Impact of Expanded Choice on Attrition in the Housing Voucher Program

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Abstract

This paper examines whether expanding neighborhood choice by adding a more localized approach to setting the rental payment standard affects length-of-stay in the U.S. Housing Choice Voucher (HCV) program. Payment standards are typically constant within a metropolitan area, rather than small geographic areas such as ZIP Codes. Using data from the Small Area Fair Market Rent (SAFMR) Demonstration by the U.S. Department of Housing and Urban Development (HUD), we observed changes in program exit rates over time in housing agencies adopting ZIP-Code-based payment standards and compare these with changes in exit rates in programs that continued under metropolitan-area-based standards. We expand the analysis by looking at subgroups, specifically households with children, seniors, adults with disabilities, and residents in lower, average, or higher rent neighborhoods. We find that the introduction of SAFMRs increased program attrition, with exit rates that imply about a 2-year reduction in the median length of program participation (from a base of about 11 years). Effects are largest among working-age adults and in households living in lower- and moderate-rent areas at the time of program introduction. We conclude with a discussion of how our findings on program attrition and housing independence inform recent proposals to adopt more flexible payment standards or increase public housing agencies (PHAs) authority to change payment standards under Moving to Work (MTW) authority.

Introduction

The Small Area Fair Market Rent (SAFMR) Demonstration by the U.S. Department of Housing and Urban Development (HUD) set out to determine whether replacing metropolitan-area Fair Market Rents (FMRs) with ZIP-Code-based SAFMRs increased voucher holders' access to and location in higher-opportunity neighborhoods. Evidence to date finds that, on average, switching to SAFMRs

makes voucher holders more likely to locate in higher-opportunity neighborhoods (Dastrup, et al., 2018; Reina, Acolin, and Bostic, 2018; Collinson and Ganong, 2018), particularly among households with children (Dastrup, Ellen, and Finkel, 2019). There is not yet evidence, however, on whether introducing SAFMRs affects voucher holders' length of participation in the voucher program; that is, whether maintaining subsidized tenancy over time is affected by the introduction of SAFMRs. This article studies how the replacement of metropolitan-area rent standards with ZIP-Code-level rent standards affects the average length of stay in the Housing Choice Voucher (HCV) program.

Leaving the voucher program can represent a positive development in a household's self-sufficiency and economic well-being if it is the result of increases in household income. Although there are no comprehensive data sets reliably detailing reasons for exit from the HCV program, a common perception is that most exits are not associated with incomes so high as to make the voucher recipient income ineligible or even to make the net subsidy so small as to make it not worth the administrative requirements of the program (Gubits, Khadduri, and Turnham, 2009; Lubell, Shroder, and Steffen, 2003). Rather, program exit typically represents a substantial loss in resources that the household continues to need.[1] Many factors may contribute to program attrition other than income: for example, tenant-landlord relationships, quality of the unit and neighborhood, availability of local informal welfare networks (family, friends), moves to nursing homes, death, and proximity to employment.

SAMFRs may interact with many of these factors that affect a household's continued receipt of assistance. Relative to the metropolitan-area-wide FMRs, SAFMRs result in lower maximum subsidies in neighborhoods with prevailing rents lower than the metropolitan-area-wide FMR, and SAFMRs result in higher maximum subsidies in neighborhoods with prevailing rents above the metropolitan-area-wide FMR. This may make the program less attractive to landlords and voucher recipients in lower rent neighborhoods, where a relatively large share of voucher holders has historically been located. Conversely, this may make the program more attractive to landlords and voucher recipients in higher rent neighborhoods. Different subsidy caps in different ZIP Codes within a metropolitan area also represent added complexity for both voucher holders and landlords participating in the program. This added complexity may result in shorter program participation, for example by making it more difficult for tenants to understand the applicable payment standard when searching apartment listings for a new apartment, or by increasing landlords' costs of navigating the program.

In this article, we estimate the effect of the introduction of SAFMRs on the length of participation in the HCV program. We estimate Weibull survival models on a large longitudinal administrative data set representing approximately one million program participants in 145 public housing agencies (PHAs), from 1995 through 2017. We find that the introduction of SAFMR increased program attrition, particularly among working-age adults and in households living in low- and average-rent areas at the time of program introduction. Our estimated model implies exit rates

[1] A family with one full-time worker earning minimum wage cannot afford the local FMR for a two-bedroom apartment anywhere in the United States (HUD, 2018). A recent study finds that for every 100 families with incomes less than 30 percent of the area median income, there are only 22 affordable units that are not already occupied by a higher income household or a household with children (Airgood-Obrycki and Molinsky, 2019).

over time that would cumulatively result in about a 2-year reduction in median length of program participation (from a base of about 11 years). Effects are largest particularly among working-age adults and in households living in lower and moderate rent areas at the time of program introduction. These findings highlight the need for additional research to determine the factors resulting in program attrition.

Literature Review and the SAFMR Study

Previous studies have shown that length of stay in the voucher program varies by several household characteristics. Senior heads of household are less likely to leave the program than households headed by a nonsenior person; households headed by people with disabilities are less likely to leave than households headed by people without disabilities; African-Americans are less likely to leave than Whites; and women are less likely to leave than men (McClure, 2017; Lubell, Shroder, and Steffen, 2003). Households with infants or toddlers are less likely to leave the voucher program, but households with older children are more likely to leave (Cortes, Lam, and Fein, 2008). Our analysis controls for all these household characteristics when testing whether a policy change affects the probability of a household leaving the program and examines whether SAFMR affects program attrition among certain demographic groups compared with others.

