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FINAL REPORT MATCH STUDY FY 2012 INCOME

QUALITY CONTROL FOR RENTAL ASSISTANCE SUBSIDY DETERMINATION

September 27, 2013

**Quality Control for Rental Assistance
Subsidy Determinations**

Final Income Match Report FY 2012

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Appendix

MTW Population and Error Estimates

As part of the Quality Control for Rental Assistance Subsidy Determinations (HUDQC) Study, the U.S. Department of Housing and Urban Development (HUD) contracted with ICF International to conduct an Income Match Study between income data from the National Directory of New Hires (NDNH) income data and income data from the Quality Control (QC) study collected during field data collection. The purpose of the Income Match Study is to identify the rental housing assistance payment errors associated with intentional tenant misreporting of income. The match was conducted for all adult household members¹ in the Fiscal year (FY) 2012 HUDQC study through their social security numbers with NDNH data files provided by HUD. This report includes the results of the income match for the PHA-administered Public Housing, Section 8 - Voucher, and Section 8 - Moderate Rehabilitation programs; and the Housing-administered Section 8, Section 202 and Section 811 Project Rental Assistance Contracts (PRAC) and Section 202/162 Project Assistance Contracts (PAC) programs.

This report is divided into three major sections: (I) study summary, (II) methodology, and (III) detailed findings. The study summary section presents an overview of the study, a summary of the estimated subsidy costs associated with intentional unreported income for the FY 2012 study, and historical estimated subsidy costs associated with the FY 2010 and FY 2011 studies. The methodology section provides details on the process used to review and resolve each income record received from the NDNH data match. Lastly, the detailed findings section provides subsidy cost information associated with unreported income by program type, income type, and study year.

I. STUDY SUMMARY

Using the results of the income match between adult household members in the FY 2012 HUDQC study and the NDNH data, sources of earned income or unemployment compensation that were not found during the QC field data collection process were identified.² The NDNH data contained quarterly information on the source and amount of nearly all legally reportable sources of earned income and unemployment compensation benefits. These data excluded sole proprietors without any employees. For each source of earned or unemployment compensation income identified through NDNH, a determination was made regarding whether the source was new or whether the source was previously identified during the QC field data collection process. Each case was thoroughly analyzed to avoid the double counting of income. For cases in which a potential new source of income was identified, third-party verification data were gathered and used to confirm either the tenant's monthly employment income or the monthly unemployment compensation benefits. Confirmed new sources of income were added to the QC files and tenant rent was recalculated to estimate the impact of the unreported income on HUD subsidies.

The findings from the FY 2012 analysis of NDNH data indicate that intentional tenant unreported income resulted in an estimated overpayment of \$419.2 million in annual HUD subsidy costs. Exhibit 1 provides subsidy cost information by program type for the FY 2012 study.

¹ HUD was provided with Social Security Numbers for heads of households, co-heads, and spouses regardless of age, along with all household members 18 and older.

² QC field data were collected from three primary sources: (1) the 50058/50059 Forms found in tenant files; (2) documentation found in tenant files; and (3) household interviews. A fourth source, third-party verification obtained by ICF, was also used on an as-needed basis.

Exhibit 1

Summary of FY 2012 Subsidy Cost Estimates Associated with Intentional Unreported Income by Program Type, Nationally Weighted for Both Earned Income and Unemployment Compensation

Program Type	Subsidy Cost	95% Confidence Intervals
PHA-Administered – Public Housing	\$203,685,292	±\$113,852,186
PHA-Administered – Section 8 Voucher	\$168,802,108	±\$99,292,046
Owner-Administered	\$46,712,918	±\$34,454,319
Total	\$419,200,318	±\$165,316,295

Exhibit 2 summarizes the subsidy cost associated with unreported income for the FY 2010, FY 2011 and FY 2012 studies. Due to the limited number of cases with new unreported income, these estimates could fluctuate greatly from year to year. In FY 2012 the subsidy overpayment cost was lower than in FY 2011 (about \$419.2 million and \$428.5 million, respectively), but was higher than in FY 2010 (about \$203.2 million).

