

American Housing Survey

Listing of Programs and Variables Used in CINCH and Rental Dynamics Analysis for 2015 and 2017 American Housing Surveys

Prepared For:

**U.S. Department of Housing & Urban Development
Office of Policy Development & Research**

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**Contract No.: 86614619C00004
CLIN: 0001AD**

June 2020

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The following SAS programs and data sets have been provided to HUD:

- **National and Metro Forward- and Backward-Looking Components of Inventory Change (CINCH) Weights SAS codes:** Using the American Housing Survey (AHS) datasets (ahs2015n.sas7bdat and ahs2017n.sas7bdat) from 2015 and 2017, as well as the case history file (AHSCaseHistory2015to2017.sas7bdat), the following SAS codes were used to create the forward-looking CINCH weights FLCINCHWT, backward-looking CINCH weights BLCINCHWT, forward-looking status FLSTATUS, backward-looking status BLSTATUS, and other variables to be used for the Rental Dynamics tables and the Characteristics Forward- and Backward-Looking Tables A, B, C, and D.
 1. 15-17-NATIONAL-FORWARD_CINCH_Weights.SAS
 2. 15-17-NATIONAL-BACKWARD_CINCH_Weights.SAS
 3. 15-17-DETROIT-FORWARD-CINCH_Weights.SAS
 4. 15-17-DETROIT-BACKWARD-CINCH_Weights.SAS
 5. 15-17-HOUSTON-FORWARD_CINCH_Weights.SAS
 6. 15-17-HOUSTON-BACKWARD_CINCH_Weights.SAS
- **National and Metro Forward- and Backward-Looking CINCH Characteristics Tables A, B, C, and D SAS codes:** Using the SAS datasets created by the CINCH weights SAS codes listed above, the following SAS codes were used to create the forward- and backward-looking CINCH tables A-D.
 1. 15-17_NATIONAL_FORWARD_TABLE_A.SAS
 2. 15-17_NATIONAL_FORWARD_TABLE_B.SAS
 3. 15-17_NATIONAL_FORWARD_TABLE_C.SAS
 4. 15-17_NATIONAL_FORWARD_TABLE_D.SAS
 5. 15-17_NATIONAL_BACKWARD_TABLE_A.SAS
 6. 15-17_NATIONAL_BACKWARD_TABLE_B.SAS
 7. 15-17_NATIONAL_BACKWARD_TABLE_C.SAS
 8. 15-17_NATIONAL_BACKWARD_TABLE_D.SAS
 9. DETROIT_15_17_FORWARD_TABLE_A.SAS
 10. DETROIT_15_17_FORWARD_TABLE_B.SAS
 11. DETROIT_15_17_FORWARD_TABLE_C.SAS
 12. DETROIT_15_17_FORWARD_TABLE_D.SAS
 13. DETROIT_15_17_BACKWARD_TABLE_A.SAS
 14. DETROIT_15_17_BACKWARD_TABLE_B.SAS
 15. DETROIT_15_17_BACKWARD_TABLE_C.SAS
 16. DETROIT_15_17_BACKWARD_TABLE_D.SAS
 17. HOUSTON_15_17_FORWARD_TABLE_A.SAS
 18. HOUSTON_15_17_FORWARD_TABLE_B.SAS
 19. HOUSTON_15_17_FORWARD_TABLE_C.SAS
 20. HOUSTON_15_17_FORWARD_TABLE_D.SAS

21. HOUSTON_15_17_BACKWARD_TABLE_A.SAS
22. HOUSTON_15_17_BACKWARD_TABLE_B.SAS
23. HOUSTON_15_17_BACKWARD_TABLE_C.SAS
24. HOUSTON_15_17_BACKWARD_TABLE_D.SAS

- **National and Metro Forward- and Backward-Looking Rental Dynamics SAS codes and 2015–17 SAS datasets:** Some Housing Affordability Data System (HADS) variables were used to construct the national and the metro (Detroit and Houston) rental dynamics tables. Prior to 2015, the HADS files were maintained by HUD and the AHS files by the Census Bureau; researchers had access to both and could merge the two files. Beginning with the 2015 AHS survey, HADS was added to the AHS but fell subject to tighter Census Bureau restrictions designed to preserve the confidentiality of AHS respondents. For now, the HADS data can be accessed only on the internal use file maintained at the Census Bureau. To produce the report, the authors had to create computer code that HUD could run at the Census Bureau.¹