Household income also influences attrition in the housing voucher program but less than one might expect. The most positive reason for leaving the voucher program is through increased financial self-sufficiency in the form of improved earnings. Only one-third of all participants leaving the housing voucher program have earnings, however, and income is not a good predictor of exit (Olsen et al., 2005; McClure, 2017). HUD cannot track a household's income after they leave the program, so most previous studies (and this current one) have imperfect income measurement. One way SAFMR policy may affect attrition is through access to better neighborhoods. If SAFMR policy can improve access to higher opportunity neighborhoods, we might expect participants to improve financial self-sufficiency and for this to be associated with a greater likelihood of leaving the program. The Moving to Opportunity study found mixed evidence on how moving to higher opportunity neighborhoods affected the employment and earnings of adults (Sanbonmatsu et al., 2011; Turner, Nichols, and Comey, 2012).[2]

Patterns of exit in the SAFMR Demonstration households are similar to those found in other studies. The analysis of the SAFMR Demonstration included five Demonstration PHAs and two PHAs in the Dallas area where SAFMRs were imposed due to a legal settlement; we will refer to these seven PHAs collectively as "the seven SAFMR PHAs". Exhibit 1 compares the distribution of household characteristics in the seven SAFMR PHAs prior to the switch from FMR to SAFMR, with the distribution of household characteristics of households that exited the program at some point between the introduction of SAFMR and December 31, 2017. Using simple t-tests (Chi-square tests for categorical variables), households that eventually left the program have different characteristics compared with the full sample of households served by the program ($p < .001$ in all cases). Households that eventually exited the program are less likely to be headed by a woman,

[2] Chetty, Hendren, and Katz (2016) found that the future earnings of children is positively impacted by moving to lower poverty neighborhoods, but this evidence is too indirect to suggest a strong association between SAFMR and an increased rate of exit due to improved tenant self-sufficiency.

less likely to have children of any age, more likely to be White (than African-American), more likely to be Hispanic, less likely to be disabled, and more likely to be living in a neighborhood with average or higher than average rent. Households that left the program are more likely to be senior (we do not have sufficient detail to know how many of these exits are due to death) and to have a higher income.

Exhibit 1

Characteristics of SAFMR PHA Program Participants: At Time of Intervention Introduction and at Time of Exit

Characteristic	Mean at Intervention Introduction (%)	Mean at Exit, Among Leavers (%)
Female	85.9	84.1
Senior	18.5	22.7
No Kids	40.7	53.9
Kids Under Age 5	23.2	11.1
Kids Age 5 to 12	42.4	28.6
Kids Age 13 to 17	37.0	27.8
White	19.4	22.4
African-American	75.3	73.3
Hispanic	8.9	10.5
People with Disabilities	36.7	37.0
Lives in Neighborhood With Average Rent Ratio <90% FMR[a]	39.2	38.2
Lives in Neighborhood With Average Rent Ratio Between 90% and 110% of FMR[a]	44.1	44.2
Lives in Neighborhood With Average Rent Ratio >1.1[a]	16.6	17.5
Any Income	99.0	98.4
Average Income	$17,734	$20,624
N	48,819	19,793

FMR = Fair Market Rent. PHA = Public Housing Authority. SAFMR = Small Area Fair Market Rent.
a Sample sizes are 48,134 and 19,479 due to missing data on rent ratios.
Notes: This analysis includes only households participating in the voucher program at the time of the introduction of SAFMR policy. The difference in the means of each row is statistically significant (p<.001, using Chi-squared tests for binary variables and t-tests for continuous variables). The categories "kids under age 5," "kids age 5 to 12," and "kids age 13 to 17" are not mutually exclusive, as households have can children across a wide age range.
Source: SAFMR Demonstration Data, SAFMR PHAs only

In addition to household characteristics, some studies have found that neighborhood features are associated with attrition in the voucher program. Ambrose (2005) found that greater neighborhood poverty is associated with a lower probability of leaving the voucher program, but there is no information on why this association arises. Olsen, Davis, and Carillo (2005) find that greater vacancy rates are associated with lower probability of leaving the program, but, again, the reason for this association is not clear. Under SAFMR, higher poverty neighborhoods become less attractive because of the PHA's lower payment standards in those neighborhoods, forcing either

landlords to accept lower rents or program participants to make larger contributions to the rental payment. Olsen, Davis, and Carillo (2005) found that increasing the tenant rent contribution leads to small positive increases in the probability of leaving the program.

The switch from FMR to SAFMR reduces the percent of units affordable to program participants in lower rent neighborhoods and increases the percent of units affordable to program participants in higher rent neighborhoods. For neighborhoods with median rents that were less than 90 percent of the metropolitan-area median rent, the SAFMR demonstration found that 73 percent of all units had rents below FMR, but only 46 percent had rents below the SAFMR. This reduction in the proportion of units affordable to participants suggests that the introduction of the SAFMR payment standard may make it more difficult for program participants residing in lower rent/high-poverty neighborhoods to remain in their housing unit, because landlords may be less motivated to participate in the program (Dastrup et al., 2018). At the same time, a higher share of units was affordable in higher rent neighborhoods (26 percent affordable under FMR and 64 percent under SAFMR), increasing the value proposition of the voucher to landlords and program participants who would like to reside in higher rent neighborhoods.[3]

Effect of SAFMR on Attrition in the Housing Choice Voucher Program

In this section, we describe our approach to estimating the causal effect of SAFMRs on program attrition in the voucher program. We estimate the impact of the change from metropolitan-area FMRs to SAFMRs using a difference-in-differences approach within a survival analysis model. To examine the robustness of our main specification, we test alternatives specifications of the hazard function and use Monte Carlo analysis. We omit a detailed description of the data and the HUD demonstration from which they derived, as these are extensively described in Dastrup et al. (2018).

The difference-in-differences component compares the exit rates of voucher program tenants before the introduction of SAFMRs with exit rates of tenants after the introduction, and then it compares this difference across treated PHAs and untreated PHAs. The unit of observation is a household-"stay."[4]

This approach offers causal estimates under the assumption that SAFMR PHAs would have had parallel trends in exit rates during our study period in the absence of SAFMRs. The difference-in-difference approach removes potential bias from the impact estimate due to unobservable PHA

[3] A recent HUD study found that refusal rates were much higher in low-poverty neighborhoods compared with the rates in higher-poverty neighborhoods (Cunningham et al., 2018).