Exhibit 2

Summary of Subsidy Cost Estimates Associated with Intentional Unreported Income by Program Type for FY 2010 through FY 2012, Nationally Weighted for Both Earned Income and Unemployment Compensation

Program Type	Subsidy Cost		
	FY 2010	FY 2011	FY 2012
PHA-Administered Public Housing	\$45,432,813	\$78,621,422	\$203,685,292
PHA-Administered Section 8 Vouchers	\$86,708,910	\$265,695,668	\$168,802,108
Owner-Administered	\$71,056,268	\$84,174,531	\$46,712,918
Total	\$203,198,010	\$428,492,621	\$419,200,318

For study years FY 2005 through FY 2010, the same population counts were used to create the weights. In FY 2011 and again in FY 2012, the population totals were updated to more accurately reflect the current population. In FY 2012, Moving to Work households were included in the frame resulting in an increase in the population totals.³ Comparing overall and program type subsidy cost estimates from FY 2011 to FY 2012, only the subsidy cost estimate for Public Housing showed a statistically significant change. Analysis performed separating out the FY 2012 non-MTW population and comparing it to the FY 2011 population, which did not include MTW, showed that the entirety of the change in error for Public Housing could not be solely attributed to sampling variance or the inclusion of the MTW population.⁴ The Income Match Study estimates are reliant on a small number of cases in error, however, and can fluctuate greatly from year to year.

³ Please refer to the *HUDQC FY 2012 Final Report*, Chapter 2: The Sample, for a more detailed explanation of this change.

⁴ Please refer to the Appendix of the Income Match report for a more detailed explanation of this analysis and the impact of the inclusion of the MTW population on error estimates.

II. METHODOLOGY

In preparation for the FY 2012 income match, ICF reviewed HUD guidelines and protocols in addition to the correspondence and forms used in the FY 2011 income match. The forms were revised, as appropriate, and instructions for processing the data were updated. The income match review and analysis were conducted according to the detailed procedures found in *FY 2012 Income Match Plan* dated May 16, 2013.

As mentioned previously, the NDNH match provides data for both earned income and unemployment compensation benefit income for the household members included in the FY 2012 QC sample. Comprehensive findings are presented for households with earned income and households with unemployment compensation benefit income.

Two different processes are used to review earned income and unemployment compensation benefits records. Once the records have been processed, and sources of unreported new income are discovered, the same methodology is used to estimate the subsidy cost associated with the income.

The processes used are described below.

Earned Income

The match with the NDNH database identified earned income for 1,000 households from the FY 2012 QC sample. The study used the following two-step protocol for the initial categorization of household member income data:

- Step 1: Initially, each case was reviewed and organized by aggregating cases with similar categorizations, such as whether the employer was the same as that identified during the QC study or a potential new employer.
- Step 2: After each case was categorized, a more thorough review was conducted for cases in which it was unknown whether the employer from the NDNH data matched the QC employer. During this second review, all the cases were re-categorized into two classes, either resolved (no new income discovered) or unresolved (potential new source of income exists). As part of the review process, NDNH earned income was excluded for household members who were live-in aides or dependents.

During the *initial* review of the data, households were categorized as follows:

- **NDNH and QC employers are the same.** The employer identified through the NDNH data was the same as the employer identified through the QC process.
- **NDNH earnings are not considered a new source.** The earnings identified through the NDNH match were not considered new sources of income primarily because they were not earned during the appropriate time period. Other reasons included income for Live-in aides or income for household members who were minors at the time of recertification.
- **Unclear whether the NDNH employer is new.** Three types of cases fell into this category. The first type included cases in which employment income was found in both NDNH and

QC data but the employer name in the NDNH data did not match the employer name in the QC data. The second type included cases in which the tenant name in the NDNH data did not match the tenant name in the QC data. These two types of cases required further investigation before the households were considered to have a potential new source of income. The third type included cases that had data only in the NDNH data, and therefore, were considered to be potential new sources of income.

For cases that required further investigation, file documents from the QC study were reviewed, an Internet search was conducted and/or employers were called to obtain additional information to determine if the QC and NDNH employers and/or tenants were the same.

Exhibit 3 summarizes how households were categorized by program type.

