#### **Policy Briefs**

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# Using American Community Survey Data in HUD's Income Limits and Fair Market Rents

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#### Abstract

The U.S. Department of Housing and Urban Development (HUD) is required to base its Income Limits and Fair Market Rents (FMRs) on the "most recent data available." The release of the 2005 American Community Survey (ACS) data posed several challenges for including these survey data in the estimation of these program parameters. This article discusses how HUD uses 2005 ACS data to establish Income Limits and FMRs. HUD encourages researchers to evaluate HUD's current use of the data and provide suggestions for incorporating the use of ACS data for smaller areas, when available, into these estimates.

# Introduction

HUD is required by law to develop annually Income Limits for use in determining the eligibility of applicants for its assisted housing programs. Major active HUD-assisted housing programs that rely on Income Limits to determine eligibility are the Public Housing program, Section 8 Housing Assistance Payments program, Section 202 Supportive Housing for the Elderly, and Section 811 Supportive Housing for Persons with Disabilities. Many other federal and state housing, lending, or

other programs with income-based standards for participation incorporate, by statutory or regulatory reference, HUD's Median Family Incomes (MFIs)<sup>1</sup> and Income Limits.

Fair Market Rents (FMRs) are also required to be developed annually and published in final form, after providing an opportunity to comment, by October 1st of each year. These estimates are used primarily for HUD's Housing Choice Voucher Program, the Moderate Rehabilitation Single Room Occupancy Program, and the HOME rental assistance programs.

HUD calculates Income Limits and FMRs using the Office of Management and Budget's (OMB's) current geographic area definitions, with some exceptions. Currently, HUD develops these estimates annually for 2,575 geographic areas—530 metropolitan areas and 2,045 nonmetropolitan counties.

### **Description of the American Community Survey**

Beginning with the 2010 Census, the long-form sample survey, heretofore the "gold standard" of socioeconomic survey data, will no longer be conducted. The Census Bureau developed the American Community Survey (ACS) to replace the decennial census long-form survey and to provide more timely information on the social, economic, and housing characteristics of the population in areas smaller than census regions, census divisions, or states. Starting in 2006, the Census Bureau implemented its plan to release ACS data annually for areas with a population of 65,000 or more. For areas with a population ranging between 20,000 and 65,000, the Census Bureau will release estimates based on 3 years of aggregated survey data, with the first such release in 2008. Updates of the 3-year estimates will be published annually in subsequent years. The same approach will be used for areas with a population of less than 20,000, but these releases will require aggregating data for 5 years to produce estimates. The first 5-year estimates for these areas will be released as early as 2010, and annual releases will follow. Partly because the data are more current and partly because decennial census long-form data no longer will be collected, HUD will rely increasingly on ACS data to produce its Income Limits and FMRs.

The ACS and the decennial census long-form survey use similar questions and similar data collection methods (that is, both are mailed surveys with extensive nonresponse followup). Despite these similarities, the ACS differs from the long-form survey in important respects that affect its use for HUD purposes. Among the most important differences are those (detailed below) concerning timeliness of data, measurement of variables, and the size and related statistical imprecision of the ACS.

- The ACS provides updated information throughout the decade because ACS data are collected continuously. In contrast, the long-form data were collected only once each decade, and that data became increasingly outdated as the decade progressed.
- The ACS is conducted on a continuous, rolling basis throughout the year; therefore, survey responses do not correspond to a particular date. The long-form responses are as of the census date, typically April 1; the lack of a fixed as-of date has implications for the as-of date assumed

<sup>&</sup>lt;sup>1</sup> Most financial institutions and programs refer to the Area Median Income. This term is equivalent to HUD's Median Family Income.

for ACS-based calculations. The as-of date HUD has assigned for ACS 2005-based rents is June 30, 2005, the midpoint of 2005. The Census Bureau inflates income data to the annual average Consumer Price Index (CPI) for the ACS reference year. ACS MFI estimates thus correspond to "annual 2005" estimates, which HUD then updates to December by using the December CPI.