[4] As we cannot observe long stays post-intervention, we restrict the analysis sample to households that entered the voucher program after 1980. We also restrict the estimation to time periods beginning in 2009 which is when our historical HUD data set begins, so that households entering prior to 2009 do not bias the estimation of the survival function. For example, consider two households that enter the voucher program in 2000, where Household A leaves the voucher program in 2005 and Household B leaves the voucher program in 2015. Household A is not observed in our data, because household-stays that ended prior to 2009 are not observed. Household B is observed, but we only use information about that household's "survival" at $t \geq 108$ months ($108=12*(2009 - 2000)$), so that Household B does not contribute an upwards bias of the survival probability at $0 < t < 108$. A household that entered, exited, and re-entered the program will appear in our data twice, if the exit took place during or after January 1, 2009, and the second re-entry took place between January 1, 2009, and December 31, 2017.

characteristics that are constant over the analysis time period (for example, local PHA practices and preferences in tenant selection). While the impact estimates could still be biased due to time-varying characteristics that coincided with the introduction of SAFMR and that affected the SAFMR PHAs and PHAs metropolitan-area-wide FMRs differently, we find that possibility unlikely, as the comparison sample is very large and the SAFMR demonstration sites were selected within clusters of PHAs that were similarly sized, in markets with similar FMRs, and had similar percentages of voucher holders that were working age (see Dastrup et al., 2018).

We estimate a Weibull survivor function using Stata's survival analysis packages, which models the probability that an existing tenant is still in the voucher program after t months. We considered other specifications (including the more typical proportional hazard model), but the data yield linear, parallel trends (straight lines) in log cumulative hazard over log time, suggesting that Weibull is the most appropriate specification. Equation 1 shows the Weibull cumulative hazard function, including household characteristics X; PHA characteristics Z; an indicator of PHA ever randomly assigned to using SAFMRs, SA; an indicator for pre- and post-introduction of the SAFMR policy, $POST_t$; and a random error term ϵ. The coefficient β_2 is the primary coefficient of interest, as it provides the estimate of whether the introduction of SAFMRs affected tenants' probability of leaving the program. Our findings are robust to the use of alternative hazard models (Gompertz) and consideration of correlated random errors at the PHA-level using a shared frailty parameter.

$$(1) \qquad H(t) = \exp(\beta_1 + \beta_2 SA * POST_t + \beta_3 SA + \beta_4 POST_t + \beta_2 X + \beta_3 Z + \epsilon)\ t^a.$$

All households are censored at 15 years duration to avoid longer term households' outsized influence on the shape parameters of the Weibull model (our main findings are robust to their inclusion).

To visualize the analysis, exhibit 2 shows the probability (and confidence intervals around those probabilities) that a household will remain in the voucher program after t months (a) prior to the SAFMR demonstration and (b) after the SAFMR demonstration. These graphs begin at 1.0 (a 100 percent probability of remaining in the voucher program at the time of move-in) and decrease to roughly 0.25 by the 175th month of participation (a 25 percent probability of still being in the voucher program after roughly 14.5 years). The median length of stay is the number of months at which 50 percent (0.5 on the y-axis) are still in the program.[5] The solid line shows this probability for households participating in PHAs assigned to use the SAFMRs, and the dashed line shows the probability for households participating in PHAs using the typical (metropolitan-wide) payment standards. The solid line is higher than the dashed line in exhibit 2(a), showing that households in PHAs that will later participate in the SAFMR demonstration are more likely to "survive," such as, persist in the program, prior to the introduction of the SAFMR policy than households in PHAs that will not participate in the SAFMR demonstration. In an experiment with a larger sample, we would expect the two lines in exhibit 2(a) to overlap perfectly, indicating no differences between the treatment and comparison group prior to the demonstration. Two of the SAFMR sites (Cook County and Mamaroneck) were the biggest influence in generating the gap in the pre-demonstration survival curves, and note that this gap is not surprising given that a sample size of

[5] McClure estimated that the median length of stay in the voucher program is 4 years. Our data suggest that the median is much longer at 11 years (2017). One reason for this discrepancy may be that we do not include stays of less than 1 month.

seven PHAs is small and cannot be expected to reflect the average of a group of 138 comparison PHAs. This difference could be due to the combination of the housing market and participant types served in these PHAs.

The survival function of the SAFMR PHAs looks markedly different after the introduction of SAFMR policy. It nearly overlaps with the survival function of the non-SAFMR PHAs, as shown in exhibit 2(b). These data strongly suggest that the introduction of SAFMR led to induced program exit.

Exhibit 2(a)

Probability of Remaining in the Voucher Program, by Months Since Entry: Prior to SAFMR Demonstration