Exhibit 3
Initial Categorization of Earned Income for Each Household by Program Type

Categories	PHA-administered		Owner-administered		Total	
	Households	Percent	Households	Percent	Households	Percent
NDNH and QC employers are the same	387	51%	129	55%	516	52%
NDNH earnings are not considered to be new	202	26%	62	26%	264	26%
Unclear whether NDNH employer is new	176	23%	44	19%	220	22%
TOTAL*	765	100%	235	100%	1000	100%

*Data in this exhibit are unweighted.

Of the 220 households in which it was unclear whether NDNH employer was new, it was determined that for 13 households the employers in NDNH and QC data were either the same or that the tenant name listed in the NDNH data was not the tenant identified in the QC process. Therefore, these households were not considered to have a potential new source of unreported income. The remaining 207 households were considered to have a potential new source of income.

For the 207 households with a potential new source of unreported income, further follow-up actions were taken to determine whether the income should be considered as unreported. The steps taken were as follows:

- If the employer was connected with The Work Number,⁵ the Work Number was used to gather wage information.
- All other employers were sent a letter requesting wage verification.

⁵ The Work Number is a private accounting firm contracted by employers to process payrolls and provide employment verification and payroll data to authorized third parties.

- Follow-up calls were made to all employers who did not respond to the request for verification within 7 business days after the request was mailed.

Exhibit 4 compares FY 2011 to FY 2012 for the number of *households* with potential new sources of income, the number of *employers* to whom third-party requests were sent, and the number of *employers* from whom third-party verification was received. In certain cases, as indicated by the table below, some households had multiple sources of potential new sources of income identified by the NDNH data. Therefore, the number of households and employers do not correspond one-to-one.

Exhibit 4
Comparison of FY 2011 and FY 2012 Verification Requests for Potential New Sources of Earned Income

Third-Party Verification Requests	FY 2011			FY 2012		
	PHA-Admin	Owner-Admin	Total	PHA-Admin	Owner-Admin	Total
Total Households with Potential New Sources of Income	211	67	278 (12% of QC households)	168	39	207 (9% of households)
Employers to whom Third-Party Requests Were Sent*	282	95	377	201	48	249
Employers where Third-Party Verification Was Received*	233	82	315 (84% return rate)	169	43	212 (85% return rate)

*Some households have multiple potential sources of new income from the NDNH data.

Unemployment Compensation Benefits

The match with the NDNH database identified unemployment compensation income for 325 of the households in the FY 2012 QC sample. During the initial review, these households were categorized as follows:

- **NDNH and QC benefits were the same.** Unemployment compensation benefits were identified in both the QC and the NDNH data.
- **NDNH benefits were not considered to be new.** Unemployment compensation benefits identified through the NDNH match were not received during the appropriate time period.
- **NDNH benefits were considered to be a potential new source of income.** Unemployment compensation benefits were a potential source of new unreported income.

Exhibit 5 categorizes households with unemployment compensation benefits records by program type, following the initial review described above.

**Exhibit 5
Initial Categorization of Unemployment Compensation for Each Household by Program Type**

Categories	PHA-administered		Owner-administered		Total	
	Number	Percent	Number	Percent	Number	Percent
NDNH and QC were the same	66	26%	15	21%	81	25%
NDNH benefits are not considered to be new	154	60%	43	61%	197	61%
NDNH benefits were considered to be a potential new source of income	35	14%	12	17%	47	14%
TOTAL	255	100%	70	100%	325	100%

For the 47 households in which the NDNH identified benefits were considered to be a potential new source of income, verification requests were sent to the respective State agencies that administered the benefits to the households.

Exhibit 6 provides a comparison of the response rates for FY 2011 and FY 2012 for requests for verification of benefit information from State agencies administering unemployment compensation benefits.

**Exhibit 6
Comparison of FY 2011 and FY 2012 Verification Requests for Potential New Source of Unemployment Compensation Benefits**

Third-Party Verification Requests	FY 2011			FY 2012		
	PHA-Admin	Owner-Admin	Total	PHA-Admin	Owner-Admin	Total
Total Households with potential source of Unemployment Compensation Benefits*	43	13	56	35	12	47
Requests sent to the appropriate State agency	43	13	56	35	13	48
Total number received	30 (70% return rate)	11 (85% return rate)	41 (73% return rate)	23 (66% return rate)	9 (69% return rate)	32** (67% return rate)

*In FY 2011, the total households with a potential source of unemployment compensation benefits was the same as the number of requests sent because there was only one request per household. In FY 2012, there was more than one unemployment compensation benefits request for one household.