- The annual ACS has slightly more than one-tenth as many completed surveys as the decennial long-form survey, which surveyed approximately one out of every six households.
- The ACS reports data using different reporting periods for different-sized areas. For areas with a population of less than 65,000, the Census Bureau considers annual estimates to be below publication standards; therefore, it will release only 3-year moving average estimates for areas with a population ranging from 20,000 to 65,000 and 5-year moving averages for areas with a population below 20,000. The Census Bureau has addressed the relative imprecision of ACS estimates by publishing 90-percent confidence intervals around all ACS estimates. In contrast, long-form data releases do not include estimates of confidence intervals because normally they are small.
- The smaller ACS annual samples mean that ACS estimates have larger estimated margins of error (MoEs) than the comparable estimates from the long-form decennial census data. The ACS seeks to provide estimates that are close to the true population values for the variables measured. The likely accuracy of these estimates depends partly on sample sizes and partly on the distribution of values for a variable. The MoE, when added to and subtracted from the survey estimate, provides an indication of the range around a survey estimate, or the confidence interval, within which the true population value is likely to be found. For example, the 90-percent confidence interval for an estimate is the range around an estimate that provides a 90-percent likelihood of the true population value. ACS 1-year survey results, even for the largest areas, are inherently less reliable than 2000 Census results, as the following examples illustrate.
  - MoEs for 90-percent confidence intervals around 2000 Census median incomes for metropolitan areas as estimated by HUD range from 0.3 percent to 9 percent and average 1.5 percent.
  - In the 2000 Census, 91 percent of metropolitan area MFI estimates have MoEs of 2.5 percent or less.
  - MoEs around 2005 ACS MFI estimates for metropolitan areas with a population of 65,000 or more range from 0.7 percent to just under 20 percent and average 6.4 percent.
  - Less than 10 percent of 2005 ACS MFI estimates have MoEs of less than 2.5 percent.
- Estimates for areas smaller than census tracts (for example, block groups) will not be released in the official ACS tables. In contrast, long-form estimates provide block group data.
- The nature of several ACS-collected data items is altered. For example, the time period considered for the concept of income is changed significantly. The decennial census, taken in April, asked about income in the past calendar year, meaning that the 2000 Census actually provided annual 1999 income data. The ACS, for which data are collected throughout the year,

asks for income from the preceding 12 months, meaning that the 2005 ACS collects income information spanning 2 years, from January 2004 through December 2005. Incomes reported in ACS surveys are adjusted for inflation by the Census Bureau, using the CPI, to make them equivalent to annual incomes for the survey year.<sup>2</sup>

• Another change that affects both Income Limits and FMRs is the definition of *residency*. The ACS defines residency as "current residence." Use of this definition means a *housing unit* is a survey household's current residence if (1) the household that is currently living or staying in the unit is expected to stay more than 2 months, (2) the household in the unit is staying for less than 2 months but has no other place to live or stay, or (3) the household usually lives at the sample address but is away for a short period of time. In contrast, the long-form survey used a "usual residence" definition (that is, the place where a household lives and sleeps most of the year). This difference has a potentially significant effect on measured incomes and rents in areas where households typically reside in vacation or second homes for more than 2 months.

#### **Estimating Income Limits Using ACS Data**

MFI estimates serve as the basis for Income Limit calculations. The following definitions apply to HUD's Income Limit groups:

- Very low-income families—families whose incomes do not exceed 50 percent of the area MFI. This is the principal income limit definition, subject to adjustment as described in the following text, from which others are generally derived.
- Low-income families—families whose incomes do not exceed 80 percent of the area MFI.
- Extremely low-income families-families whose incomes do not exceed 30 percent of the area MFI.

Exceptions to these arithmetic relationships between MFIs and Income Limits occur when family incomes or housing-cost-to-income relationships are unusually high or low. HUD updates the MFI by using ACS income data and then calculates Income Limits based on the MFI.

HUD calculates MFIs by FMR area, using the Census Bureau definition of "family"<sup>3</sup> as the first step in the process of establishing Income Limits. The 2000 Census provides base income estimates for 1999.

The 2005 ACS data became available in late 2006 and were incorporated into HUD's fiscal year (FY) 2007 MFI estimates and Income Limits, released on March 20, 2007. HUD sought to make as much use of the 2005 ACS data as was statistically justified. The base income was still set at 1999 from the 2000 Census and the 2005 ACS data were used to update the 1999 income to 2005. MFI estimates have significantly larger MoEs than decennial census estimates of MFIs and often

<sup>&</sup>lt;sup>2</sup> Income, Earnings, and Poverty Data From the 2005 American Community Survey, page 2, accessed at census.gov/prod/2006pubs/ acs-02.pdf.