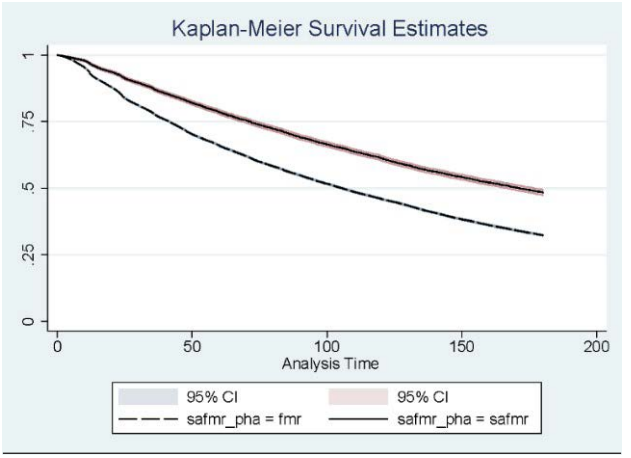
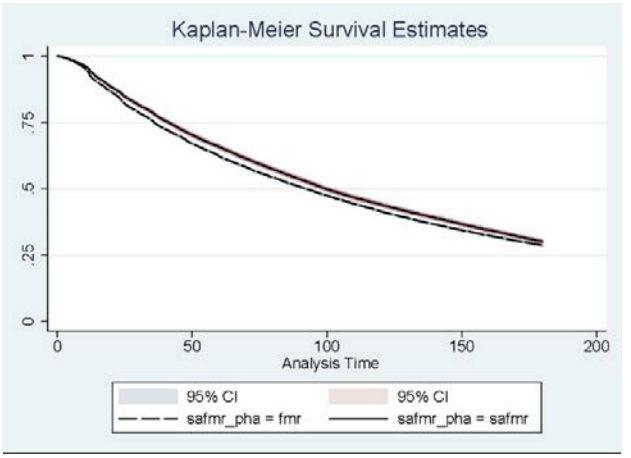


Exhibit 2(b)

Probability of Remaining in the Voucher Program, by Months Since Entry: After SAFMR Demonstration



Consistent with exhibits 2(a) and 2(b), estimation of the survival regression model reveals that the introduction of SAFMR increased program exit. For any given length of time in the program and household characteristic, the introduction of SAFMR increased the probability of exit by 27 percent (a hazard ratio of 1.269). Exhibit A.1 in the appendix shows the full set of hazard ratios for all covariates in the regression model. This result is robust to alternative specifications, including the exclusion of random effects at the PHA-level and use of the Gompertz model instead of the Weibull model (see exhibit A.1). Of course, the increased probability of program attrition leads to shorter lengths of stay in the voucher program. Using the main model estimates, exhibit 3 shows the regression-adjusted median length of stay in months for households in treatment and comparison PHAs, both before and after the introduction of SAFMR. These medians are consistent with the survival rates in exhibit 2 and suggest that the introduction of SAFMR decreased the median length of stay by 20 percent (-27 divided by 134).[6]

Exhibit 3

Regression-Adjusted Median Length of Stay in the Voucher Program (Months)

	SAFMR PHAs	Comparison PHAs	Difference
After SAFMR	92	93	– 1
Before SAFMR	134	108	26
Difference	– 42***	– 15***	– 27***

*** $p < 0.001$

Notes: For SAFMR PHAs, the data include 54,860 households participating in the voucher program prior to the intervention and 56,061 households participating in the voucher program after the introduction of the intervention, of which 37,021 participated in the program in both periods. For comparison PHAs, the data include 738,807 households participating in the voucher program prior to the intervention and 668,602 households participating in the voucher program after the introduction of the intervention, of which 474,863 households participated in the program in both periods.

We were surprised at the large estimated impact of the change from metropolitan area FMR to SAFMR on attrition. One hypothesis we had is that our findings could be due to chance, owing to the small number of PHAs in the treatment group (7 out of 145 in the full sample). To explore this hypothesis, we conducted a Monte Carlo analysis using the 138 PHAs in the comparison group. Over 100 iterations, we randomly assigned 6 to 7 comparison PHAs to a "treatment" group and ran the same difference-in-difference Weibull model. On average, those simulations found no impact (a hazard ratio of 0.997, i.e. nearly 1). Despite the small number of PHAs in the simulated "treatment" groups, only one out of the hundred simulations yielded an impact estimate as large as the impact in our main analysis. In fact, our main finding is 2.31 standard deviations larger than the average simulated impact estimate. From this exercise, we conclude that although our main finding is puzzlingly large, there is roughly a one percent probability that it is due to random chance.

We tested to see if the impact was different across various tenant groups. We use the standard triple-difference specification, shown Equation (2), with W being a dummy (binary indicator) variable for subgroup inclusion. Table A.2 in the appendix shows the full set of estimated hazard ratios for all coefficients in the subgroup analyses.

$$(2) \quad H(t) = \exp\left(\beta_1 + \beta_2 SA * POST_t * \mathrm{W} + \beta_3 SA * \mathrm{W} + \beta_4 POST_t * \mathrm{W} + \beta_5 \mathrm{W} + \beta_2 SA * POST_t + \beta_3 SA + \beta_4 POST_t + \beta_2 X + \beta_3 Z + \epsilon\right) t^a$$

[6] The SAFMR demonstration data suggest longer median lengths of stay than previously reported (McClure, 2017).

Similar to previous studies, our main finding and subgroup analysis finds that heads of household with disabilities are less likely to exit, in general, compared to nondisabled heads of household. Interestingly, we find no evidence that heads of household with disabilities were differently affected by the introduction of SAFMR compared to nondisabled heads of household. Stated differently, the introduction of SAFMR increased the hazard of exit for heads of household with disabilities just as much as it did for nondisabled heads of household.

We also compared households with children, to households without children. Similar to previous studies, our main finding and subgroup analysis find that households with children are less likely to exit, in general, compared with households without children. We find no evidence that households with children were differently affected by the introduction of SAFMR compared with households without. Stated differently, the introduction of SAFMR increased the likelihood of exit for households with children just as much as it did for households without children.

We next looked at households living in high rent neighborhoods at the time the SAFMR demonstration began. (We do not do a subgroup analysis based on neighborhood type at time of exit because neighborhood type at time of exit is endogenous to the policy change, as shown by Dastrup, Ellen, and Finkel, 2019.) Similar to Dastrup et al. (2018), high-rent neighborhoods are defined as neighborhoods where the median rent is 110 percent higher than the metropolitan area FMR. Unlike for households living in neighborhoods with rents lower than the 110 percent of the metropolitan area FMR, there is no evidence that households living in high-rent neighborhoods are more likely to exit the program after the introduction of SAFMR than before the introduction of SAFMR. The difference in impact for household participants in higher rent neighborhoods compared with all other households is statistically significant ($p < .001$). This finding suggests that the introduction of SAFMR increased attrition in lower and moderate rent neighborhoods but not in higher rent ones.