**Of the 32 responses received, 15 provided unemployment benefit data; the rest either required a fee or indicated they could not provide the information due to state or local regulations.

Calculating the Subsidy Cost

To determine whether an income (either from employment or unemployment compensation) should be considered a new unreported source of income, third-party verification and NDNH quarterly wage and benefit information were examined. Third-party verification was examined to determine whether the household member had income in the month before and after the QC month, during and after the QC month or before, during, and after the QC month. In the absence of third-party verification, income that started or ended in the QC Quarter was not considered a new source of income unless the amount earned during that quarter was similar (between 85–115%) to the income earned in either the previous or subsequent quarters.

If the wage data provided by the third-party or NDNH met the criteria above, the income received during the QC Quarter was multiplied by four to determine the annual countable income. NDNH data were used to calculate the unreported income, even if third-party verification income information was available.

III. DETAILED FINDINGS

After reviewing the information obtained through the NDNH match and all the verification received from the third parties, it was determined that 72 households had new sources of earned income and 6 households had new sources of unemployment compensation income.

The annual subsidy loss associated with the new sources of income was determined by adding these new sources of income to the income already identified during the QC field data collection, and recalculating the household's rent. Weights were used to determine nationally representative subsidy losses associated with all the income discovered for the households in the QC sample.

Exhibit 7 provides a summary of case dispositions for the households included in the FY 2012 HUDQC sample after the process was completed. The table provides the number of total households selected for the QC study by program type, the number of households in the QC study that had earned income or unemployment compensation, and the number of households for which NDNH provided unreported earned income or unemployment compensation benefits.

**Exhibit 7
Income Match Final Case Dispositions (FY 2012)**

Case Disposition	PHA-Administered		Owner-administered	Total
	Public Housing	Section 8 Vouchers		
QC Household Sample Size	803	800	801	2404
QC Households with Earnings or Unemployment Compensation	326	338	195	859
Households where NDNH Data Identified Income Sources Did Not Match QC Study Sources				
• Earned Income	78	90	39	207
• Unemployment Compensation	16	19	12	47
Households with Unreported Income				
• Earned Income	38	24	10	72
• Unemployment Compensation	2	2	2	6
Total Sources of Unreported Income that Affected Subsidy Determinations for QC Households	40	26	12	78

Exhibit 8 provides a summary of weighted and unweighted subsidy discrepancies associated with the 72 households in which new earned income sources were identified.

**Exhibit 8
Summary of Subsidy Cost Estimates for Earned Income**

Program Type	Unweighted Values	Nationally Weighted Values*
	Cases with Unreported Income	Cases with Unreported Income
PHA-Administered - Public Housing		
Households in Error	38	60,000
Unreported Income	\$552,588	\$928,119,000
Subsidy Cost	\$120,144	\$199,334,000
PHA-Administered - Section 8 Vouchers		
Households in Error	24	69,000
Unreported Income	\$263,784	\$738,389,000
Subsidy Cost	\$57,300	\$159,295,000
Owner-Administered		
Households in Error	10	16,000
Unreported Income	\$72,456	\$116,668,000
Subsidy Cost	\$21,348	\$34,505,000
Total		
Household in Error	72	145,000
Unreported Income	\$888,828	\$1,783,177,000
Subsidy Cost	\$198,792	\$393,135,000

* Note: For nationally weighted results, program-specific data may not equate to overall total data due to rounding.

Exhibit 9 provides a summary of weighted and unweighted subsidy discrepancies associated with the six households in which new unemployment compensation benefits were identified.

