Moving to Work Retrospective

A Picture of Moving to Work Agencies' Housing Assistance

Moving to Work Agencies' Use of Funding Flexibility

Housing Choice and Self Sufficiency Outcomes at Moving to Work Agencies

The Impact of the Moving to Work Demonstration on the Per Household Costs of Federal Housing Assistance

Evaluating the Effects of Santa Clara County Housing Authority's Rent Reform

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The Impact of the Moving to Work Demonstration on the Per Household Costs of Federal Housing Assistance

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Foreword

The Moving to Work (MTW) demonstration, launched in 1996, gives participating public housing agencies (PHAs) the flexibility to design and test new ways of providing housing assistance, provided that new policies are intended to achieve one or more of the following statutory objectives: (1) to reduce cost and achieve greater cost effectiveness in Federal expenditures; (2) to give incentives to families with children where the head of household is working, seeking work, or preparing for work; and (3) to increase housing choices for low-income families. This study, one of six reports produced by HUD's retrospective evaluation of MTW, focuses on costs.

Based on a rigorous analysis of changes over time in funds received and households served, beginning with a pre-MTW baseline, this study shows that participating in the MTW demonstration was not associated with increased or decreased costs to HUD per household served. The study finds that, after joining MTW, agencies experienced an increase in funding, but also served a greater number of households. Further, the research tested whether altering program mix, decreasing housing quality or affordability, or serving higher income or easier to serve households might explain the stable cost per household, and found that these factors did not account for cost per household staying the same after joining the demonstration. Finally, although MTW agencies continued to serve the same or more households per dollar received and did not reduce per household spending, they generated large reserves (traditional agencies are not allowed to do this).

This study is the best evidence to date that MTW agencies are innovating in cost effectiveness, but it stops short of describing and explaining how MTW agencies do it. The next steps for policy research are to understand how they are doing this and the extent to which activities of the current MTW agencies could improve cost effectiveness at all public housing agencies.

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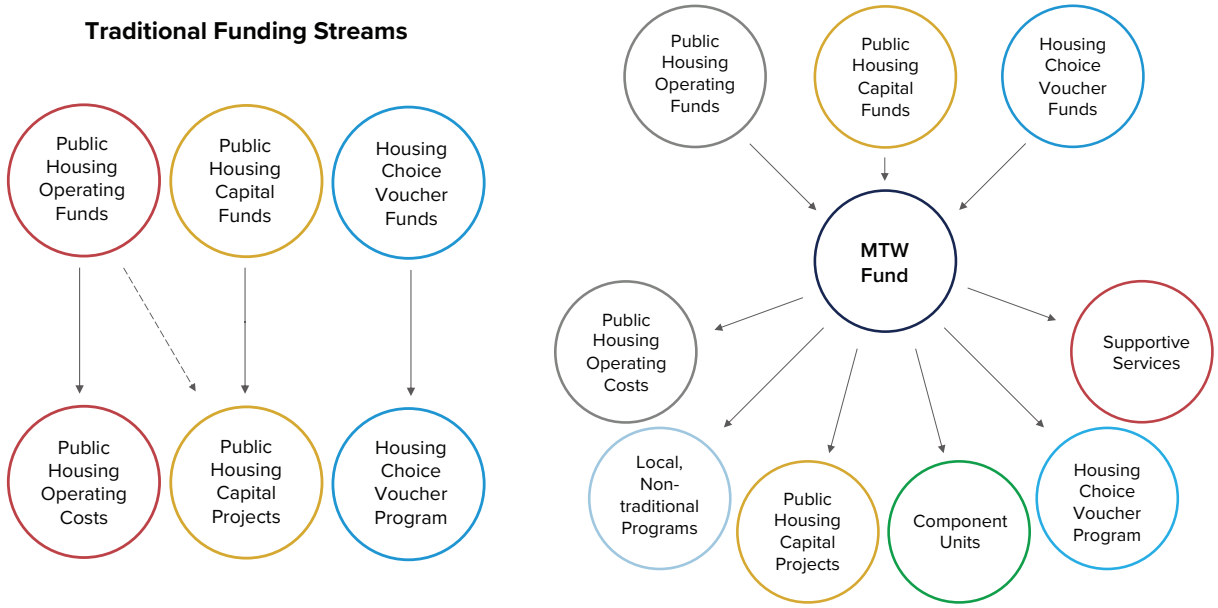
Executive Summary

Moving to Work (MTW) is a HUD demonstration that gives selected public housing agencies (PHAs) greater flexibility with their spending and the ability to provide innovative housing assistance to low-income households. The demonstration has three objectives: reduce costs and increase cost effectiveness, promote employment and economic self-sufficiency, and increase housing choices for low-income families. This report focuses on the first of these objectives: increasing cost effectiveness.

