLOSS *(1.128293751)*

11. Recalculate FLCINCHWT as follows:

    a. For SAME =1, FLCINCHWT = Ratio1*FLCINCHWT

    b. For INTLOSS =1, FLCINCHWT = Ratio2*FLCINCHWT

12. From published reports obtain estimated 2001 counts for all owner-occupied units, all renter-occupied units, all vacant units, and all seasonal units.[7]

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[7] At this point, the algorithm differs from that used in the metropolitan CINCH studies. In the metropolitan areas, we controlled to occupied, vacant, and seasonal units but not for owner-occupied or renter-occupied units. We are expanding the controls because of the importance of the tenure in the tables on income and housing costs.

	2001 adj to 2000 Census	Sum of FLCINCHWT	Ratio Adjustment
Housing Stock	118,196,000		
Occupied	105,435,000		
Owner-Occupied	71,708,000	70,197,790	1.022
Renter	33,727,000	33,181,627	1.016
Vacant	9,705,000	11,872,492	0.817
Seasonal	3,055,000	2,944,122	1.038

Calculate:

a. Sum FLCINCHWT for all SAME = 1 or INTLOSS = 1 in which IN01_ISTATUS = "1" (occupied units) AND IN01_TENURE = 1 (owner-occupied units). Ratio adjust the FLCINCHWT for these observations so that they sum to the published total for owner-occupied units.

b. Sum FLCINCHWT for all SAME = 1 or INTLOSS = 1 in which IN01_ISTATUS = 1 (occupied units) AND (2 LE IN01_TENURE LE 3) (renter-occupied units). Ratio adjust the FLCINCHWT for these observations so that they sum to the published total for renter-occupied units.

c. Sum FLCINCHWT for all SAME = 1 or INTLOSS = 1 in which (IN01_ISTATUS='2' OR IN01_ISTATUS='3') AND NOT (8 LE IN01_VACANCY LE 10) (URE and vacant units). Ratio adjust the FLCINCHWT for these observations so that they sum to the published total for vacant units.

d. Sum FLCINCHWT for all SAME = 1 or INTLOSS = 1 in which (IN01_ISTATUS='2' OR IN01_ISTATUS='3') AND (8 LE IN01_VACANCY LE 10) (Seasonal units). Ratio adjust the FLCINCHWT for these observations so that they sum to the published total for seasonal units.

13. Sum of FLCINCHWT after final weighting:

	N	Sum of FLCINCHWT
SAME	44,994	116,337,061
INTLOSS	731	1,857,939
Total	45,725	118,195,000

Backward Looking: From 2003 to 2001

The following are the steps necessary to prepare the data to analyze where 2003 units came from. AHS variables are given their codebook names and presented in capital letters. 2003 variables are labeled IN03_; we refer to 2001 variables by the suffix IN01_.

1. Merge the 2001 and 2003 files, using the flat files. *(N= 71170)* Keep non-matches—this is important because of the expanded samples in Los Angeles, New York, Chicago, Philadelphia, Detroit, and Northern New Jersey in 2003, and because units are added to the AHS sample between surveys.

2. For all units let MXPWT = max (IN03_PWT, IN01_PWT). (PWT is the pure weight). In general, the pure weights should not differ except in the six metropolitan areas with added sample in 2003. If there were an unusually low IN03_PWT for one or more observations for other reasons, this step would also adjust for that low value.

3. Compute an estimate of the 2003 stock (CURRENTCOUNT) by summing IN03_WGT90GEO across all observations. (WGT90GEO is the final weight, not the pure weight.) *CURRENTCOUNT= 120776934*

4. Eliminate from the sample:

    a. All units found in the 2003 survey but not in the 2001 survey, except units not found in the 1999 survey. This will eliminate the expanded samples for the six metropolitan areas, but will retain new construction and other additions. *There were 8856 cases in 2003 but not in 2001. Of these, 6797 were in 1999 and 2059 were not in 1999. We kept the 2059. This gave us a file of 62,314+2059=64,373. Of the2059, 1696 had REUAD values, 363 did not. Note that we assume that all of these 2059 adds are adds to the national sample. A few are probably adds to the supplemental sample. Including the latter will give more weight to the six large metropolitan areas. Of the 8856 cases, 6882 were in the six large metropolitan areas. This is 85 more cases than the number of observations found in the 1999 survey. It is not unreasonable to assume that the six largest metropolitan areas would absorb 85 of the 2059 adds without taking into account adds to the supplement sample.*

    b. All type B or type C losses in the 2003 (10 LE IN03_NOINT LE 38). These units are not part of the 2003 stock and therefore we do not track them backwards.

    c. All observations that were deleted in the 2003 prelist subsampling (IN03_NOINT=39).