Exhibit 9
Summary of Subsidy Cost Estimates for Unemployment Compensation

Program Type	Unweighted Values	Nationally Weighted Values*
	Cases with Unreported Income	Cases with Unreported Income
PHA-Administered – Public Housing		
Households in Error	2	2,000
Unreported Income	\$15,212	\$17,876,000
Subsidy Cost	\$3,228	\$4,351,000
PHA-Administered – Section 8 Vouchers		
Households in Error	2	6,000
Unreported Income	\$10,236	\$31,785,000
Subsidy Cost	\$3,060	\$9,507,000
Owner-Administered		
Households in Error	2	3,000
Unreported Income	\$27,672	\$43,667,000
Subsidy Cost	\$7,716	\$12,208,000
Total		
Households in Error	6	11,000
Unreported Income	\$53,120	\$93,328,000
Subsidy Cost	\$14,004	\$26,066,000

* Note: For nationally weighted results, program-specific data may not equate to overall total data due to rounding.

Exhibit 10 provides a summary of weighted and unweighted subsidy costs associated with the 78 households in which new income sources were identified⁶. The discrepancies are presented by program type; however, these numbers are provided for informational purposes and are not statistically reliable due to the low incidence of error. Furthermore, program subsidy cost errors are less than expected based on the dollar reporting errors. This occurred because three households had no subsidy cost associated with them as they were already paying the maximum rent for that program type. The total subsidy error associated with the income from the NDNH data was estimated to be \$419.2 million.

Exhibit 10
Summary of Subsidy Cost Estimates for Both Earned Income and Unemployment Compensation

Program Type	Unweighted Values	Nationally Weighted Values*
	Cases with Unreported Income	Cases with Unreported Income
PHA-Administered - Public Housing		
Households in Error	40	62,000
Unreported Income	\$567,800	\$945,995,000
Subsidy Cost	\$123,372	\$203,685,000
PHA-Administered - Section 8 – Vouchers		
Households in Error	26	75,000
Unreported Income	\$274,020	\$770,174,000
Subsidy Cost	\$60,360	\$168,802,000
Owner-Administered		
Households in Error	12	19,000
Unreported Income	\$100,128	\$160,335,000
Subsidy Cost	\$29,064	\$46,713,000
Total		
Households in Error	78	156,000
Unreported Income	\$941,948	\$1,876,505,000
Subsidy Cost	\$212,796	\$419,200,000

* Note: For nationally weighted results, program-specific data may not equate to overall total data due to rounding.

⁶The 78 households in error include 72 households with new earned income and 6 households with new unemployment compensation benefits.

Exhibit 11 provides a comparison of the nationally-weighted findings from the FY 2010 and FY 2011 Income Match studies to the FY 2012 findings.

Note that although the total number of households in error has increased, total unreported income and total subsidy cost have decreased since FY 2011. This could be attributed to households in error that were paying maximum rent and therefore did not have an effect on the dollar amounts of unreported income or subsidy costs.

Exhibit 11
Comparison of FY 2010 through FY 2012 Findings Using Nationally Weighted Values*

Program Type	FY 2010	FY 2011	FY 2012
	Cases with Unreported Income		
PHA-Administered - Public Housing			
Households in Error	23,000	38,000	62,000
Unreported Income	\$416,371,000	\$575,564,000	\$945,995,000
Subsidy Cost	\$45,433,000	\$78,622,000	\$203,685,000
PHA-Administered - Section 8 – Vouchers			
Households in Error	32,000	74,000	75,000
Unreported Income	\$348,883,000	\$1,144,493,000	\$770,174,000
Subsidy Cost	\$86,709,000	\$265,696,000	\$168,802,000
Owner-Administered			
Households in Error	26,000	25,000	19,000
Unreported Income	\$344,946,000	\$304,059,000	\$160,335,000
Subsidy Cost	\$71,056,000	\$84,175,000	\$46,713,000
Total			
Households in Error	81,000	137,000	156,000
Unreported Income	\$1,110,200,000	\$2,024,117,000	\$1,876,505,000
Subsidy Cost	\$203,198,000	\$428,493,000	\$419,201,000

* Note: For results presented above, program-specific data may not equate to overall total data due to rounding.

While there was a slight decrease in the overall dollar error, the difference was not statistically significant. Comparing overall and program type subsidy cost estimates from FY 2011 to FY 2012, only the subsidy cost estimate for Public Housing showed a statistically significant change. As indicated previously, the entirety of the change in error for Public Housing could not be solely attributed to sampling variance or the inclusion of the MTW population.⁷ The Income Match Study estimates are reliant on a small number of cases in error, however, and can fluctuate greatly from year to year.