MTW aims to make PHAs more cost-effective by easing regulations, encouraging innovation, and providing greater flexibility in how PHAs use their HUD funding (see exhibit ES1), but previous studies have found that MTW agencies spend more per assisted household than traditional PHAs. These studies, however, do not account for spending levels before agencies joined the MTW demonstration, and thus do not establish whether this difference is caused by the MTW demonstration. This is the first study to examine changes in PHA cost effectiveness using data from before and after PHAs joined the MTW demonstration compared with traditional PHAs during the same period. This study therefore better accounts for other differences between housing agencies that can affect costs, and it isolates the impact of MTW status on cost effectiveness. The study also provides a more comprehensive picture of the impact of flexible funding and program assistance on costs by including all public housing and Housing Choice Voucher (HCV) program funding and all households assisted by those funds, including families assisted through local, non-traditional programs, which only MTW agencies are allowed to operate.[1]

Exhibit ES1: Moving to Work Funding Flexibility



MTW = Moving to Work.

Source: Moving to Work Standard Agreement Attachment C, "Statement of Authorizations," retrieved from HUD's MTW portal, https://www.hud.gov/program_offices/public_indian_housing/programs/ph/mtw/mtwsa

[1] The analysis excludes special purpose voucher programs such as the Family Unification Program and HUD-VA Supportive Housing because these programs are not part of agencies' Moving to Work agreements.

Methodology

This study defines cost effectiveness as "cost per household," or the total funding PHAs receive from HUD each year for public housing and HCV programs divided by the number of households assisted by these funds. This measure was selected as the most comprehensive measure of cost per household because it includes all funding sources that are eligible for MTW funding flexibility and all households assisted through this funding, including households assisted through local, non-traditional MTW programs. It also allows for a more direct comparison of cost-effectiveness between MTW and traditional agencies than looking at expenditures because MTW agencies report expenditures differently than traditional PHAs.

The analysis uses 15 years of historical data, from 2003 through 2017, to measure trends within PHAs before and after receiving MTW status. It then compares those trends with traditional PHAs of comparable size during the same period. To better understand how, if at all, MTW status affects cost effectiveness, it creates separate estimates of the effect of MTW status on PHAs' annual funding from HUD and on the number of households PHAs assist with that funding.

This analysis is limited to 2003 to 2017 because of data quality and availability challenges in data reported to HUD prior to 2003. Therefore, the estimates show the effect of MTW status on cost per assisted household for the 18 PHAs that entered or exited the MTW demonstration during this period and for whom there is reliable data.[2] The analysis excludes some of the largest MTW agencies—such as the Chicago Housing Authority, Home Forward (Portland, Oregon), and the Cambridge Housing Authority—that entered the demonstration prior to 2003.

Findings

Moving to Work status does not affect public housing agencies' cost effectiveness.

MTW status has no significant impact on cost per assisted household when MTW agencies are compared with traditional PHAs of similar size. Although MTW status is associated with an increase in HUD funding, the agencies use this funding to assist more households, resulting in no significant change in cost effectiveness.

Exhibit ES2 displays the results from our main statistical model, which shows the average change in cost per assisted household, HUD funding, and number of households assisted by a PHA after joining the MTW demonstration compared with other similarly sized agencies. PHAs receive, on average, 11 percent more funding from HUD after joining the MTW demonstration and assist 10 percent more households.[3] Because these effects are of similar size, the effect of MTW status on cost per assisted household is negligible (exhibit ES2).

[2] The 18 public housing agencies included in the impact analyses are Alaska, Atlanta, Baltimore City, Boulder, Champaign, Charlotte, District of Columbia, Columbus (GA), Fairfax County, Greene, High Point (NC), Holyoke, King County, Lexington-Fayette Urban County, Orlando, Reno, San Bernardino, and San Diego. The event study discussed in appendix B includes only 12 public housing agencies due to data limitations (see exhibit B5).

[3] Because outcome measures entered the regression in log form, percentage change is calculated by exponentiating the coefficient and subtracting 1. For example, the coefficient for HUD funding is 0.106 and the estimated percentage change is (e^0.106)-1=0.112 or 11 percent.