To investigate further, we closely examined households that live in lower and moderate rent neighborhoods at the beginning of the SAFMR Demonstration. As in Dastrup et al. (2018), lower rent neighborhoods are defined as ZIP Codes where the median rent is at most 90 percent of the metropolitan area median rent. We found that in general (prior to the SAFMR Demonstration and in non-SAFMR PHAs) households living in lower rent neighborhoods are more likely to leave the program than households in moderate rent neighborhoods (median rents between 90 and 110 percent the metropolitan median). For households that live in lower rent neighborhoods, the introduction of the SAFMR increased the probability of exit by 26 percent. For households that live in moderate rent neighborhoods, SAFMR increased the probability of exit by 41 percent, which statistical tests show is significantly larger than the increase in probability of exit for lower rent neighborhood participants. Therefore, we reject the hypothesis that the main result is driven solely by voucher participants living in lower rent neighborhoods; rather, it is driven both by participants in lower rent neighborhoods and participants in moderate rent neighborhoods. This finding is surprising since the SAFMR formula results in SAFMRs that are similar or identical to FMRs in these ZIP Codes. Further research is needed to determine the contribution to this finding of payment standards (set by PHAs within the 90 to 110 percent of either SAFMR or FMR), program complexity, and other factors.

Last, we examined subgroups defined by age. The introduction of SAFMR had a different effect on program attrition for households with seniors (age 62 and over) compared with households with no seniors. Both groups were more likely to exit after the introduction of SAFMR, but the increased hazard was smaller for households with seniors than households with no seniors (hazard ratio of 1.106 for seniors, 1.303 for nonseniors). The difference is statistically significant ($p < .001$). We can speculate on possible explanations for this difference (for example, seniors are otherwise less likely to move), but future research should clarify how the introduction of SAFMR had a different effect on these two types of households. In the SAFMR PHAs, a slightly smaller percentage of households with seniors live in high-rent neighborhoods than households with no seniors (16.8 percent compared with 15.9 percent). Therefore, the differential result for seniors is not tied to the results on average neighborhood rent levels.

Discussion

The results show increased rates of program attrition after the introduction of SAFMRs. Further research is needed to shed light on the reasons for the increased program attrition. It is theoretically ambiguous how the change from metropolitan area FMRs to SAFMRs would affect the length of stay in the program. The change from metropolitan area FMRs to SAFMRs may *decrease* attrition in higher rent neighborhoods because the program's generosity has increased. At the same time, if higher rent neighborhoods coincide with better economic possibilities for financial self-sufficiency, SAFMRs would ultimately *increase* attrition in higher rent neighborhoods. We found that households residing in higher rent neighborhoods were less likely to leave the program after the introduction of SAFMR than before, suggesting that, in the first 5 years after implementation, the effects of increased generosity of the subsidy in those neighborhoods outweigh factors that might decrease participation.

Another reason SAFMR might affect attrition is that it may *increase* attrition in lower rent neighborhoods because landlords may be less willing to accept the lower payment standards or interface with a more complicated program. Also, HCV participants with a lower valued subsidy might decide that the program's paperwork requirements are too burdensome. Indeed, we found that households residing in lower rent neighborhoods were more likely to leave the program after the introduction of SAFMR than before. Puzzlingly, households in moderate rent neighborhoods were also more likely (in fact, even more likely than those in lower rent neighborhoods) to leave the program after the introduction of SAFMR. Prior to this analysis, HUD recognized the potential burden to existing program participants at PHAs that switch from FMR to SAFMR. In part to address this possibility, Section 107 of the recently enacted Housing Opportunity Through Modernization Act (HOTMA) provides PHAs with flexibility in how they set payment standards in areas where the new payment standard falls below the metropolitan-area FMR. Under this new rule, PHAs are explicitly given the option of allowing higher PHA rental contributions for units whose new payment standard falls below the previous metropolitan-area FMR payment standard. These protections and additional experience with SAFMRs may result in different outcomes than we find for the SAFMR demonstration PHAs in our analysis.

Attrition from the voucher program is puzzling in general because most households are not financially better off as a result of leaving the program. Researchers would be able to document tenant experience and explain demonstration impacts on attrition if the HUD Form 50058 that describes each participating household recorded reasons for program exits. This article and the previous literature suggest that the list of categorical responses recording the exit reason should include: (1) death, (2) moving to co-habit with partner, (3) leaving geographic service area, (3) eviction, (4) no longer in need of housing subsidy, (5) difficulty finding an apartment, and (6) moving to a nursing or other more intensive care facility, as well as others. Increased resources and improved processes for gathering this exit information would likely allow for more focused research conclusions to inform policies that can affect program attrition.

Conclusion

During the SAFMR demonstration, the seven participating PHAs saw increased attrition rates from the HCV program that imply a decrease in median length of program participation of about 2 years (from a median base of about 11 years of participation). The increase in attrition is attributable to the change from metropolitan area rents to SAFMRs. Households in lower and moderate rent neighborhoods were affected but households in high-rent neighborhoods were not. Working-age adults were more affected than households with adults over age 62. Characteristics of participants exiting the program suggest that exits represent a decrease in household resources. Additional research and data collection are needed to understand the reasons for program exits and how the introduction of SAFMRs interacts with these reasons. Although the demonstration evaluation and related research have found that SAFMRs led to an increase in households—especially those with children—moving to high-rent neighborhoods, a more complete welfare analysis of SAFMRs is needed to take into account its impact on attrition from the voucher program.