5. Compute SMXPWT = sum of MXPWT *(118,839,620, N=55106)* after step 4; this sum is a first estimate of the size of the 2003 housing stock based on units retained for analysis.

6. Compute a BLCINCHWT = MXPWT*(CURRENTCOUNT/SMXPWT). This computation ratios the weights up so that they sum to the 2003 stock.

7. Identify *sames*, *new construction, interviewed new construction*, *other adds*, and *interviewed other adds:*[8]

    a. SAME=1 if IN01_ISTATUS = 1, 2, or 3 AND IN03_ISTATUS = 1, 2, OR 3

    b. NC = 1 if IN03_ISTATUS=1, 2, 3, or 4 AND ((IN03_REUAD = 3) OR (10 LE INO1_NOINT LE 11))

    c. INTNC = 1 IF NC=1 AND IN03_ISTATUS=1, 2, or 3

    d. ADD = 1 if IN03_ISTATUS=1, 2, 3, or 4 AND ((4 LE IN03_REUAD LE 11) OR (12 LE IN01_NOINT LE 17))

    e. INTADD = 1 if ADD =1 AND IN03_ISTATUS=1, 2, OR 3

8. Calculate:

    a. SSAME = sum of BLCINCHWT for all SAME = 1 *(98703777.25with N = 44994)*

    b. SNC = sum of BLCINCHWT for NC =1 *(3196620.73 with N = 1544)*

    c. SINTNC = sum of BLCINCHWT for INTNC=1 *(3179155.63 with N = 1536)*

    d. SADD = sum of BLCINCHWT for ADD =1 *(1352236.15 with N = 537)*

    e. SINTADD= sum of BLCINCHWT for INTADD = 1 *(1323946.41 with N =521)*

9. Eliminate from subsequent analysis all observations that were 2001 or 2003 type A noninterviews. We cannot use the noninterviews because there is no information on the characteristics of these units. However, we retain them until this point so that we can get good estimates of the number of recoveries (SADD) and the number of newly constructed units (SNC).

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[8] Other adds are units that were type B losses in 2001 but are in the 2003 housing stock plus new housing units that are not new construction, such as the conversion to residential use of a warehouse or mobile home move-ins.

10. Calculate:

    a. Ratio1 = (CURRENTCOUNT – (SADD + SNC))/SSAME
       (120776934 – (1352236.15 +3196620.73))/98703777.25 = 1.177544369

    b. Ratio2 = SNC/SINTNC *(3196620.73/3179155.63 = 1.005493629)*

    c. Ratio3 = SADD/SINTADD *(1352236.15/1323946.41 =1.021367738)*

11. Recalculate BLCINCHWT as follows:

    a. For SAME = 1, BLCINCHWT = Ratio1*BLCINCHWT

    b. For INTNC= 1, BLCINCHWT = Ratio2*BLCINCHWT

    c. For INTADD = 1, BLCINCHWT = Ratio3*BLCINCHWT

12. From published reports obtain estimated 2003 counts for all owner-occupied units, all renter-occupied units, all vacant units, and all seasonal units.[9]

	2003	Sum of BLCINCHWT	Ratio Adjustment
Housing Stock	120,777,000		
Occupied	105,842,000		
Owner-Occupied	72,238,000	71414028.16	1.012
Renter	33,604,000	32381755.53	1.038
Vacant	11,369,000	13533758.99	0.840
Seasonal	3,566,000	3447391.32	1.034

   Calculate:

    a. Sum BLCINCHWT for all SAME = 1 or INTLOSS = 1 in which INO3_ISTATUS = "1" (occupied units) AND IN03_TENURE = 1 (owner-occupied units). Raito adjust the BLCINCHWT for these observations so that they sum to the published total for owner-occupied units.

    b. Sum BLCINCHWT for all SAME = 1 or INTLOSS = 1 in which IN03_ISTATUS = "1" (occupied units) AND (2 LE IN03_TENURE LE

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[9]At this point, the algorithm differs from that used in the metropolitan CINCH studies. In the metropolitan areas, we controlled to occupied, vacant, and seasonal units but not for owner-occupied or renter-occupied units. We are expanding the controls because of the importance of the tenure in the tables on income and housing costs.