Exhibit ES2: The Effect of Moving to Work on HUD Cost per Assisted Household, HUD Funding, and Number of Assisted Households

	Cost per Assisted Household	HUD Funding	Assisted Households
Impact of MTW	**0.013**	**0.106*** **	**0.092*** **
	(0.030)	**(0.024)**	**(0.028)**
Control Variables			
Area Median Rent	0.298***	0.144**	-0.154***
	(0.071)	(0.060)	(0.047)
Government Wage	0.048*	0.023	-0.025
	(0.026)	(0.026)	(0.020)
Number of PHAs	727	727	727
Adjusted Within R-Squared	0.096	0.083	0.039
Observations	10,905	10,905	10,905

* p<0.10, ** p<0.05, *** p<0.01

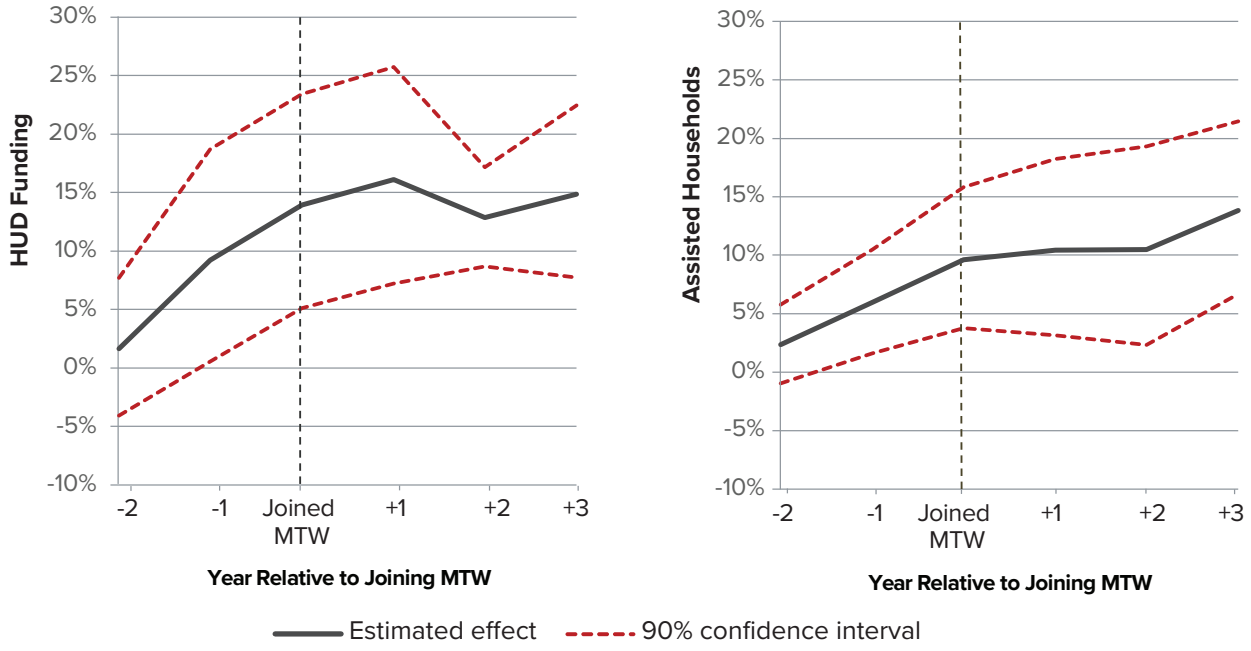
MTW = Moving to Work. PHA = public housing agency.

Notes: Standard errors (listed in parentheses) are heteroskedastic robust and clustered at the PHA level. Data cover 2003–2017. Regressions include only PHAs with at least 750 households and exclude agencies that joined MTW before 2003. They also exclude the Oakland Housing Authority, Tacoma Housing Authority, Housing Authority of the County of Santa Clara, and Housing Authority of the City of San Jose because of incomplete data on households in public housing. (See footnote 2 in this report for a list of included MTW agencies.) All regressions include year and PHA fixed effects. Cost per assisted household, HUD funding, assisted households, area median rent, and government wages enter the regression in logged form.

Sources: Urban Institute Analysis of HUD's Office of Public and Indian Housing Information Center, Financial Data Schedule, and Voucher Management System data

Examining these effects on an annual basis shows that the main increase in HUD funding and assisted households occurred the year that agencies joined MTW, and then continued to increase in subsequent years (exhibit ES3). These two effects combined lead to no significant difference in cost effectiveness in any year before or after joining the MTW demonstration (exhibit ES4).