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Appendix A: Additional Exhibits

Exhibit A.1

Main Results (1 of 2)

	Weibull Model Without PHA-Cluster Robust Standard Errors	Gompertz Model Without PHA-Cluster Robust Standard Errors	Weibull Model With PHA-Cluster Robust Standard Errors
Interaction of Post Dummy and SAFMR-PHA Dummy	1.399*** [1.357,1.443]	1.387*** [1.344,1.430]	1.270*** [1.230,1.311]
Indicator for Time ≥ Post-Intervention	1.089*** [1.081,1.097]	1.106*** [1.099,1.114]	1.171*** [1.163,1.179]
PHAs Using SAFMRs	0.720*** [0.701,0.739]	0.730*** [0.711,0.749]	0.795 [0.589,1.074]
Cluster = 2	1.040*** [1.028,1.052]	1.038*** [1.026,1.050]	1.053 [0.900,1.232]
Cluster = 4	0.552*** [0.542,0.562]	0.558*** [0.548,0.568]	0.520*** [0.424,0.640]
Cluster = 5	(omitted)	(omitted)	(omitted)
Cluster = 6	0.766*** [0.759,0.773]	0.772*** [0.764,0.779]	-0.195* [0.678,0.998]
Cluster = 7	0.456*** [0.448,0.464]	0.464*** [0.456,0.472]	0.438*** [0.322,0.596]
Household Head is a Woman	0.729*** [0.723,0.736]	0.745*** [0.739,0.752]	0.740*** [0.733,0.747]
Head of Household with Disability	0.822*** [0.815,0.829]	0.833*** [0.826,0.840]	0.793*** [0.786,0.800]
Household Head is White	1.419*** [1.406,1.430]	1.419*** [1.406,1.430]	1.265*** [1.252,1.276]
Household Head is Hispanic	0.950*** [0.939,0.960]	0.951*** [0.941,0.961]	0.870*** [0.860,0.882]
Children Under Age 5 Present	0.974*** [0.966,0.983]	0.960*** [0.952,0.969]	0.947*** [0.939,0.955]
Children Age 5 to 12 Present	0.846*** [0.839,0.853]	0.851*** [0.845,0.858]	0.842*** [0.835,0.849]
Children Age 13 to 17 Present	0.918*** [0.910,0.926]	0.934*** [0.926,0.942]	0.928*** [0.920,0.936]
More Than One Adult in Household	0.844*** [0.836,0.850]	0.854*** [0.846,0.861]	0.877*** [0.869,0.884]
At Least One Adult Age 62+	1.005 [0.994,1.015]	1.018*** [1.008,1.029]	1.025*** [1.014,1.036]
Income > $0 and < $5K	0.941*** [0.922,0.960]	0.944*** [0.925,0.963]	0.904*** [0.886,0.923]
Income ≥ $5K and < $10K	0.947*** [0.929,0.966]	0.952*** [0.934,0.971]	0.921*** [0.903,0.940]

Exhibit A.1

Main Results (2 of 2)

	Weibull Model Without PHA-Cluster Robust Standard Errors	Gompertz Model Without PHA-Cluster Robust Standard Errors	Weibull Model With PHA-Cluster Robust Standard Errors
Income ≥ $10K and < $15K	0.964*** [0.945,0.983]	0.970** [0.951,0.990]	0.960*** [0.941,0.979]
Income ≥ $15K and < $20K	1.052*** [1.031,1.073]	1.054*** [1.033,1.075]	1.046*** [1.025,1.068]
Income ≥ $20K and < $25K	1.195*** [1.170,1.220]	1.198*** [1.174,1.224]	1.206*** [1.181,1.231]
Income ≥ $25K	1.735*** [1.699,1.770]	1.747*** [1.713,1.782]	1.818*** [1.782,1.857]
Constant	0.008*** [0.008,0.008]	0.010*** [0.009,0.010]	0.007*** [0.007,0.008]
Weibull Shape Parameter	1.036*** [1.033,1.039]		1.066*** [1.062,1.069]
Gompertz Shape Parameter		0.999*** [0.999,0.999]	
Theta			0.151*** [0.120,0.189]

PHA = Public Housing Authority. SAFMR = Small Area Fair Market Rent.

** p < 0.05, ** p < 0.01, *** p < 0.001*

*Notes: This table displays the model results as hazard ratios, which are exp(*coeff*) where* coeff *are the estimated model coefficients. For the SAFMR PHAs, there are 54,860 observations pre-intervention and 56,061 observations post-intervention. For the metropolitan area FMR PHAs, there are 738,807 observations pre-intervention and 668,602 observations post-intervention. Income is inflation adjusted to 2018 dollars. Ninety-five percent confidence intervals in brackets.*

Exhibit A.2

Subgroup Analyses (1 of 3)