⁷ Please refer to the Appendix of the Income Match report for a more detailed explanation of this analysis and the impact of the inclusion of the MTW population on error estimates.

Appendix: MTW Population and Error Estimates

APPENDIX: MTW POPULATION AND ERROR ESTIMATES

For the FY 2012 study, ICF determined the population counts for each program to enable the compilation of weights. ICF conducted analysis to determine the impact of the change in the population totals due to the inclusion of the Moving to Work (MTW) population in FY 2012 on error estimates in the HUDQC Study and Income Match Study.

Summary

1. For the HUDQC Study the changes in the gross error and average error estimates from FY 2011 to FY 2012 were due to the inclusion of the MTW program in the study and the sampling variance.
2. For the Income Match Study the changes in the gross error and average error estimates from FY 2011 to FY 2012 for the Public Housing program were changes that cannot be explained solely by the inclusion of the MTW program in the study and the sampling variance. For the PHA-Administered Section 8 program the changes were due to the inclusion of the MTW program in the study and the sampling variance.

Change in Population Totals Due to the Inclusion of the MTW Population

For FY 2012, HUD requested that MTW PHAs be included in the sampling frame for the QC and Income Match Studies. The request was a change from all previous QC and Income Match Studies in which HUD explicitly requested the removal of all MTW PHAs from the frame. The inclusion of the MTW PHAs resulted in an increase in the population totals. In addition, there were slight changes in the population totals, net the MTW population.

The table below provides the population totals by program type for the FY 2011 and FY 2012 studies. Of the 384,036 additional units served by these programs in FY 2012, 377,213 were a result of the addition of the MTW program in the sample frame.

Exhibit 1: Change in Population Totals over Time

Program Type	FY 2005 to FY 2010 Population Totals ¹	FY 2011 Population Totals	FY 2012 Population Totals	Percent Increase in Population Totals from FY 2011 to FY 2012
Public Housing Total	955,000	1,052,503	1,154,796	+9.72%
Public Housing (non-MTW)	955,000	1,052,503	1,040,708	-1.12%
Public Housing (MTW)	0	0	114,088	
PHA-Admin. Section 8 Total	1,858,000	1,912,467	2,198,722	+14.97%
PHA-Admin. Section 8 (non-MTW)	1,858,000	1,912,467	1,935,597	+1.21%
PHA-Admin. Section 8 (MTW)	0	0	263,125	
Owner-Administered	1,320,000	1,382,670	1,378,158	-0.33%
Total	4,133,000	4,347,640	4,731,676	+8.83%

¹Population totals were obtained from the statement of work for the 2005 RFP.

Impact of the Inclusion of the MTW Population on Error Estimates in the HUDQC and Income Match Studies

In order to determine the impact of the inclusion of the MTW population, ICF calculated error estimates for FY 2012 for both the non-MTW and the MTW population. ICF then conducted statistical tests comparing error for the FY 2012 non-MTW population to the FY 2011 population, which did not include MTW. This comparison was done for both the overall gross error estimate and for the program level gross error estimates.

When comparing the FY 2012 non-MTW population to the FY 2011 population, which did not include MTW, the results of the tests showed the following:

- For the QC Study, there was no statistically significant difference in total gross dollar error for both the overall estimate and for the program level estimates.
- For the QC Study, there was no statistically significant difference in average gross dollar error for both the overall estimate and for the program level estimates.
- For the Income Match study, the difference in total gross dollar error was only statistically significant for the Public Housing program.
- For the Income Match study, the difference in average gross dollar error was only statistically significant for the Public Housing program.

Based on these statistical tests, ICF can conclude that for the QC study the change in the total and average gross dollar estimates were due to an increase in the population totals due to the inclusion of the MTW population. Any other variance can be attributed to the fact that estimates can fluctuate from year to year based on the sample selected. Estimates should be considered in conjunction with their 95% confidence intervals.

For the Income Match Study, however, the entirety of the change for the Public Housing program could not be solely attributed to sampling variance. The Income Match Study estimates are reliant on a small number of cases in error and can fluctuate greatly from year to year. The HUDQC sample was not designed to produce the Income Match Study estimates with the same level of precision as the QC study. In order to achieve the same level of precision for the Income Match estimates, the HUDQC sample would have to increase considerably.

