# Listing of Programs and Variables Used in CINCH and Rental Dynamics Analysis for 2005 and 2007 American Housing Surveys 

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## Listing of Programs and Variables Used in CINCH and Rental Dynamics Analysis for 2005 and 2007 American Housing Surveys

The following 11 programs and one data set have been posted on the American Housing Survey (AHS) Web site:

- CINCH_05_07_DATA: For each control number, this file contains the weights used in forward-looking CINCH analysis (FLCINCHWT) and the weights used in the backwardlooking CINCH analysis (BLCINCHWT), along with the variables used to identify CINCH status and rental affordability status. These variables are defined in this document. One can replicate the Rental Dynamics tables using this file only. To replicate the CINCH tables, one has to merge this file with data from the 2005 and 2007 AHS files.
- FORWARD_WEIGHTS_05_07: the program used to create FLCINCHWT.
- BACKWARD_WEIGHTS_05_07: the program used to create BLCINCHWT.
- FORWARD_TABLE_1: the program used to generate Forward-Looking Table 1.
- FORWARD_TABLE_2: the program used to generate Forward-Looking Table 2.
- FORWARD_TABLE_3: the program used to generate Forward-Looking Table 3.
- FORWARD_TABLE_4: the program used to generate Forward-Looking Table 4.
- BACKWARD_TABLE_1: the program used to generate Backward-Looking Table 1.
- BACKWARD_TABLE_2: the program used to generate Backward-Looking Table 2.
- BACKWARD_TABLE_3: the program used to generate Backward-Looking Table 3.
- BACKWARD_TABLE_4: the program used to generate Backward-Looking Table 4.
- RENT_DYNAMICS_05_07: the program used to generate the rental dynamics core tables.

The following pages define the variables that were used to generate the CINCH and rental dynamic tables. The CINCH_05_07_DATA file contains these variables.

Each of the variables defined below is calculated using variables defined elsewhere.

Definitions for SAME, INTLOSS, etc., can be found in the companion document, Weighting Strategy for 2005-2007 CINCH Analysis. ${ }^{1}$ This document also explains how the weights were derived.

Definitions for NOINT, OWNRENT, and other variables with IN05_ or IN07_ prefixes can be found in the AHS Codebook or the Housing Affordability Data System documentation. ${ }^{2}$ The IN05_ and IN07_ prefixes indicate which AHS survey (2005 or 2007) was used for the value of that particular variable.

CONTROL $=$ Control number
This is the scrambled control number from the AHS masterfile. It is used to preserve confidentiality and to enable longitudinal matches to earlier files. It is a character variable of 12 spaces in length.

IN07_REUAD = Reason unit got added to sample - see AHS Codebook for definition
IN07_REVREUAD = "a revised" Reason unit got added to sample
REVREUAD = REUAD
IF (1 LE IN05_ISTATUS LE 4 AND 3 LE IN07_REUAD LE 11), REVREUAD = 2
IN07_REUAD identifies units added to the sample in 2007, but 106 units also had values for IN05_ISTATUS, which indicates that they were part of the sample in 2005. Discussion with the Census Bureau indicates that the REUAD values for these cases are erroneous. Normally, REUAD would be used to identify additions to the stock, but these erroneous values would lead to double counting, that is, there would be 106 cases identified both as SAMES and as additions. Therefore a revised version of REUAD is needed. The code REVREUAD =2 identifies these units.

IN07_SAMEDU = Same HU as last enumeration - see AHS Codebook for a definition of this variable and see the AHS_FAQ for an explanation of the variable.

IN07_SAMEDU2 = "a revised" Same HU as last enumeration
The logic used for the code is presented first and then the interpretation for the various values of SAMEDU2 is given. The code is sequential, that is, later lines will overwrite earlier lines.