Subgroup	Households with at Least One Person with a Disability Present	Households with at Least One Senior Present	Households with at Least One Child Present	Higher Rent Neighborhood (Rent Ratio >1.1 Area Median Rent)	Lower Rent Neighborhood (Rent Ratio <0.9 Area Median Rent)
(by Comparison)	Households with No Persons with Disabilities Present	Households with No Seniors Present	Households with No Children Present	Average and Low Rent Neighborhoods	Average Rent Neighborhoods
Interaction of Subgroup Dummy, Post Dummy, and SAFMR Dummy	0.94 [0.880,1.004]	0.848*** [0.780,0.921]	1.023 [0.962,1.088]	0.784*** [0.717,0.858]	0.895** [0.834,0.960]
Interaction of Subgroup Dummy and Post Dummy	0.967*** [0.953,0.982]	0.935*** [0.916,0.953]	1.082*** [1.069,1.095]	1.111*** [1.086,1.134]	0.844*** [0.829,0.859]
Interaction of Subgroup Dummy and SAFMR Dummy	1.147*** [1.085,1.212]	1.078* [1.008,1.153]	0.877*** [0.833,0.924]	0.117** [1.045,1.209]	1.135*** [1.070,1.203]
Interaction of Post Dummy and SAFMR Dummy	1.297*** [1.249,1.347]	1.305*** [1.260,1.351]	1.255*** [1.197,1.314]	1.309*** [1.265,1.354]	1.413*** [1.353,1.478]
Post Dummy (Indicator for Time ≥>= Post-Intervention)	1.184*** [1.174,1.195]	1.183*** [1.174,1.192]	1.121*** [1.110,1.132]	1.158*** [1.149,1.166]	1.210*** [1.200,1.220]
SAFMR Dummy (Indicator for PHAs Using SAFMRs)	0.761 [0.563,1.029]	0.785 [0.581,1.061]	0.854 [0.631,1.155]	0.782 [0.579,1.057]	0.726* [0.536,0.984]
Cluster = 2	1.055 [0.901,1.234]	1.053 [0.899,1.232]	1.054 [0.900,1.234]	1.053 [0.900,1.232]	1.048 [0.895,1.228]
Cluster = 4	0.521*** [0.424,0.640]	0.520*** [0.424,0.639]	0.521*** [0.424,0.640]	0.520*** [0.423,0.639]	0.510*** [0.414,0.627]
Cluster = 5	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)
Cluster = 6	-0.195* [0.678,0.999]	-0.196* [0.678,0.997]	0.823* [0.678,0.998]	0.823* [0.678,0.998]	0.819* [0.674,0.993]
Cluster = 7	0.437*** [0.321,0.595]	0.438*** [0.322,0.596]	0.437*** [0.321,0.595]	0.438*** [0.322,0.596]	0.421*** [0.309,0.573]

Exhibit A.2

Subgroup Analyses (2 of 3)

Subgroup (by Comparison)	Households with at Least One Person with a Disability Present Households with No Persons with Disabilities Present	Households with at Least One Senior Present Households with No Seniors Present	Households with at Least One Child Present Households with No Children Present	Higher Rent Neighborhood (Rent Ratio >1.1 Area Median Rent) Average and Low Rent Neighborhoods	Lower Rent Neighborhood (Rent Ratio <0.9 Area Median Rent) Average Rent Neighborhoods
Household Head is a Woman	0.740*** [0.733,0.747]	0.740*** [0.733,0.747]	0.736*** [0.730,0.743]	0.740*** [0.733,0.747]	0.731*** [0.725,0.739]
Head of Household with Disability	0.803*** [0.794,0.812]	0.793*** [0.786,0.799]	0.795*** [0.789,0.803]	0.793*** [0.786,0.800]	0.796*** [0.789,0.803]
Household Head is White	1.265*** [1.252,1.276]	1.265*** [1.252,1.276]	1.266*** [1.255,1.278]	1.264*** [1.252,1.276]	1.271*** [1.259,1.284]
Household Head is Hispanic	0.870*** [0.860,0.882]	0.871*** [0.860,0.882]	0.869*** [0.858,0.880]	0.870*** [0.860,0.882]	0.860*** [0.848,0.871]
Children Under Age 5 Present	0.946*** [0.938,0.955]	0.947*** [0.939,0.955]	0.933*** [0.925,0.941]	0.947*** [0.939,0.955]	0.954*** [0.945,0.963]
Children Age 5 to 12 Present	0.842*** [0.835,0.849]	0.842*** [0.835,0.849]	0.829*** [0.822,0.836]	0.841*** [0.834,0.848]	0.840*** [0.833,0.848]
Children Age 13 to 17 Present	0.928*** [0.920,0.936]	0.928*** [0.920,0.936]	0.917*** [0.909,0.925]	0.928*** [0.920,0.936]	0.923*** [0.914,0.932]
More Than One Adult in Household	0.877*** [0.869,0.884]	0.877*** [0.869,0.885]	0.875*** [0.868,0.883]	0.877*** [0.869,0.884]	0.874*** [0.866,0.882]
At Least One Adult Age 62+	1.023*** [1.012,1.034]	1.064*** [1.048,1.079]	1.028*** [1.017,1.039]	1.025*** [1.014,1.036]	1.022*** [1.010,1.034]
Income > $0 and < $5K	0.905*** [0.887,0.924]	0.905*** [0.886,0.923]	0.902*** [0.884,0.921]	0.904*** [0.886,0.923]	0.906*** [0.887,0.926]
Income ≥ $5K and < $10K	0.922*** [0.904,0.940]	0.922*** [0.904,0.940]	0.920*** [0.902,0.938]	0.921*** [0.903,0.940]	0.926*** [0.907,0.945]

Exhibit A.2

Subgroup Analyses (3 of 3)

Subgroup	Households with at Least One Person with a Disability Present	Households with at Least One Senior Present	Households with at Least One Child Present	Higher Rent Neighborhood (Rent Ratio >1.1 Area Median Rent)	Lower Rent Neighborhood (Rent Ratio <0.9 Area Median Rent)
(by Comparison)	Households with No Persons with Disabilities Present	Households with No Seniors Present	Households with No Children Present	Average and Low Rent Neighborhoods	Average Rent Neighborhoods
Income ≥ $10K and < $15K	0.961*** [0.942,0.980]	0.961*** [0.942,0.980]	0.958*** [0.940,0.978]	0.960*** [0.941,0.979]	0.963*** [0.943,0.983]
Income ≥ $15K and < $20K	1.047*** [1.026,1.068]	1.047*** [1.025,1.068]	1.043*** [1.022,1.065]	1.046*** [1.025,1.068]	1.052*** [1.030,1.075]
Income ≥ $20K and < $25K	1.207*** [1.181,1.232]	1.206*** [1.181,1.232]	1.202*** [1.176,1.228]	1.206*** [1.179,1.231]	1.221*** [1.195,1.250]
Income ≥ $25K	1.820*** [1.784,1.859]	1.820*** [1.782,1.857]	1.815*** [1.779,1.853]	1.818*** [1.781,1.857]	1.861*** [1.820,1.900]
Ratio of Neighborhood Rent to FMR at Time of Intervention Introduction > 1.1				0.962*** [0.947,0.976]	
Ratio of Neighborhood Rent to FMR at Time of Intervention Introduction < 0.9					1.197*** [1.183,1.213]
Constant	0.007*** [0.007,0.008]	0.007*** [0.007,0.008]	0.008*** [0.007,0.008]	0.008*** [0.007,0.008]	0.007*** [0.007,0.008]
Weibull Shape Parameter	1.066*** [1.062,1.069]	1.065*** [1.062,1.068]	1.065*** [1.062,1.068]	1.065*** [1.062,1.068]	1.065*** [1.062,1.068]
Random Effect Parameter (Frailty)	0.151*** [0.120,0.189]	0.151*** [0.120,0.189]	0.151*** [0.121,0.189]	0.151*** [0.120,0.189]	0.152*** [0.121,0.190]