<sup>&</sup>lt;sup>3</sup> The Census Bureau definition of *family* is a householder with one or more other people living in the same household who are related to the householder by birth, marriage, or adoption. The definition of family excludes one-person households and multiperson households of unrelated individuals.

produce lower estimates compared with forward-trended 2000 census data; therefore, HUD has implemented ACS results with some caution.

The following major steps outline the calculation of FY 2007 MFIs and Income Limits:

- Aggregate 2000 Census income distributions by FMR area and estimate 1999 MFIs based on these data.<sup>4</sup>
- For update factors, take 1999 MFI estimates to December 2005:
  - For areas with a population of 65,000 or more, a weighted average of (a) the change in local area MFI from 1999 (2000 Census) to 2005 (local 2005 ACS) and (b) the change in state MFI from 1999 (state 2000 Census estimates) to 2005 (state 2005 ACS estimates) is calculated. The weight assigned to the change in state MFI (b) is five times the local "margin of error ratio" (MoER), or one, whichever is smaller. The MoER is defined as the margin of error for the 90-percent confidence interval of the 2005 ACS local estimate divided by the 2005 ACS estimate of local MFI. The weight assigned to the change in local median family income from the ACS (a) is the larger of 1 minus 5 times the MoER or zero.<sup>5</sup>
  - *For areas with a population of less than 65,000,* Income Limits are developed in several steps. First, census and ACS survey data are used to develop national- and state-level estimates of change in MFIs. Then, the Bureau of Labor Statistics' (BLS's) local area wage data are used to develop an indicator of relative income change within states; but they are adjusted so that when summed to the state level they produce the same change as the ACS. Based on research on the relationship between state median income growth, local average wage growth, and local median income growth between the 1990 and 2000 Censuses, local 2000 Census-based MFI estimates are updated by HUD using a combination of ACS state median income and local BLS average wage data until more localized ACS data begin to be available.
- Because of delays in the availability of BLS and ACS data, estimates are trended to produce a current estimate. All estimates are trended from December 2005 to April 2007 (1.25 years) with a trending factor of 3.5 percent per year, which is based on the average change in MFIs between the past two decennial censuses.
- For the outlying territories,<sup>6</sup> which currently lack BLS or ACS coverage, the 1999 income data from the 2000 Census are updated to 2005 using the national ACS income change.

<sup>&</sup>lt;sup>4</sup> Underlying 2000 Census income distribution tables have not changed from fiscal year 2006. They are posted at www. huduser.org.

<sup>&</sup>lt;sup>5</sup> Because the largest margin of error rate (MoER) in the fiscal year (FY) 2005 American Community Survey (ACS) local data is approximately 0.2, the factor of 5 ensures that the local ACS estimates with the largest MoERs exert almost no influence on the FY 2007 Median Family Income (MFI) estimates. In cases in which HUD's special tabulations of MFIs have MoERs larger than in Census-published areas, HUD effectively excludes their use by capping the value of 5 times MoER at 1.

<sup>&</sup>lt;sup>6</sup> The areas without ACS coverage are American Samoa, Guam, the Northern Mariana Islands, and the U.S. Virgin Islands. Puerto Rico is covered by the ACS-equivalent Puerto Rico Community Survey.

#### **Estimating Fair Market Rents Using ACS Data**

Fair Market Rents are based on a gross-rent concept. Gross rent includes the costs of all major utilities, whether they are included in *contract* rent or paid directly by the family. All utility costs are included except telephone, cable or satellite television, and Internet services. HUD seeks to set FMRs at levels that will ensure availability of a sufficient supply of rental housing to program participants. To accomplish this objective, HUD must set FMRs both high enough to permit a selection of units and neighborhoods and low enough to serve as many low-income families as possible.

The level at which HUD sets FMRs is expressed as a percentile point within the rent distribution of standard-quality, recent-mover, rental housing units.<sup>7</sup> HUD currently uses the 40th percentile rent, the dollar amount below which 40 percent of standard-quality, recent-mover, rental-housing units are rented.<sup>8</sup> In its computation, HUD is required to exclude nonmarket rental housing; therefore, HUD excludes all units that fall below a specified rent level derived from HUD public housing rent data as likely to be either assisted housing or some other form of nonmarket rent.