IN07_SAMEDU2 = B

[^0]IF IN07_SAMEDU = 2, IN07_SAMEDU2 = 1
IF (IN07_SAMEDU = 2 AND (((IN03_NUNIT2 = IN07_NUNIT2) AND (IN05_NUNIT2 NE IN07_NUNIT2)) OR ((IN03_ROOMS = IN07_ROOMS) AND (IN05_ROOMS NE IN07_ROOMS)))) THEN IN07_SAMEDU2 = 2

IF (IN07_SAMEDU = 2 AND ((IN05_NOINT = "B" OR IN05_NOINT LT 30) AND IN07_NOINT GE 30)) THEN IN07_SAMEDU2 = 3

IF (IN07_SAMEDU =2 AND (IN05_NUNIT2 = 4 AND IN07_NOINT = 13)) THEN IN07_SAMEDU2 = 4

IF (IN07_SAMEDU = 2 AND IN07_SAMEDU2 NE 2 AND (IN07_NUNIT2 = 4 AND (IN05_NUNIT2 = B OR (IN05_NUNIT2 = 4 AND (IN05_BUILT NE IN07_BUILT)) OR IN05_NUNIT2 LT 4))) THEN IN07_SAMEDU = 5

IF (IN07_SAMEDU = 2 AND IN07_NUNIT2 NE 4 AND (IN07_BUILT LT 2005 AND ((IN03_ROOMS = IN05_ROOMS) AND (IN05_ROOMS LT IN07_ROOMS))) AND IN07_NOINT = B) THEN IN07_SAMEDU2 = 6

IF (IN07_SAMEDU = 2 AND IN07_NUNIT2 NE 4 AND (IN07_BUILT LT 2005 AND ((IN03_ROOMS = IN05_ROOMS) AND (IN05_ROOMS GT IN07_ROOMS))) AND IN07_NOINT = B) THEN IN07_SAMEDU2 = 7

IF (IN07_SAMEDU = 2 AND IN07_NUNIT2 NE 4 AND (IN07_BUILT LT 2005 AND ((IN03_ROOMS = IN05_ROOMS) AND (IN05_ROOMS NE IN07_ROOMS))) AND 1 LE IN07_NOINT LE 12 ) THEN IN07_SAMEDU2 = 8

IN07_SAMEDU2 = B
IF IN07_SAMEDU = 2, IN07_SAMEDU2 = 1
IF (IN07_SAMEDU = 2 AND (((IN03_NUNIT2 = IN07_NUNIT2) AND (IN05_NUNIT2 NE IN07_NUNIT2)) OR ((IN03_ROOMS = IN07_ROOMS) AND (IN05_ROOMS NE IN07_ROOMS)))) THEN IN07_SAMEDU2 = 2

IF (IN07_SAMEDU = 2 AND ((IN05_NOINT = "B" OR IN05_NOINT LT 30) AND IN07_NOINT GE 30)) THEN IN07_SAMEDU2 = 3

IF (IN07_SAMEDU =2 AND (IN05_NUNIT2 = 4 AND IN07_NOINT = 13)) THEN IN07_SAMEDU2 = 4

IF (IN07_SAMEDU = 2 AND IN07_SAMEDU2 NE 2 AND (IN07_NUNIT2 = 4 AND (IN05_NUNIT2 = B OR (IN05_NUNIT2 = 4 AND (IN05_BUILT NE IN07_BUILT)) OR IN05_NUNIT2 LT 4))) THEN IN07_SAMEDU = 5

IF (IN07_SAMEDU = 2 AND IN07_NUNIT2 NE 4 AND (IN07_BUILT LT 2005 AND ((IN03_ROOMS = IN05_ROOMS) AND (IN05_ROOMS LT IN07_ROOMS))) AND IN07_NOINT = B) THEN IN07_SAMEDU2 = 6

IF (IN07_SAMEDU = 2 AND IN07_NUNIT2 NE 4 AND (IN07_BUILT LT 2005 AND ((IN03_ROOMS = IN05_ROOMS) AND (IN05_ROOMS GT IN07_ROOMS))) AND IN07_NOINT = B) THEN IN07_SAMEDU2 = 7

IF (IN07_SAMEDU = 2 AND IN07_NUNIT2 NE 4 AND (IN07_BUILT LT 2005 AND ((IN03_ROOMS = IN05_ROOMS) AND (IN05_ROOMS NE IN07_ROOMS))) AND 1 LE IN07_NOINT LE 12 ) THEN IN07_SAMEDU2 = 8