3) (renter-occupied units). Ratio adjust the BLCINCHWT for these observations so that they sum to the published total for renter-occupied units.

c. Sum BLCINCHWT for all SAME = 1 or INTLOSS = 1 in which (IN03_ISTATUS='2' OR IN03_ISTATUS='3') AND NOT(8 LE IN03_VACANCY LE 10) (URE and vacant units). Ratio adjust the BLCINCHWT for these observations so that they sum to the published total for vacant units.

d. Sum BLCINCHWT for all SAME = 1 or INTLOSS = 1 in which (IN03_ISTATUS='2' OR IN03_ISTATUS='3') AND (8 LE IN03_VACANCY LE 10) (Seasonal units). Ratio adjust the BLCINCHWT for these observations so that they sum to the published total for seasonal units.

13. Sum of weights after final adjustment:

	N	Sum of BLCINCHWT
SAME	44994	116,328,205
INTADD	521	1,312,155
INTNC	1536	3,136,640
Total	47051	120,777,000

Appendix B: A Single-Weight Option

One can make the forward-looking analysis and the backward-looking analysis consistent by the following process:

- Compute weights for the "units that exist in both years" and losses using the forward-looking algorithm in Appendix A.
- Compute weights for "units that exist in both years," new construction, and other additions using the backward-looking algorithm in Appendix A.
- Force the "units that exist in both years" to have the same weights in both the forward-looking and backward-looking analyses. This could be done in various ways. For example, each unit in the "units that exist in both years" group could be given the average of its forward-looking and backward-looking weights.
- Adjust the weights for losses so that the sum of "units that exist in both years" and losses equals the 2001 housing stock.
- Adjust the weights for new construction and other additions so that the sum of "units that exist in both years" plus new construction plus other additions equals the 2003 housing stock.

We tested this approach by using the FLCINCHWT for *sames* in both years and adjusting the weights for new construction so that the sum of *sames*, new construction, and other additions equals the 2003 housing stock. It turns out that the single-weight approach did not work well at all. When we split the analysis into two pieces, we were able to choose FLCINCHWT and BLCINCHWT so that these weights satisfied two conditions:

- The sum of the weights over the relevant units equaled the existing housing stock in the relevant year, 2001 for FLCINCHWT and 2003 for BLCINCHWT.
- Within each year, occupied owner units, occupied rental units, vacant units, and seasonal units equal published totals for each group.

Since we made no change in the forward-looking analysis, both conditions still held for 2001. With the new weights, we were still able to make the sum of the weights over the relevant units equal to the 2003 stock. However, the new approach introduced serious discrepancies in the estimates of the four groups, as shown in Table B-1.

**Table B-1: Comparison of Single-Weight Estimates
for 2003 with Published Numbers**

	Published 2003 AHS Estimates	Single-Weight Estimates	Percent Difference
Housing Stock	120,777,000	120,777,000	0.0%
Occupied			
Owner-Occupied	72,238,000	72,447,000	0.3%
Renter	33,604,000	32,244,000	-4.2%
Vacant	11,369,000	12,796,000	11.2%
Seasonal	3,566,000	3,290,000	-8.4%

The reason for the discrepancy is easily seen in the table for step 12 in the algorithm for the backward-looking weights. This table shows that we had to make large adjustments in the weights to equal the published totals for vacant units. (Similarly large adjustments had to be made in step 12 for the forward-looking weights.) Large adjustments were needed because CINCH analysis requires interviews in both years. If a unit experiences a type A non-interview in either year, it is thrown out of the sample in step 9. Refusals are, by definition, limited to occupied units. The only way a vacant unit can be a type A non-interview is if the interviewer cannot find the unit. Therefore, vacant units are overrepresented among *sames*.

Steps 10 and 11 adjust the weights to account for the units eliminated at step 9. The weights for each *same* receives the same adjustment. As a result, the adjusted weights overestimate vacant units. Therefore, a large adjustment is needed at step 12.

Step 12 in the forward-looking analysis adjusts the weights for units that were vacant in 2001 and vacant in both years, but it does not adjust the weights for units that were vacant only in 2003. For this reason, the single weights continue to overestimate vacant units in 2003.

At this point, we decided to abandon the single-weight option and use the two-step approach, keeping the forward-looking analysis and the backward-looking analysis separate.