HUD incorporated the 2005 ACS data into the FMR calculations for the FY 2008 proposed FMRs, published July 12, 2007. Some of the same concepts that HUD developed during the production of Income Limits were also used for the publication of FMRs. HUD also took into account the significantly smaller sample available for generating FMRs. Because FMR estimates are based on only rents for two-bedroom, standard-quality, recent-mover, market-rate rental units, sample sizes are often small. To explicitly consider this factor in the calculations, HUD uses information from both the survey MoE and the sample size to determine when and to what extent local ACS data should be used in FMR rent calculations. The Census Bureau requires 3 unweighted sample cases or 50 weighted sample cases for publication of any cell in HUD special tabulations; however, HUD believes these requirements are too liberal. For example, a single area could have five sample cases with very similar rent values. The MoE for this survey result would be very small, but HUD would still reject these data as possibly nonrepresentative.

HUD used data from the 2005 ACS survey largely to replace the accumulated 2001-through-2005 FMR update factors from various sources HUD used to estimate FY 2007 FMRs. HUD continues to use random digit dialing (RDD) telephone surveys performed between 2001 and 2005 in FMR calculations in limited circumstances.<sup>9</sup> When both the FMR standard-quality, recent-mover, market-rate rental units, sample size is 200 or more and the MoE is small, HUD has rebenchmarked FMR areas using the annual ACS rent estimates; these FMR areas have been rebenchmarked to 2005

<sup>&</sup>lt;sup>7</sup> Standard-quality rental housing units have the following attributes as derived from possible responses on the American Community Survey (ACS) questionnaire: "Occupied rental units paying cash rent," "Specified renter on 10 acres or less," "With full plumbing," "With full kitchen," "Unit built before 2005," and "Meals not included in rent." For the 2005 ACS, recent movers have moved into the unit in 2004 or 2005.

<sup>&</sup>lt;sup>8</sup> Most Fair Market Rent (FMR) areas are based on a 40th-percentile rent. Certain areas, however, are assigned 50th-percentile FMRs, which were established by a rule published on October 2, 2000, that also established the eligibility criteria used to select areas that would be assigned 50th-percentile rather than the normal 40th-percentile FMRs. (See 24 CFR 888.113.)

<sup>&</sup>lt;sup>9</sup> Random digit dialing telephone surveys rely on computer-assisted technology to randomly select the phone number that will be called. These surveys collect recent mover rents by metropolitan area.

for the FY 2008 proposed FMRs. For the FY 2009 FMRs, HUD may rebenchmark these and some additional FMR areas to 2006 using ACS data.

To produce FY 2008 proposed FMRs, HUD first calculates 2005-equivalent rents for all FMR areas using update factors, then evaluates valid local area ACS results against these 2005-equivalent rents, and then updates and trends these rents to April 2008, the midpoint of FY 2008, using standard FMR update procedures. HUD calculates update factors using decennial census data and 2005 ACS data. All update factors reflect the change in standard-quality, two-bedroom median rents between the 2000 decennial census and the 2005 ACS at the smallest level of geography for which at least 200 survey cases are available in the 2005 ACS data. HUD uses four different levels of aggregation to measure rent changes from 2000 to 2005. These levels of aggregation can be separated into two geographic categories: the first category is state based, and the second category is metropolitan-area based.

Of the two varieties of state-based updated factors, the first, and most basic, factor measures the change in median rents using all observations available for a given state. The second state-based update factor is calculated from a subset of state observations. HUD derives the subset by removing the observations in metropolitan areas with valid ACS surveys (that is, ACS surveys with 200 or more standard-quality, two-bedroom observations). HUD uses this update factor to measure the change in median rents without the effect of rent changes in the portion of the state already covered by ACS metropolitan surveys.

HUD also generates update factors for two types of metropolitan area definitions, Core Based Statistical Areas (CBSAs) and FMR areas. CBSAs are unmodified OMB-defined metropolitan areas. FMR areas are either OMB-defined metropolitan areas or HUD-defined subareas of CBSAs, as defined in the proposed FY 2006 and proposed FY 2007 FMR preambles.