Interpret SAMEDU2 as follows:
IN07_SAMEDU2 = B Not applicable
IN07_SAMEDU2 = 1 Not clear why SAMEDU = 2
IN07_SAMEDU2 = 2 Possibly the wrong unit was interviewed in 2005
IN07_SAMEDU2 $=3$ A new type-C non-interview
IN07_SAMEDU2 $=4$ Vacant mobile home lot that was occupied in 2005
IN07_SAMEDU2 = 5 Mobile home move in (to a vacant lot, replacing an old mobile
home, or replacing a non-mobile home structure) - note that, if IN05_NOINT NE B, this implies either a mobile home move out or a demolition of another structure type
IN07_SAMEDU2 $=6$ Possible merger
IN07_SAMEDU2 $=7$ Possible split
IN07_SAMEDU2 = 8 Possible merger or split - we cannot tell because the work has not been completed or the unit was not interviewed

## BLCINCHWT = Backward-looking CINCH weight

This is the weight applied to 2007 cases in backward-looking CINCH analysis.
00000-99999

FLCINCHWT = Forward-Looking CINCH weight
This is the weight applied to 2005 cases in forward-looking CINCH analysis.
00000-99999

IN05 = Observation used in the forward-looking analysis
1 = a unit that is part of the 2005 housing stock and is used in the forward-looking analysis.
This variable has a missing value for all other cases.
IN07 = Observation used in the backward-looking analysis
1 = a unit that is part of the 2007 housing stock and is used in the backward-looking analysis.
This variable has a missing value for all other cases.
IN05_WEIGHT = Final 2005 AHS weight based on 1980 Census geography
00000-99999

IN07_WEIGHT = Final 2007 AHS weight based on 1980 Census geography 00000-99999

IN05_WGT90GEO = Final 2005 AHS weight based on 1990 Census geography 00000-99999

IN07_WGT90GEO = Final 2007 AHS weight based on 1990 Census geography 00000-99999

FLSTATUS = Forward status = status of a 2005 unit in 2007
1 = in 2005 stock and in 2007 stock:
IF SAME=1 THEN FLSTATUS=1

2 = in 2005 stock but a loss in 2007 due to conversion or merger:
IF INTLOSS=1 AND ((32 LE IN07_NOINT LE 33) OR (IN07_SAMEDU2='6' OR IN07_SAMEDU2='7' OR IN07_SAMEDU2='8')) THEN FLSTATUS=2

3 = in 2005 stock but a loss in 2007 due to house or mobile home move out:
IF INTLOSS=1 AND (IN07_NOINT=31 OR IN07_SAMEDU2='4' OR (IN05_NUNIT2 = '4' AND IN07_SAMEDU2 = '5')) THEN FLSTATUS=3

4 = in 2005 stock but a loss in 2007 due to nonresidential use:
IF INTLOSS=1 AND (IN07_NOINT=12 OR IN07_NOINT=14) THEN FLSTATUS=4
$5=$ in 2005 stock but a loss in 2007 due to demolition or disaster:
IF INTLOSS=1 AND (IN07_NOINT=30 OR (1 LE IN05_NUNIT2 LE 3 AND (IN07_NOINT = 13 OR IN07_SAMEDU2 = '5'))) THEN FLSTATUS=5

6 = in 2005 stock but a loss in 2007 due to damage or condemnation:
IF INTLOSS=1 AND (15 LE IN07_NOINT LE 16) THEN FLSTATUS=6

7 = in 2005 stock but a loss in 2007 for other reason:
IF INTLOSS=1 AND ((10 LE IN07_NOINT LE 11 AND IN07_SAMEDU2 NE '8') OR IN07_NOINT=17 OR (36 LE IN07_NOINT LE 37)) THEN FLSTATUS=7

BLSTATUS = Backward status = status of a 2007 unit in 2005
1 = in 2007 stock and in 2005 stock:
IF SAME=1 THEN BLSTATUS=1

2 = in 2007 stock but not in 2005 stock; added by conversion or merger:

IF INTADD=1 AND ((6 LE IN07_REVREUAD LE 8) OR (IN07_SAMEDU2='6' OR IN07_SAMEDU2='7' OR IN07_SAMEDU2='8')) THEN BLSTATUS=2