The SAS codes (listed below) used to produce these rental dynamics tables were provided to HUD along with SAS data containing the control numbers for cases to be extracted from the 2015 and 2017 AHS Internal Use Files, which contain the 2015 and 2017 HADS respectively, and the case history SAS data and the weights used in the forward-looking CINCH analysis (FLCINCHWT), or the weights used in the backward-looking CINCH analysis (BLCINCHWT) along with the variables used to identify CINCH status and rental affordability status. These variables are defined in this document. The SAS codes ran by HUD are:

1. 15-17-NATIONAL_FORWARD_RENTAL_DYNAMICS.SAS
2. 17-15_NATIONAL_BACKWARD_RENTAL_DYNAMICS.SAS
3. 15-17-DETROIT_FORWARD_BACKWARD_RENTAL_DYNAMICS.SAS
4. 15-17-HOUSTON_FORWARD_BACKWARD_RENTAL_DYNAMICS.SAS

The SAS data provided along with the above SAS codes to HUD to produce the Rental Dynamics Tables are:

1. flCINCH_skinny.sas7bdat (NATIONAL), which contains the variables CONTROL, INTSAME, INTLOSS, and FLCINCHWT.
2. blCINCH_skinny.sas7bdat (NATIONAL), which contains the variables CONTROL, INTSAME, INTADD, NC, OTHNEW, OTHB, and BLCINCHWT.
3. flCINCH_detroit_skinny.sas7bdat, which contains the variables CONTROL, INTSAME, INTLOSS, and FLCINCHWT.
4. blCINCH_detroit_skinny.sas7bdat, which contains the variables CONTROL, INTSAME, INTADD, NC, OTHNEW, OTHB, and BLCINCHWT.
5. flCINCH_houston_skinny, which contains the variables CONTROL, INTSAME, INTLOSS, and FLCINCHWT.

¹ The authors appreciate the assistance of David A. Vandenbroucke of HUD's Office of Policy Development and Research.

6. bLCINCH_houston_skinny, which contains the variables CONTROL, INTSAME, INTADD, NC, OTHNEW, OTHB, and BLCINCHWT.

The following pages define the variables that were used to generate the CINCH and rental dynamics tables. These variables are included in the data produced by the forward- and backward-looking weights SAS codes and in the skinny SAS datasets listed above.

Each of the variables defined below is calculated using variables defined elsewhere. Definitions for INTSAME, INTLOSS, INTADD, NC, OTHNEW, and OTHB can be found in the document *Weighting Strategy for 2015–2017 CINCH Analysis*.² This document also explains how the weights were derived.

A sample case that is found in both the 2015 and 2017 housing stock is called a “SAME.” An important subgroup of “SAMES” are sample cases that were interviewed in both 2015 and 2017; members of this group are labeled as “INTSAME”, created as follows:

Interviewed Sames:

INTSAME = 0;

IF (NOINT15 LT 1 AND NOINT17 LT 1) THEN INTSAME=1;

Interviewed Losses:

INTLOSS = 0;

IF NOINT15 LT 1 AND (10 LE NOINT17 LE 18 or 30 LE NOINT17 LE 42) THEN
INTLOSS = 1;

Interviewed Additions:

INTADD = 0;

IF (NOINT17 LT 1 AND (10 LE NOINT15 LE 18)) or (NOINT17 LT 1 AND (PWT15
LE 0)) THEN INTADD = 1;

The INTADD = 1 group is broken into three subgroups NC, OTHNEW, and OTHB defined as follows:

NC = 0;

IF (NOINT17 LT 1 AND (PWT15 LE 0) AND IN17_YRBUILT = 2010) OR
NOINT15 IN (10, 11) THEN NC = 1;

OTHNEW = 0;

IF (NOINT17 LT 1 AND (PWT15 LE 0) and IN17_YRBUILT NE 2010) THEN
OTHNEW = 1;

OTHB = 0;

IF (NOINT17 LT 1 AND NOINT15 IN (12,13,14,15,16,17,18,19)) THEN OTHB = 1;

² Found on the HUD AHS website under CINCH files: <http://www.huduser.org/portal/datasets/CINCH.html>.