Exhibit ES3: The Effect of Moving to Work on HUD Funding and Number of Assisted Households (Percent Change)

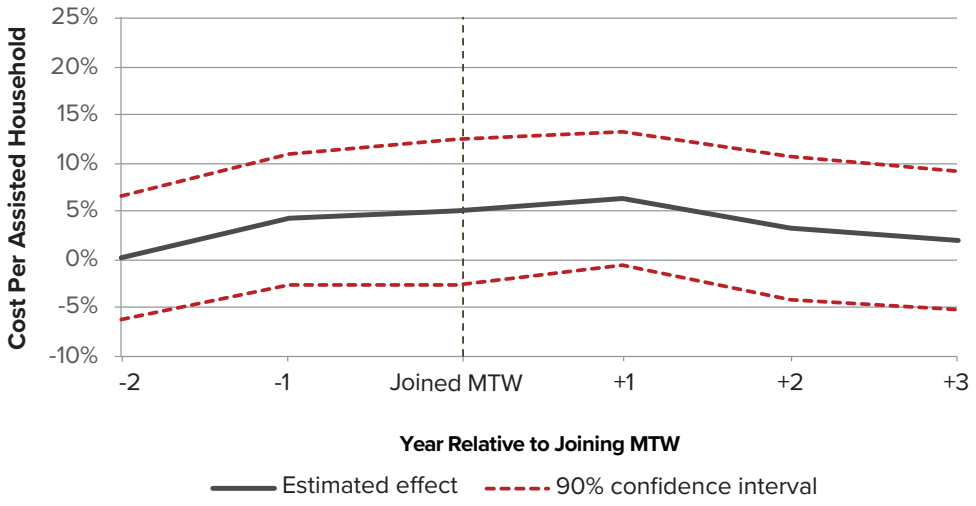


MTW = Moving to Work.

Notes: Vertical dotted line and "Year joined MTW" represent the year in which public housing agencies (PHAs) execute their first MTW contract. The solid line represents the point estimate and the dashed lines on either side of this estimate represent the 90-percent confidence interval. Estimates are converted from log form to percent change. Regressions include only agencies with at least 750 households and exclude PHAs that joined MTW before 2005 or after 2015, because they need to have 2 years of data prior to joining MTW and 3 years of data after joining to enter this equation. Impact analyses do not include Oakland Housing Authority, Tacoma Housing Authority, Housing Authority of the County of Santa Clara, or Housing Authority of the City of San Jose because of incomplete data on households in public housing. All regressions include year and PHA fixed effects. Median rent and government wages are included as control variables. HUD cost per household, area median rent, and government wages enter the regression in logged form.

Sources: Urban Institute Analysis of HUD's Office of Public and Indian Housing Information Center, Financial Data Schedule, and Voucher Management System data

Exhibit ES4: The Effect of Moving to Work on HUD Cost per Household Over Time (Percent Change)



MTW = Moving to Work.

Notes: Vertical dotted line and "Year joined MTW" represent the year in which public housing agencies (PHAs) execute their first MTW contract. The solid line represents the point estimate and the dashed lines on either side of this estimate represent the 90-percent confidence interval. Estimates are converted from log form to percent change. Regressions include only agencies with at least 750 households and exclude agencies that joined MTW before 2005 or after 2015, because they need to have 2 years of data prior to joining MTW and 3 years of data after joining enter this equation. They also exclude the Oakland Housing Authority, Tacoma Housing Authority, Housing Authority of the County of Santa Clara, or Housing Authority of the City of San Jose because of incomplete data on households in public housing. All regressions include year and PHA fixed effects. Median rent and government wages are included as control variables. HUD cost per household, area median rent, and government wages enter the regression in logged form.

Sources: Urban Institute Analysis of HUD's Office of Public and Indian Housing Information Center, Financial Data Schedule, and Voucher Management System data

There is no evidence that Moving to Work agencies maintain cost effectiveness by shifting their program mix, reducing housing quality or affordability, or serving different households.

The study also analyzed the effects of MTW status on cost effectiveness after including additional measures to control for changes in the mix of public housing units, tenant-based vouchers, and project-based vouchers in an agency's portfolio; housing affordability and quality; and targeting of assistance to households that may be more expensive to serve. None of these factors resulted in a significant difference in the estimated effect of MTW status on HUD costs per assisted household, suggesting that MTW agencies do not maintain cost effectiveness by shifting their program mix, reducing housing quality or affordability, or serving different households.