3 = in 2007 stock but not in 2005 stock; added by house or mobile home move in: IF INTADD=1 AND (IN05_NOINT=13 OR (4 LE IN07_REVREUAD LE 5) OR IN07_SAMEDU2 ='5') THEN BLSTATUS=3
$4=$ in 2007 stock but not in 2005 stock; added from nonresidential use:
IF INTADD=1 AND ((IN05_NOINT=12 OR IN05_NOINT=14) OR IN07_REVREUAD=9) THEN BLSTATUS=4

5 = in 2007 stock but not in 2005 stock; added by new construction:
IF INTNC=1 AND (IN07_REVREUAD=3 OR ((10 LE IN05_NOINT LE 11)
AND NOT(IN07_SAMEDU2 = '8'))) THEN BLSTATUS=5
$6=$ in 2007 stock but not in 2005 stock; added from temporary losses in 2005 stock: IF INTADD=1 AND ((15 LE IN05_NOINT LE 16) AND NOT(IN07_SAMEDU2='5' OR IN07_SAMEDU2='6' OR IN07_SAMEDU2='7' OR IN07_SAMEDU2='8')) THEN BLSTATUS=6

7 = in 2007 stock but not in 2005 stock; added from other sources:
IF INTADD=1 AND ( IN07_REVREUAD = 10 OR IN05_NOINT = 17) THEN BLSTATUS=7

The last four variables deal with the concept of rental affordability. Previous rental dynamics studies have classified rents into eight categories based on the ratio of the unit's rent to various income levels. HUD has created a group of data sets called the Housing Affordability Data System (HADS) that provides various types of affordability-related information on AHS units for different survey years. The eight categories are derived from the HADS documentation, and HADS variables are used to define the remaining four variables. Definitions of the variables from the HADS data set are found in Housing Affordability Data System. ${ }^{3}$

A unit is considered affordable to the members of a class if the rent of the unit is no greater than 30 percent of the highest monthly income for that class. The eight categories are:

- Non-market: either no cash rent or a subsidized rent.
- Extremely low rent (affordable to renters with incomes less than or equal to 30 percent of local area median income).
- Very low rent (affordable to renters with incomes greater than 30 percent but less than or equal to 50 percent of local area median income).

[^1]- Low rent (affordable to renters with incomes greater than 50 percent but less than or equal to 60 percent of local area median income).
- Moderate rent (affordable to renters with incomes greater than 60 percent but less than or equal to 80 percent of local area median income).
- High rent (affordable to renters with incomes greater than 80 percent but less than or equal to 100 percent of local area median income).
- Very high rent (affordable to renters with incomes greater than 100 percent but less than or equal to 120 percent of local area median income).
- Extremely high rent (affordable to renters with incomes greater than 120 percent of local area median income).

FLRENT = 2005 rent category
1 = a non-market rental unit in 2005:
IF IN05_OWNRENT='2' AND (IN05_TENURE='3' OR IN05_Assisted=1 OR IN05_RENT=1) THEN FLRENT=1

2 = an extremely low-rent rental unit in 2005:
IF IN05_OWNRENT='2' AND NOT (IN05_TENURE='3' OR IN05_Assisted=1 OR IN05_RENT=1) AND IN05_COST08RELAMICAT=1 THEN FLRENT=2

3 = a very low-rent rental unit in 2005:
IF IN05_OWNRENT='2' AND NOT (IN05_TENURE='3' OR IN05_Assisted=1 OR IN05_RENT=1) AND IN05_COST08RELAMICAT=2 THEN FLRENT=3

4 = a low-rent rental unit in 2005:
IF IN05_OWNRENT='2' AND NOT (IN05_TENURE='3' OR IN05_Assisted=1 OR IN05_RENT=1) AND IN05_COST08RELAMICAT=3 THEN FLRENT=4

5 = a moderate-rent rental unit in 2005:
IF IN05_OWNRENT='2' AND NOT (IN05_TENURE='3' OR IN05_Assisted=1
OR IN05_RENT=1) AND IN05_COST08RELAMICAT=4 THEN FLRENT=5
6 = a high-rent rental unit in 2005:
IF IN05_OWNRENT='2' AND NOT (IN05_TENURE='3' OR IN05_Assisted=1
OR IN05_RENT=1) AND IN05_COST08RELAMICAT=5 THEN FLRENT=6
7 = a very high-rent rental unit in 2005:
IF IN05_OWNRENT='2' AND NOT (IN05_TENURE='3' OR IN05_Assisted=1
OR IN05_RENT=1) AND IN05_COST08RELAMICAT=6 THEN FLRENT=7