In addition, because the sample was not designed to provide estimates at the MTW level, the estimates for MTW may not be sufficiently robust. The sample may be too small and should not be assumed to meet the precision requirements of the RFP.

The results of the statistical tests are summarized in the tables below for both the QC Study and the Income Match Study. There were no statistically significant differences for the QC Study. For the Income Match Study, the only statistically significant difference was for the Public Housing program for both gross rent error and average rent error.

**Exhibit 2: Total Gross Rent Error: QC and Income Match Study
FY 2011 and FY 2012 (non-MTW)**

Total Gross Rent Dollars in Error				
Administration Type	2011 ¹	95% Confidence Interval	2012 ² (non-MTW)	95% Confidence Interval
QC Study				
Public Housing	\$139,885,423	±\$40,739,573	\$182,850,964	±\$59,721,979
PHA-Administered Section 8	\$436,155,531	±\$99,234,601	\$391,808,888	±\$108,985,444
Owner-Administered	\$119,168,035	±\$43,758,418	\$177,234,106	±\$61,458,635
QC Study Total	\$695,208,989	±\$108,727,689	\$751,893,958	±\$152,516,336
Income Match Study				
Public Housing	\$78,621,422	±\$50,494,615	\$195,542,066*	±\$111,353,021
PHA-Administered Section 8	\$265,695,668	±\$129,281,809	\$158,514,981	±\$100,060,759
Owner-Administered	\$84,174,531	±\$75,991,304	\$46,712,918	±\$34,454,319
Income Match Study Total	\$428,491,621	±\$142,965,491	\$400,769,965	±\$163,036,844

Note: *Difference from FY 2011 at significance p<0.05

¹The 2011 population totals and sample excluded MTW

²The 2012 population totals and sample included MTW

**Exhibit 3: Average (Monthly) Gross Rent Error for All Households: QC and Income Match Study
FY 2011 and FY 2012 (Non-MTW)**

Average Rent Dollars in Error (Monthly)				
Administration Type	2011 ¹	95% Confidence Interval	2012 ² (non-MTW)	95% Confidence Interval
QC Study				
Public Housing	\$11	±\$3	\$15	±\$5
PHA-Administered Section 8	\$19	±\$4	\$17	±\$5
Owner-Administered	\$7	±\$3	\$11	±\$4
QC Study Total	\$13	±\$2	\$14	±\$3
Income Match Study				
Public Housing	\$75	±\$48	\$191*	±\$111
PHA-Administered Section 8	\$139	±\$68	\$81	±\$51
Owner-Administered	\$61	±\$55	\$34	±\$25
Income Match Study Total	\$99	±\$33	\$92	±\$39

Note: * Difference from FY 2011 at significance p<0.05

¹The 2011 population totals and sample excluded MTW

²The 2012 population totals and sample included MTW

Technical Notes

- When comparing populations from year to year, it is not appropriate to use the FY 2012 population totals excluding the MTW population while including MTW in the sample. For the same reason, it is not appropriate to produce FY 2012 estimates using FY 2011 population totals. The FY 2012 sample, which includes MTW, would not represent the FY 2011 population, which excludes MTW. Any comparison of two samples in order to determine whether there are significant differences between two estimates requires that the samples represent the same populations. This is particularly important if the sample represents two different years and the comparison is meant to determine whether a meaningful change has taken place.
- In order to produce estimates for the non-MTW and MTW populations separately for FY 2012, the non-MTW sample can be treated as a domain, sufficiently large that one can obtain estimates from that domain for purposes of comparing with the 2011 sample. The 2012 non-MTW sub-sample is smaller, but the weights add to a comparable population because the average weight is larger. Note that the estimates for the MTW domain may not be sufficiently robust, because the MTW sample may be too small and should not be assumed to meet the HUDQC sampling precision requirements.
- The comparison of total gross dollar error does not account for changes in the population net the MTW population. While the population excluding MTW did change slightly from FY 2011 to FY 2012, these changes were small in nature. When comparing dollar error from year to year, average dollar error is the best estimate for comparison because it is not impacted by changes in population size.
- Statistical tests not separating out MTW for the QC study showed that for the QC study, the differences in total and average gross dollar error were already not significant, implying that separating out MTW would not change these results, which proved to be correct. For the Income Match Study, statistical tests not separating out MTW showed that the change in the Public Housing estimate was statistically significant. Separating out the MTW population confirmed this finding as well.