Moving to Work status has varying effects on other facets of public housing agency rental assistance spending.

Although MTW status does not affect spending per household overall, it does affect certain spending categories. MTW status is not associated with a statistically significant change in spending on administrative costs or tenant services per assisted household, but it is associated with a large increase in dollars per household held in reserves. In interviews, some agencies' staff said they use these greater reserves to provide gap financing for affordable housing development projects, which may lead to increases in the number of households served in the long run.

Coupled with the finding that HUD costs per household do not increase for agencies in the

MTW demonstration, these results suggest that MTW agencies increase their savings in operating reserves while still serving roughly the same number of assisted households per dollar of HUD funding as before joining the demonstration.

Differences from Previous Research

Previous studies have found that MTW agencies receive more funding per assisted household than traditional PHAs, but these studies lacked data on MTW agencies' costs per household before joining the demonstration. Studies that compare MTW agencies with traditional PHAs in terms of spending on specific activities, such as program administration, find that MTW agencies spend more per assisted household, but these differences diminish after accounting for higher housing and labor costs in the markets where MTW agencies operate. This suggests that MTW agencies' higher costs per assisted household and higher spending may reflect preexisting differences between MTW and traditional PHAs, rather than the effects of receiving MTW status.

This study differs from prior studies in three ways:

- It accounts for preexisting differences between MTW agencies and traditional PHAs in both internal and external factors affecting the costs of providing rental assistance. Prior studies did not differentiate between differences that existed before the future MTW agencies joined the demonstration and differences caused by the demonstration.
- It uses 15 years of data to analyze the longer-term impact of MTW status, which accounts for agencies' spending on affordable housing development, preservation, and the creation of new types of rental assistance programs.
- It includes households assisted with housing assistance through MTW agencies' local, non-traditional programs, which are not captured in HUD's administrative data and have not been counted in prior studies.

Study Limitations

Lack of random assignment limits our ability to estimate the true causal impact of the demonstration. Eligible PHAs were not randomly assigned to the program or a control group; instead, they were chosen through selection processes that shifted from year to year before becoming more standardized in the later years of the demonstration. Although our panel method allows us to control for many of the differences between MTW agencies and traditional PHAs, we cannot fully control for differences in motivation that may prompt PHA leadership to seek MTW status.

A lack of data also contributes to three important limitations for this research:

- The analysis excludes the earliest MTW agencies because cost and funding data were not available for the earliest years of the program. This leaves out many of the largest MTW agencies and those that were most active in using their MTW flexibility.
- Inconsistent and missing data reduce the accuracy and precision of our estimates.
- Differences in how MTW agencies report financial information limit the measures available for analysis. In particular, the study does not include information on the mechanisms that allow MTW agencies to increase their reserves without increasing overall costs per assisted household. Nor does it include information on how MTW status affects agencies' ability to leverage other funding streams to support assisted households.

Finally, the study focuses only on cost effectiveness and defines cost effectiveness based on the number of households served. We chose this measure of cost effectiveness because it reflects federal costs and allows for fair comparison between MTW agencies and traditional PHAs, but it does not take into account the other two statutory objectives: promoting employment and economic self-sufficiency and increasing housing choices for low-income families. MTW agencies are not required to pursue cost effectiveness over and above the other objectives.

Conclusion

The MTW agencies included in our analysis received higher levels of HUD funding after joining the demonstration and also were able to increase the total number of assisted households served, resulting in no significant change in overall cost per household. These agencies also experienced a large increase in dollars per household held in reserves, suggesting that they were able to increase their savings while still serving roughly the same number of assisted households per dollar of HUD funding as before joining the demonstration.

Future studies should examine cost effectiveness in tandem with self-sufficiency or housing choice to determine the overall effect of the MTW demonstration on its three statutory objectives. Future studies should also estimate the relationship between MTW status and the number of affordable units within the PHA's service area to determine whether MTW agencies use their reserves to increase the supply of affordable housing more than other similar agencies.

The findings in this study do not contradict prior studies showing that MTW agencies spend more per household, but rather show that this higher level of cost per household existed prior to entering the MTW demonstration and that the demonstration itself was not the cause.