Definitions for variables with IN15_ or IN17_ prefixes can be found in the AHS Codebook or HADS documentation.³ The IN15_ and IN17_ prefixes indicate which AHS survey (2015 or 2017) was used for the value of that particular variable. Variables with this format NOINTXX where XX is replaced by the survey year, such as NOINT15, can be found in the user's guide for the AHS Case History File.⁴

Variables included:

- **CONTROL:** Control Number.
This is the scrambled control number from the AHS master file. It is used to preserve confidentiality and to enable longitudinal matches to earlier files. It is a character variable of 12 characters in length.
- **BLCINCHWT:** Backward-Looking CINCH Weight.
This is the weight applied to 2017 cases in backward-looking CINCH analysis.
- **FLCINCHWT =** Forward-Looking CINCH Weight.
This is the weight applied to 2015 cases in forward-looking CINCH analysis.
- **FLSTATUS:** Forward Status, or the status of a 2015 unit in 2017. Classified as:
 - 1, if in 2015 stock and in 2017 stock:
IF INTSAME=1 THEN FLSTATUS=1
 - 2, if in 2015 stock but a temporary loss in 2017:
IF INTLOSS=1 AND (10 LE NOINT17 LE 19) THEN FLSTATUS=2
 - 3, if in 2015 stock but a permanent loss in 2017:
IF INTLOSS=1 AND (30 LE NOINT17 LE 42) THEN FLSTATUS=3
 - 4, if other:
IF OTHER THEN FLSTATUS=4
- **BLSTATUS:** Backward Status, or the status of a 2017 unit in 2015. Classified as:
 - 1, if in 2017 stock and in 2015 stock:
IF INTSAME =1 THEN BLSTATUS=1
 - 2, if in 2017 stock but not in 2015 sample; added by new construction:
IF NC = 1 THEN BLSTATUS=2
 - 3, if in 2017 stock but not in 2015 sample; added by means other than new construction:
IF OTHNEW = 1 THEN BLSTATUS=3
 - 4, if in 2017 stock but a Type B in 2015; added from temporary losses in 2015 stock:
IF OTHB = 1 THEN BLSTATUS=4
 - 5, if other:
IF OTHER THEN BLSTATUS=5

³ Found at <http://www.huduser.org/portal/datasets/ahs/ahsprev.html#codebooks> and <http://www.huduser.org/portal/datasets/hads/hads.html>.

⁴ https://www2.census.gov/programs-surveys/ahs/documentation/2015-2017_Sample_Case_History_Readme.pdf.

The next 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 datasets called HADS, which 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 variables from the HADS dataset are found in *Housing Affordability Data System*.⁵

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.
- **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.

Variables included:

- FLRENT: 2015 Rent Category.
 - 0: Not a rental unit in 2015.
 - 1: Non-market.
 - 2: Extremely low rent.
 - 3: Very low rent.
 - 4: Low rent.
 - 5: Moderate rent.
 - 6: High rent.
 - 7: Very high rent.
 - 8: Extremely high rent.

⁵ Located at http://www.huduser.org/intercept.asp?loc=/Datasets/hads/HADS_doc.pdf.

These 9 categories were created as follows:

```
FLRENT= 0;  
IF IN15_OWNRENT='2' THEN FLRENT=IN15_COSTRELAMICAT + 1;  
IF IN15_TENURE='3' OR IN15_HUDSUB_IUF IN('1','2','3') THEN FLRENT=1;
```

- BLRENT: 2017 Rent Category.
 - 0: Not a rental unit in 2017.
 - 1: Non-market.
 - 2: Extremely low rent.
 - 3: Very low rent.
 - 4: Low rent.
 - 5: Moderate rent.
 - 6: High rent.
 - 7: Very high rent.
 - 8: Extremely high rent.

These 9 categories were created as follows:

```
BLRENT = 0;  
IF IN17_OWNRENT='2' THEN BLRENT = IN17_COSTRELAMICAT + 1;  
IF IN17_TENURE='3' OR IN17_HUDSUB_IUF IN('1','2','3') THEN BLRENT=1;
```

- FLAFFORD: Forward Rental Affordability, or the affordability status in 2017 of a 2015 rental unit. Classified as:
 - 0: Some other outcome.
 - 1: Non-market.
 - 2: Extremely low rent.
 - 3: Very low rent.
 - 4: Low rent.
 - 5: Moderate rent.
 - 6: High rent.
 - 7: Very high rent.
 - 8: Extremely high rent.
 - 9: 2017 owner unit (occupied or vacant).
 - 10: 2017 seasonal or Usual Residence Elsewhere unit.
 - 11: A unit temporary lost to the stock in 2017.
 - 12: A unit permanent lost to the stock in 2017.