8 = an extremely high-rent rental unit in 2005:
IF IN05_OWNRENT='2' AND NOT (IN05_TENURE='3' OR IN05_Assisted=1 OR IN05_RENT=1) AND IN05_COST08RELAMICAT=7 THEN FLRENT=8
. = missing
BLRENT = Current year (2007) rent category
1 = a non-market rental unit in 2007:
IF IN07_OWNRENT='2' AND (IN07_TENURE='3' OR IN07_Assisted=1 OR IN07_RENT=1) THEN BLRENT=1

2 = an extremely low-rent rental unit in 2007:
IF IN07_OWNRENT='2' AND NOT (IN07_TENURE='3' OR IN07_Assisted=1 OR IN07_RENT=1) AND IN07_COST08RELAMICAT =1 THEN BLRENT=2

3 = a very low-rent rental unit in 2007:
IF IN07_OWNRENT='2' AND NOT (IN07_TENURE='3' OR IN07_Assisted=1 OR IN07_RENT=1) AND IN07_COST08RELAMICAT = 2 THEN BLRENT=3

4 = a low-rent rental unit in 2007:
IF IN07_OWNRENT='2' AND NOT (IN07_TENURE='3' OR IN07_Assisted=1 OR IN07_RENT=1) AND IN07_COST08RELAMICAT =3 THEN BLRENT=4

5 = a moderate-rent rental unit in 2007:
IF IN07_OWNRENT='2' AND NOT (IN07_TENURE='3' OR IN07_Assisted=1 OR IN07_RENT=1) AND IN07_COST08RELAMICAT = 4 THEN BLRENT=5

6 = a high-rent rental unit in 2007:
IF IN07_OWNRENT='2' AND NOT (IN07_TENURE='3' OR IN07_Assisted=1 OR IN07_RENT=1) AND IN07_COST08RELAMICAT =5 THEN BLRENT=6

7 = a very high-rent rental unit in 2007:
IF IN07_OWNRENT='2' AND NOT (IN07_TENURE='3' OR IN07_Assisted=1 OR IN07_RENT=1) AND IN07_COST08RELAMICAT =6 THEN BLRENT=7

8 = an extremely high-rent rental unit in 2007:
IF IN07_OWNRENT='2' AND NOT (IN07_TENURE='3' OR IN07_Assisted=1 OR IN07_RENT=1) AND IN07_COST08RELAMICAT = 7 THEN BLRENT=8
. = missing
FLAFFORD = Forward rental affordability = affordability status in 2007 of 2005 rental unit
1 = a non-market rental unit in 2007:
IF IN07_OWNRENT='2' AND (IN07_TENURE='3' OR IN07_Assisted=1 OR IN07_RENT=1) THEN FLAFFORD=1

2 = an extremely low-rent rental unit in 2007:
IF IN07_OWNRENT='2' AND NOT (IN07_TENURE='3' OR IN07_Assisted=1 OR IN07_RENT=1) AND IN07_COST08RELAMICAT =1 THEN FLAFFORD=2

3 = a very low-rent rental unit in 2007:
IF IN07_OWNRENT='2' AND NOT (IN07_TENURE='3' OR IN07_Assisted=1 OR IN07_RENT=1) AND IN07_COST08RELAMICAT =2 THEN FLAFFORD=3

4 = a low-rent rental unit in 2007:
IF IN07_OWNRENT='2' AND NOT (IN07_TENURE='3' OR IN07_Assisted=1 OR IN07_RENT=1) AND IN07_COST08RELAMICAT =3 THEN FLAFFORD=4

5 = a moderate-rent rental unit in 2007:
IF IN07_OWNRENT='2' AND NOT (IN07_TENURE='3' OR IN07_Assisted=1 OR IN07_RENT=1) AND IN07_COST08RELAMICAT = 4 THEN FLAFFORD=5

6 = a high-rent rental unit in 2007:
IF IN07_OWNRENT='2' AND NOT (IN07_TENURE='3' OR IN07_Assisted=1 OR IN07_RENT=1) AND IN07_COST08RELAMICAT =5 THEN FLAFFORD=6