To generate the 2005 FMR base calculation (which is not the same as the published FY 2005 two-bedroom FMR), HUD uses the update factor, which varies by the level of geography used. With one exception, the update factor HUD uses is the update factor for the smallest geographic area that also contains 200 or more survey observations. Subareas for FMR areas without valid local surveys receive either the CBSA- or state-level update factor, based on which factor moves its estimate closer to the CBSA rent value. The actual decision process, which is somewhat involved, is described in detail in the online FMR documentation systems referenced at the end of this article.

After HUD generates the 2005 FMR base calculation using the decennial census-based rent and the relevant ACS-based update factor, it evaluates local area recent-mover ACS results. ACS recent-mover rent estimates are used only to provide a new 2005 FMR base calculation when the FMR area has more than 200 recent-mover cases and when the rent result from these recent-mover cases is *statistically* different from the 2005 FMR base calculation.

HUD used local area and regional CPI inflation factors to take the rent estimates from June 2005 to December 2006 and used the standard HUD annual trending of 3 percent for 1.25 years to project the FMR estimate from the end of 2006 to April 2008.

# **Benefits and Challenges of Incorporating 2005 ACS Data in** Income Limit Calculations

HUD has no choice but to use the ACS data. It is all that will be available from now on, and it represents the most current data available. HUD is using the 1-year data with caution because of the greater MoEs, but the state ACS data derived from the fully implemented 2005 ACS have a much greater degree of reliability than previous (2000-to-2004) test-ACS state MFI estimates. In the FY 2007 HUD MFI estimates, HUD is using direct comparisons between the state estimates from the 2000 Census and the 2005 ACS to calculate state-level changes, rather than using a combination of CPS-to-CPS (the Census Bureau's Current Population Survey) and ACS-to-ACS changes and applying them to 2000 Census estimates.

Eventually, when the 5-year aggregated data become available, HUD will be able to eliminate the use of BLS data. The BLS data are measuring wages, which, although an important component, is not the same as measuring family income, so the elimination of this updating measure will improve the income estimates.

The new procedure has the effect of producing a number of downward adjustments to state median family income estimates due to inherent differences between forward-trended 2000 Census estimates and the ACS estimates. One source of this difference may be that the flow nature of the income reference period for ACS respondents results in the failure to capture real income growth experienced by sampled families after they were surveyed. That is, if all families surveyed by the 2005 ACS were asked in December 2005 about their income during the previous 12 months rather than throughout the course of the year, the resulting MFI estimate would be higher to the extent families had experienced real income growth during 2005. HUD anticipates that as local ACS MFI estimates become available for smaller areas, they will also reflect the negative differential between 2000 Census and ACS MFI estimates, which is why HUD implemented this change in estimation methodology with the first use of the full ACS. HUD mitigates declines in its MFI estimates by using a "hold harmless policy" for Income Limits.

In implementing 2005 ACS data, HUD faced two primary challenges. First, only estimates for areas with a population of 65,000 or more are available. Second, even when estimates of local median income are available, the smaller sample sizes of the ACS relative to the decennial census mean that ACS survey estimates are not as reliable. Decennial census estimates were also subject to sampling error, but the ACS develops estimates from annual samples using fewer surveys, which are more likely to vary due to sampling error.

HUD's objective was to minimize the possibility of publishing income estimates in which the annual change is more a reflection of the variation in estimation errors than a reflection of changes in underlying economic conditions. To meet this objective, HUD developed a formula for incorporating 2005 ACS local median income estimates into its FY 2007 MFI estimates that explicitly considers the MoEs in the local ACS results. The formula HUD developed gives lower weight to the potentially less accurate ACS estimates with large MoEs, thus limiting the influence of local ACS estimates in these areas on the HUD MFI estimates. Conversely, the formula gives heavier weight to ACS local median income estimates with small MoEs, enabling the ACS estimate to be the dominant component of HUD estimates in these areas.

### **Benefits and Challenges of Incorporating 2005 ACS Data in Fair** Market Rent Calculations

The decennial census served as the benchmark for FMRs. To eliminate trending of up to 14 years, HUD developed a survey methodology—RDD telephone surveys—that would rebenchmark areas between census periods. Based on telephone interviewing, the RDD survey has become much more costly and difficult to conduct over time, and, because the ACS provides better sample data, the use of the ACS data provides a benefit to HUD in reducing the need for RDD surveys in most large metropolitan areas.