These 13 categories were created as follows:

```
FLAFFORD=0;  
IF INTSAME=1 AND IN15_OWNRENT='2' AND IN17_OWNRENT='2' THEN  
FLAFFORD=IN17_COSTRELAMICAT + 1;  
IF INTSAME=1 AND IN15_OWNRENT='2' AND (IN17_TENURE='3' OR  
IN17_HUDSUB_IUF IN('1','2','3')) THEN FLAFFORD=1;  
IF INTSAME=1 AND IN15_OWNRENT='2' AND IN17_OWNRENT='1' THEN  
FLAFFORD=9;
```

```

IF INTSAME=1 AND IN15_OWNRENT='2' AND (INTSTATUS17='2' OR
IN17_VACANCY IN('06','07','08','09','10','11')) THEN FLAFFORD=10;
IF INTLOSS=1 AND IN15_OWNRENT='2' AND (NOINT17 GE 10) THEN
FLAFFORD=11;
IF INTLOSS=1 AND IN15_OWNRENT='2' AND (NOINT17 GE 30) THEN
FLAFFORD=12;

```

- BLAFFORD: Backward Rental Affordability, or affordability status in 2015 of a 2017 rental unit. Classified as:
 - 0: Some other outcome.
 - 1: Non-market.
 - 2: Extremely low rent.
 - 3: Very low rent.
 - 4: Low rent.
 - 5: Moderate rent.
 - 6: High rent.
 - 7: Very high rent.
 - 8: Extremely high rent.
 - 9: 2015 owner unit (occupied or vacant).
 - 10: 2015 seasonal or Usual Residence Elsewhere unit.
 - 11: A new construction addition in 2017.
 - 12: An “other” addition in 2017.
 - 13: A recovery of a 2015 temporary loss.

These 14 categories were created as follows:

```

BLAFFORD = 0
IF IN15_OWNRENT='2' THEN BLAFFORD = IN15_COSTRELAMICAT + 1
IF (IN15_TENURE='3' OR IN15_HUDSUB_IUF IN('1','2','3')) THEN
BLAFFORD=1
IF IN15_OWNRENT='1' THEN BLAFFORD=9
IF (INTSTATUS15='2' OR IN15_VACANCY IN('06','07','08','09','10','11')) THEN
BLAFFORD=10
IF NC= 1 THEN BLAFFORD=11
IF OTHNEW = 1 THEN BLAFFORD=12
IF OTHB =1 THEN BLAFFORD=13

```

For the metro rent dynamics analysis, these variables were collapsed because of smaller sample sizes. These variables are redefined as follows:

- FLRENTM: Metro 2015 Rent Category.
 - 0: Not rental in 2015.
 - 2: Assisted, no cash, or low rent in 2015.
 - 5: Moderate rent in 2015.
 - 7: High rent in 2015.

These four groups are created as follows:

- ```
FLRENTM = 0
IF FLRENT IN {1,2,3} THEN FLRENTM = 2
IF FLRENT IN {4,5} THEN FLRENTM = 5
IN FLRENT IN {6,7,8} THEN FLRENTM = 7
```
- FLAFFORDM: Metro Forward Rental Affordability.
    - 0: Not rental in 2017.
    - 2: Assisted, no cash, or low rent in 2017.
    - 5: Moderate rent in 2017.
    - 7: High rent in 2017.
    - 9: Part of owner or seasonal stock in 2017.
    - 12: Lost by 2017.

These 6 groups are created as follows:

```
FLAFFORDM = 0
IF FLAFFORD IN {1,2,3} THEN FLAFFORDM = 2
IF FLAFFORD IN {4,5} THEN FLAFFORDM = 5
IF FLAFFORD IN {6,7,8} THEN FLAFFORDM = 7
IF FLAFFORD IN {9,10} THEN FLAFFORDM = 9
IF FLAFFORD IN {11,12} THEN FLAFFORDM = 12
```

BLRENTM: Metro 2017 Rent Category.

- 0: Not rental in 2017.
- 2: Assisted, no cash, or low rent in 2017.
- 5: Moderate rent in 2017.
- 7: High rent in 2017.

These four groups are created as follows:

```
BLRENTM = 0
IF BLRENT IN {1,2,3} THEN BLRENTM = 2
IF BLRENT IN {4,5} THEN BLRENTM = 5
IN BLRENT IN {6,7,8} THEN BLRENTM = 7
```

BLAFFORDM: Metro Backward Rental Affordability

- 0: Not rental in 2015.
- 2: Assisted, no cash, or low rent in 2015.
- 5: Moderate rent in 2015.
- 7: High rent in 2015.
- 9: Part of owner or seasonal stock in 2015.
- 11: Added by 2017.

These six groups are created as follows:

```
BLAFFORDM = 0
IF BLAFFORD IN {1,2,3} THEN BLAFFORDM = 2
IF BLAFFORD IN {4,5} THEN BLAFFORDM = 5
```

IF BLAFFORD IN {6,7,8} THEN BLAFFORDM = 7  
IF BLAFFORD IN {9,10} THEN BLAFFORDM = 9  
IF BLAFFORD IN {11,12,13} THEN BLAFFORDM = 11