7 = a very high-rent rental unit in 2007:
IF IN07_OWNRENT='2' AND NOT (IN07_TENURE='3' OR IN07_Assisted=1 OR IN07_RENT=1) AND IN07_COST08RELAMICAT =6 THEN FLAFFORD=7

8 = an extremely high-rent rental unit in 2007:
IF IN07_OWNRENT='2' AND NOT (IN07_TENURE='3' OR IN07_Assisted=1 OR IN07_RENT=1) AND IN07_COST08RELAMICAT =7 THEN
FLAFFORD=8
9 = an owner-occupied unit in 2007:
IF (IN07_OWNRENT='1') THEN FLAFFORD=9
10 = a vacant or seasonal unit in 2007:
IF (IN07_VACANCY GE 6) OR (IN07_OWNRENT=. AND IN07_VACANCY LE 5) THEN FLAFFORD=10

11 = a unit not in the 2007 stock:
IF (10 LE IN07_NOINT) THEN FLAFFORD=11
. = missing

BLAFFORD = Backward rental affordability = affordability status in 2005 of a 2007 rental unit
1 = a non-market rental unit in 2005:
IF IN05_OWNRENT='2' AND (IN05_TENURE='3' OR IN05_Assisted=1 OR IN05_RENT=1) THEN BLAFFORD=1

2 = an extremely low-rent rental unit in 2005:
IF IN05_OWNRENT='2' AND NOT (IN05_TENURE='3' OR IN05_Assisted=1 OR IN05_RENT=1) AND IN05_COST08RELAMICAT=1 THEN BLAFFORD=2

3 = a very low-rent rental unit in 2005:
IF IN05_OWNRENT='2' AND NOT (IN05_TENURE='3' OR IN05_Assisted=1 OR IN05_RENT=1) AND IN05_COST08RELAMICAT=2 THEN BLAFFORD=3

4 = a low-rent rental unit in 2005:
IF IN05_OWNRENT='2' AND NOT (IN05_TENURE='3' OR IN05_Assisted=1 OR IN05_RENT=1) AND IN05_COST08RELAMICAT=3 THEN BLAFFORD=4

5 = a moderate-rent rental unit in 2005:
IF IN05_OWNRENT='2' AND NOT (IN05_TENURE='3' OR IN05_Assisted=1 OR IN05_RENT=1) AND IN05_COST08RELAMICAT=4 THEN BLAFFORD=5

6 = a high-rent rental unit in 2005:
IF IN05_OWNRENT='2' AND NOT (IN05_TENURE='3' OR IN05_Assisted=1 OR IN05_RENT=1) AND IN05_COST08RELAMICAT=5 THEN BLAFFORD=6

7 = a very high-rent rental unit in 2005:
IF IN05_OWNRENT='2' AND NOT (IN05_TENURE='3' OR IN05_Assisted=1
OR IN05_RENT=1) AND IN05_COST08RELAMICAT=6 THEN
BLAFFORD=7
8 = an extremely high-rent rental unit in 2005:
IF IN05_OWNRENT='2' AND NOT (IN05_TENURE='3' OR IN05_Assisted=1
OR IN05_RENT=1) AND IN05_COST08RELAMICAT=7 THEN
BLAFFORD=8
9 = an owner-occupied unit in 2005:
IF IN05_OWNRENT='1' THEN BLAFFORD=9

10 = a vacant or seasonal unit in 2005: IF (IN05_VACANCY GE 6) OR (IN05_OWNRENT=. AND IN05_VACANCY LE 5) THEN BLAFFORD=10

11 = a unit added by new construction:
IF INTNC=1 THEN BLAFFORD=11
$12=$ a unit not in the 2005 stock but not added through new construction:
IF INTADD=1 THEN BLAFFORD=12
. = missing


[^0]:    ${ }^{1}$ Found on the HUD AHS Web site under CINCH files: http://www.huduser.org/datasets/cinch.html.
    ${ }^{2}$ Found at http://www.huduser.org/intercept.asp?loc=/Datasets/ahs/AHS_Codebook.pdf and at http://www.huduser.org/intercept.asp?loc=/Datasets/hads/HADS_doc.pdf.

[^1]:    ${ }^{3}$ Located at http://www.huduser.org/intercept.asp?loc=/Datasets/hads/HADS_doc.pdf.