A challenge in using ACS data in the production of FMRs is inherent in the definition of FMR. HUD calculates FMRs for standard-quality, two-bedroom, recent-mover, market-rate, rental units. This definition of FMR means that HUD must eliminate large portions of the survey sample to provide a rental unit distribution that can generate FMRs using the following process:

- Remove approximately 65 percent of housing units because they are owned, not rented.
- From the 35 percent remaining renter housing sample, remove 60 percent of rental units because they are not two-bedroom units.
- Eliminate an additional 5 percent of the sample because those units do not meet standardquality and market-rate housing requirements.

In total, HUD can use only about 10 percent of the ACS sample in the calculation of FMRs.

Although the use of 3-year and 5-year data will improve sample sizes for the calculation of FMRs, the term "recent mover" will have no meaningful definition. Traditionally, FMRs have been based on recent-mover rents, a consideration that rents for new tenants often are higher than those for long-term residents. In the long-form decennial census data, the term "recent mover" generally was defined as a renter who moved into a unit within the past 15 months; however, this type of renter cannot be captured consistently in ACS data. For example, in an area where estimates are based on 5-year data (2005 through 2009 and released in 2010), a tenant who moved in during February 2004 and was surveyed in January 2005 would count as a recent mover, but a tenant who moved in during November 2007 and would be surveyed in December 2009 would not be classified as a recent mover.

The small ACS sample size means that few large areas have enough recent-mover rent responses to be considered probable as fully representative. HUD's ability to obtain and use recent-mover rents from the ACS as the basis of its FMRs will most likely require the development of recent-mover bonuses based on larger area data.

#### Conclusion

HUD cannot ignore the income and rent data available from the ACS, and it must continue to find ways to incorporate these data for smaller areas. HUD's measured approach to incorporating 1-year data reflects the stability of the fully implemented ACS. Although changes for FY 2007 Income Limits and FY 2008 FMRs reflect some significant changes resulting from differences in the

2000 Census and 2005 ACS data, significant differences are not expected to continue in the next year's publication. In its examination of 2006 ACS income data for the FY 2008 publication, HUD sees no significant fluctuations. HUD also expects FMRs to be fairly stable.

HUD will require additional research to provide answers on how best to proceed with the 3-year and 5-year data. For example, will HUD effectively rebenchmark Income Limits and FMRs annually after these data become available? For Income Limits, even with the hold harmless policy, does effective annual rebenchmarking of MFIs mean there will be greater annual fluctuations? For FMRs, would problems continue in measuring small areas with tight markets? Annual ACS data would enable HUD to adjust bedroom intervals (the difference in gross rents by number of bedrooms) for FMRs; however, would this annual adjustment cause too much variation in FMRs? Last, as previously mentioned, the big issue for FMRs is how to continue to use the concept of recent mover.

Researchers wishing to use MFIs, Income Limits, and/or FMRs should be fully cognizant of the origins of these series and the fact that computational methodology changes over time. Although HUD strives to maintain statistical rigor and accuracy in these series, they were designed to be program operating parameters and not a purely statistical release like Census data. Researchers are advised to limit their use of MFIs, Income Limits, and FMRs to studies of the HUD programs for which they were designed unless, after careful consideration of the estimation methodology, investigators are satisfied that the series can contribute to their research objectives.

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# Additional Reading

Researchers may further investigate Income Limits and Fair Market Rents (FMRs) by accessing useful information at the following websites:

• Interactive documentation system that explains the calculation of both 2007 Median Family Income (MFI) estimates and 2007 Income Limits: http://www.huduser.org/datasets/il/il2007\_docsys.html. The direct link to the MFI-only system: http://www.huduser.org/datasets/il/index\_mfi.html.

- Interactive documentation system that explains the calculation of FMRs from 2005 through 2008: http://www.huduser.org/datasets/fmr.html.
- Information about HUD's use of the American Community Survey in its calculation of FMRs for fiscal year (FY) 2008 is accessible directly through the FY 2008 documentation system: http://www.huduser.org/datasets/fmr/fmrs/index.asp?data=fmr08.
- Extensive discussion of the development of current HUD FMR areas: http://www.huduser.org/ datasets/fmr/fmr2006P/Preamble\_FY06\_FMRP.pdf. Discussion of further modifications: http:// www.huduser.org/datasets/fmr/fmr2007P/FY2007P\_Preamble.pdf.