Introduction

When Congress created the Moving to Work (MTW) demonstration in 1996, one of its primary goals was to allow public housing agencies (PHAs) to use their federal dollars more efficiently. Traditional PHAs are highly regulated. They receive specific funding allocations for each component of providing housing assistance and their funding is tied to the amount of funding and the number of households they served in the previous year. The 39 PHAs in the MTW demonstration have greater flexibility in how they use their HUD funding and can ask HUD to waive or relax certain program regulations. This report, one of several produced for the MTW retrospective evaluation described in exhibit 1, assesses the effect of the MTW demonstration on the per household cost of assistance. This study examines the impact of the MTW demonstration on one measure of cost effectiveness—the number of households PHAs assist per dollar of HUD funding. The cost effectiveness measure, which we call "cost per household," is the total funding PHAs receive from HUD each year for the public housing and Housing Choice Voucher (HCV) programs, divided by the number of households assisted by these programs.[4] Fifteen years of historical data are used to measure trends within PHAs before and after receiving MTW status to compare with trends in traditional PHAs of comparable size during the same period. To better understand how, if at all, MTW status affects cost effectiveness, we create separate estimates of the effect of MTW status on PHAs' annual funding from HUD and on the number of households PHAs assist with that funding.

Our model estimates the difference between MTW agencies' actual trends in cost per assisted household relative to their expected trajectory if they had not joined the demonstration. The model uses fixed effects to account for differences between MTW and traditional PHAs in size, location, and other factors not associated with the MTW demonstration. We also control for changes in local rental costs and public sector wages in the PHAs' service area that are known to affect the costs of housing assistance.[5] Because of constraints due to data quality and availability, we limit our analysis to the years 2003 through 2017 and, therefore, estimate effects of MTW status on cost per assisted household for the 18 PHAs that entered or exited the MTW demonstration during this period and for whom we have reliable data. The analysis, therefore, excludes some of the largest MTW PHAs—such as the Chicago Housing Authority, Home Forward (Portland, OR), and the Cambridge Housing Authority—that joined MTW before 2003.

Although MTW was intended to increase cost effectiveness (among other goals), most empirical studies of the demonstration have shown that MTW agencies spend more per assisted household than traditional PHAs and use a lower proportion of their annual budgets on direct housing assistance (Buron et al., 2017; Fischer, 2011; GAO, 2018). Based on these studies, we hypothesized that MTW status increases the per household costs to the Federal government of providing housing assistance. We find, instead, that MTW status has no significant impact on cost per assisted household when compared with traditional PHAs of similar size.[6] PHAs do receive significantly more funding after joining the demonstration (an estimated 11-percent

increase in annual HUD funding), but they use this money to serve significantly more households (an estimated 10-percent increase in assisted households). This results in a slight and not statistically significant increase in HUD costs per assisted household. We find that average HUD funding increased in the year that a PHA joined MTW, peaked the next year, and then leveled off, and the number of assisted households increased slightly in the year PHAs joined and then continued to grow over time.

We test our results after adjusting for differences between MTW and traditional PHAs in the types of programs they offer (that is, public housing, tenant-based HCVs, project-based HCVs, and local, non-traditional programs), housing quality, housing affordability, and the characteristics of assisted households. None of these controls change our finding that MTW status has no significant effect on the costs to HUD of providing housing assistance.

Finally, we estimate the impact of MTW status on how much PHAs spend per household (aggregate spending), how much they spend on program administration and tenant services, and how much funding they hold in operating reserves. We find no increase in aggregate spending associated with MTW. We did find, however, that MTW status is associated with statistically significant increases in the amount of funding PHAs hold in operating reserves of approximately $840 per assisted household.This suggests that MTW agencies are able to serve the same number of households per dollar of HUD funding while also saving money in reserves for future developments and other uses.[7]

Our results suggest that the MTW demonstration has little to no impact on the average costs to the Federal government of providing housing assistance. MTW status leads to an increase in HUD funding for housing assistance and a comparable increase in assisted households, resulting in no significant effect on cost effectiveness. Although our study finds no evidence of MTW meeting its statutory objective of achieving greater cost effectiveness, we also find no evidence that MTW induces the higher costs found by previous studies.