The results of the statistical tests, including the total FY 2012 estimates and the FY 2012 MTW domain estimates, are summarized in the tables below for both the QC Study and the Income Match Study.

**Exhibit 4: Total Gross Rent Error: QC and Income Match Study
Comparison of FY 2011, FY 2012, FY 2012 (non-MTW) and FY 2012 (MTW)**

Total Gross Rent Dollars in Error								
Administration Type	2011 ¹	95% Confidence Interval	2012 ²	95% Confidence Interval	2012 ² (non-MTW)	95% Confidence Interval	2012 ² (MTW)	95% Confidence Interval
QC Study								
Public Housing	\$139,885,423	±\$40,739,573	\$190,849,325	±\$60,873,592	\$182,850,964	±\$59,721,979	\$7,998,361	±\$9,279,582
PHA-Administered Section 8	\$436,155,531	±\$99,234,601	\$430,716,254	±\$107,114,648	\$391,808,888	±\$108,985,444	\$38,907,366	±\$34,341,788
Owner-Administered	\$119,168,035	±\$43,758,418	\$177,234,106	±\$61,458,635	\$177,234,106	±\$61,458,635		
QC Study Total	\$695,208,989	±\$108,727,689	\$798,799,685	±\$148,415,259	\$751,893,958	±\$152,516,336	\$46,905,727	±\$37,582,150
Income Match Study								
Public Housing	\$78,621,422	±\$50,494,615	\$203,685,292*	±\$113,852,186	\$195,542,066*	±\$111,353,021	\$8,143,226	±\$10,331,519
PHA-Administered Section 8	\$265,695,668	±\$129,281,809	\$168,802,108	±\$99,292,046	\$158,514,981	±\$100,060,759	\$10,287,127	±\$20,859,937
Owner-Administered	\$84,174,531	±\$75,991,304	\$46,712,918	±\$34,454,319	\$46,712,918	±\$34,454,319		
Income Match Study Total	\$428,491,621	±\$142,965,491	\$419,200,318	±\$165,316,295	\$400,769,965	±\$163,036,844	\$18,430,353	±\$30,004,057

Note: * Difference from FY 2011 at significance p<0.05

¹The 2011 population totals and sample excluded MTW

²The 2012 population totals and sample included MTW

**Exhibit 5: Average (Monthly) Gross Rent Error for All Households: QC and Income Match Study
Comparison of FY 2011, FY 2012, FY 2012 (non-MTW) and FY 2012 (MTW)**

Average Rent Dollars in Error (Monthly)								
Administration Type	2011 ¹	95% Confidence Interval	2012 ²	95% Confidence Interval	2012 ² (non-MTW)	95% Confidence Interval	2012 ² (MTW)	95% Confidence Interval
QC Study								
Public Housing	\$11	±\$3	\$14	±\$4	\$15	±\$5	\$5	±\$6
PHA-Administered Section 8	\$19	±\$4	\$16	±\$4	\$17	±\$5	\$14	±\$8
Owner-Administered	\$7	±\$3	\$11	±\$4	\$11	±\$4		
QC Study Total	\$13	±\$2	\$14	±\$3	\$14	±\$3	\$11	±\$5
Income Match Study								
Public Housing	\$75	±\$48	\$176*	±\$99	\$191*	±\$111	\$62	±\$82
PHA-Administered Section 8	\$139	±\$68	\$77	±\$45	\$81	±\$51	\$44	±\$101
Owner-Administered	\$61	±\$55	\$34	±\$25	\$34	±\$25		
Income Match Study Total	\$99	±\$33	\$89	±\$35	\$92	±\$39	\$51	±\$90

Note: * Difference from FY 2011 at significance $p < 0.05$

¹The 2011 population totals and sample excluded MTW

²The 2012 population totals and sample included MTW



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