FMR = Fair Market Rent. PHA = Public Housing Authority. SAFMR = Small Area Fair Market Rent.

** p < 0.05, ** p < 0.01, *** p < 0.001*

*Notes: Each column is a separate regression. This table displays the model results as hazard ratios, which are exp(*coeff*) where* coeff *are the estimated model coefficients. The regression in the last column has smaller sample sizes because households living in neighborhoods with average rents greater than 110 percent of the area FMR at the time of the intervention introduction are omitted. For this subsample, the SAFMR PHAs have 40,254 observations pre-intervention and 45,791 observations post-intervention; the metropolitan area FMR PHAs have 594,308 observations pre-intervention and 574,464 observations post-intervention. Income is inflation adjusted to 2018 dollars. Ninety-five percent confidence intervals in brackets.*

References

Ambrose, Brent W. 2005. "A Hazard Rate Analysis of Leavers and Stayers in Assisted Housing Programs Explaining Attrition in the Housing Voucher Program," *Cityscape* 8 (2): 69–93.

Airgood-Obrycki, Whitney, and Jennifer Molinsky. 2019. *Estimating the Gap in Affordable and Available Rental Units for Families*. Cambridge, MA: Joint Center for Housing Studies at Harvard University.

Chetty, Raj, Nathaniel Hendren, and Lawrence F. Katz. 2016. "The Effects of Exposure to Better Neighborhoods on Children: New Evidence from the Moving to Opportunity Experiment," *American Economic Review* 106 (4): 855–902.

Collinson, Robert, and Peter Ganong. 2018. "How Do Changes in Housing Voucher Design Affect Rent and Neighborhood Quality?" *American Economic Journal: Economic Policy* 10 (2): 62-89.

Cortes, Alvaro, Ken Lam, and David Fein. 2008. "Household Life Cycle and Length of Stay in Housing Assistance Programs," *Cityscape* 10 (1): 117-156.

Cunningham, Mary, Martha Galvez, Claudia L. Aranda, Rob Santos, Doug Wissoker, Alyse Oneto, Rob Pitingolo, and James Crawford. 2018. *A Pilot Study of Landlord Acceptance of Housing Choice Vouchers*. Washington, DC: U.S. Department of Housing and Urban Development.

Dastrup, Samuel, Ingrid Gould Ellen, and Meryl Finkel. 2019. "The Effects of Small Area Fair Market Rents on the Neighborhood Choices of Families with Children." *Cityscape* 21 (3): 19-47.

Dastrup, Samuel, Meryl Finkel, Kimberly Burnett, and Tanya de Sousa. 2018. *Small Area Fair Market Rent Demonstration Evaluation Final Report*. Prepared for the U.S. Department of Housing and Urban Development, Office of Policy Development and Research.

Gubits, D., Khadduri, J., & Turnham, J. (2009). *Housing Patterns of Low Income Families with Children: Further Analysis of Data From the Study of the Effects of Housing Vouchers on Welfare Families*. Joint Center for Housing Studies of Harvard University.

Lubell, Jeffrey M., Mark Shroder, and Barry Steffen. 2003. "Work Participation and Length of Stay in HUD-Assisted Housing," *Cityscape* 6 (2): 207–223

McClure, Kurk. (2017). *Length of Stay in Assisted Housing*. Prepared for U.S. Department of Housing and Urban Development, Office of Policy Development and Research. https://www.huduser.gov/portal/sites/default/files/pdf/LengthofStay.pdf

Olsen, Edgar O., Scott E. Davis, and Paul E. Carrillo. 2005. "Explaining Attrition in the Housing Voucher Program," *Cityscape* 8 (2): 95–113.

Olsen, Edgar O., Catherine A. Tyler, Jonathan W. King, and Paul E. Carrillo. 2005. "The Effects of Different Types of Housing Assistance on Earnings and Employment," *Cityscape* 8 (2): 163–187.

Reina, Vincent, Arthur Acolin, and Raphael W. Bostic. 2019. "Do Small Area Fair Market Rent Limits Increase Access to Opportunity Neighborhoods by Housing Choice Voucher Recipients? An Early Evaluation," *Housing Policy Debate* 29 (1): 44-61.

Sanbonmatsu, Lisa, Jens Ludwig, Lawrence F. Katz, Lisa A. Gennetian, Greg J. Duncan, Ronald C. Kessler, Emma Adam, Thomas W. McDade, and Stacy Tessler Lindau. 2011. *Moving to Opportunity for Fair Housing Demonstration Program: Final Impacts Evaluation*. Washington, DC: U.S. Department of Housing and Urban Development.

Turner, Margery Austin, Austin Nichols, and Jennifer Comey. 2012. *Benefits of Living in High-Opportunity Neighborhoods*. Washington, DC: Urban Institute.

U.S. Department of Housing and Urban Development. 2018. *Affordable Housing*. https://www.hud.gov/program_offices/comm_planning/affordablehousing/.