Results differ from prior studies for four main reasons. First, the fixed effects model accounts for pre-existing differences between MTW and traditional PHAs and the communities they serve that affect the costs of providing housing assistance. MTW agencies received and spent more funding per assisted household prior to joining the demonstration. Cross-sectional studies cannot differentiate between differences that existed before MTWs joined the demonstration and differences caused by the demonstration. Second, by using 15 years of data, it is possible to analyze the longer-term impact of MTW agencies' allocation of funding in affordable housing development, preservation, or the creation of new types of housing assistance programs. Third, this study includes households assisted through MTW agencies' local, non-traditional programs, which are not captured in HUD's administrative data and have not been included in prior studies. Finally, the analysis excludes the earliest MTW PHAs, which joined when there was less standardization in how PHAs were selected to the demonstration and more variation in their funding formulas.

[7] There appears to be no impact of MTW on spending on administrative costs per household and tenant services per household, but there is too much variation between PHAs and within PHAs over time to measure these impacts with precision.

Exhibit 1: The Moving to Work Retrospective Evaluation

The HUD-sponsored Moving to Work (MTW) Retrospective Evaluation includes six reports and an online data feature that examine different aspects of the MTW program and MTW agencies' activities and performance under the program's three statutory objectives.

A Picture of Moving to Work Agencies' Housing Assistance describes MTW agencies, the assistance they provided, and the characteristics of the households they served in 2008 and 2016. A related online data feature provides access to MTW agency-level data.

Moving to Work Agencies' Use of Funding Flexibility examines how agencies have used MTW funding flexibility, alone and with regulatory waivers, and categorizes funding flexibility activities by their primary objectives—cost effectiveness, self-sufficiency of assisted households, or increased housing choice for low-income families. The study includes an indepth examination of funding shifts for a subgroup of eight agencies.

Housing Choice and Self-Sufficiency Outcomes at Moving to Work Agencies examines the extent to which MTW agencies meet two of the program's three statutory objectives, increasing housing choice and promoting self-sufficiency for assisted households.

The Impact of the Moving to Work Demonstration on the Per Household Costs of Federal Housing Assistance examines how MTW status affects the costs, to HUD, of providing housing assistance to households in the public housing and Housing Choice Voucher (HCV) programs.

Evaluating the Effects of Santa Clara County Housing Authority's Rent Reform examines the impacts on work, earnings, and housing subsidies among assisted households of Santa Clara's unique rent reform, which increased the proportion of income that households must pay toward rent.

Moving to Work Agencies' Use of Project-Based Voucher Assistance examines multiple aspects of MTW agencies' use of project-based voucher (PBV) assistance, including the share of assistance and HCV budget authority devoted to PBVs, the relationships between PBVs and the Low-Income Housing Tax Credit and Rental Assistance Demonstration programs, the locations of PBV-assisted units, and case studies of three agencies' MTW goals and activities.

Background

Enacted by Congress in 1996, the Moving to Work (MTW) demonstration[8] allowed designated public housing agencies (PHAs) greater regulatory and funding flexibility to test innovations in housing assistance.[9] MTW agencies can apply for waiver authority to test innovations that aim to meet one or more of the demonstration's three statutory objectives:[10]

1. Reduce cost and achieve greater cost effectiveness in federal expenditures
2. Give incentives to families with children where the head of household is working, is seeking work, or is preparing for work by participating in job training, educational programs, or programs that assist people to obtain employment and become economically self-sufficient
3. Increase housing choices for low-income families

MTW agencies still must abide by statutory requirements and regulatory requirements for which they do not have a waiver. They also must serve "substantially the same" number of families as they would have if they had not joined the demonstration.[11]

Exhibit 2 displays the years in which MTW agencies signed, and in some cases terminated, their MTW agreements.[12] Most MTW agencies entered the demonstration through a competitive application process, and HUD selected them because they were high performers with strong plans for how they would use greater flexibility. One agency entered through HUD's Jobs-Plus initiative. Additionally, in 2000, 2007, and 2008, Congress directly granted MTW status to seven PHAs.[13] Some of these agencies were low performers at the time of their selection and were given MTW status to help improve their financial sustainability. The list of MTW agencies shows that they are disproportionately located in large, coastal urban areas.

[8] An additional 100 agencies will be granted MTW designation by HUD by approximately 2022 through the MTW Expansion. For more information on the MTW demonstration, as well as the MTW Expansion, see https://www.hud.gov/mtw.

[9] In this report, we refer to the 39 PHAs that held MTW status as of 2018 as "MTW agencies" and the roughly 3,000 agencies without MTW status as "traditional PHAs." The MTW Demonstration includes 39 PHAs, but the Housing Authority of the County of Santa Clara manages all housing programs for the Housing Authority of the City of San Jose so these two are treated as a single agency in the analysis and throughout the remaining sections of this report. Two agencies, Greene Metropolitan Housing Authority (Ohio) and High Point Housing Authority (North Carolina) were part of the demonstration but have since exited.

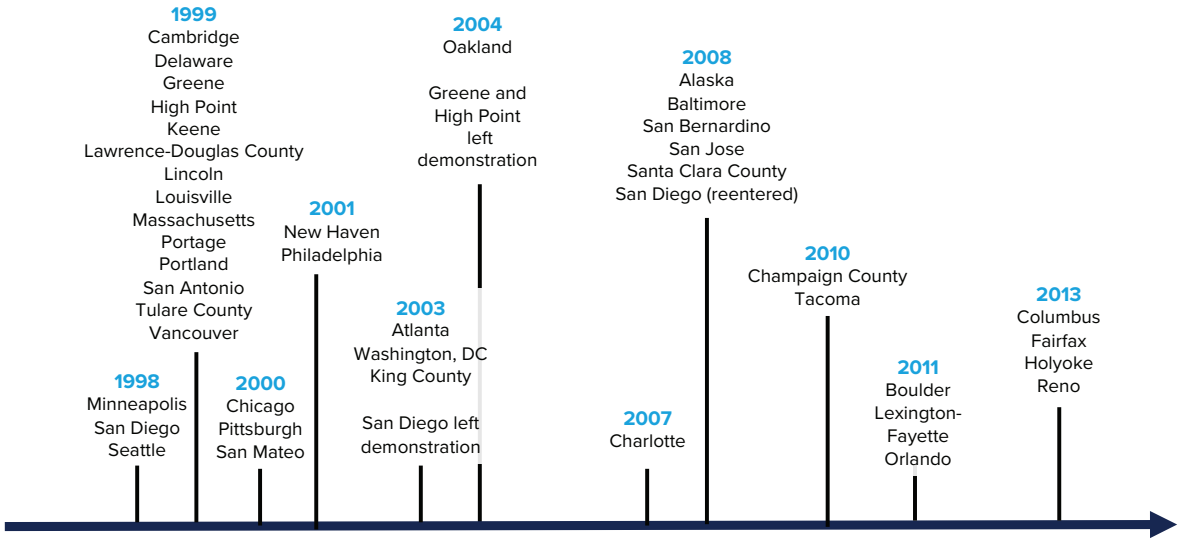
[10] Omnibus Consolidated Rescissions and Appropriations Act of 1996. Pub. L. No. 104-134, tit. II, § 204, 110 Stat. 1321, 1321-281 (codified as amended at 42 U.S.C. § 1437f note).

[11] For information on how this is calculated, see Notice PIH-2013-02 (HA) Baseline Methodology for Moving to Work Public Housing Agencies (https://www.hud.gov/sites/documents/PIH2013-02.PDF).

[12] Additional information on agency selection into the demonstration and a more detailed timeline appear in appendix A.

[13] The three PHAs selected mainly based on proposed activities rather than performance were the San Diego Housing Commission, Vancouver Housing Authority, and Minneapolis Public Housing Authority (Cadik and Nogic, 2010). The seven PHAs invited to join by Congress through an Appropriations Act were the Charlotte Housing Authority and the Housing Authority of the City of Pittsburgh in 1999; the Chicago Housing Authority in 2000; and the Alaska Housing Finance Corporation, the Housing Authority of the County of San Bernardino, the Housing Authority of the City of San Jose, and the Santa Clara County Housing Authority in 2008.

Exhibit 2: Timeline of Moving to Work Agreements



Notes: The graphic shows the year that agencies signed their Moving to Work (MTW) agreement. In the initial cohort, six agencies were accepted but dropped out before gaining MTW status: Birmingham, Alabama; Cherokee Nation, Los Angeles County, California; Stevens Point, Wisconsin; Tampa, Florida; and a consortium of five PHAs in Utah.

Source: Urban Institute analysis of documents retrieved from HUD's Moving to Work (MTW) portal, https://www.hud.gov/mtw

Moving to Work Funding and Fund Flexibility

Traditional PHAs are funded for discrete activities through a set of clearly defined formulas with strict specifications about how they can use their funding. Each year they receive separate funding allocations from HUD for the Housing Choice Voucher (HCV) Housing Assistance Payments (HAP) and administrative fees, public housing operations, and public housing capital improvements. With some exceptions, funds cannot be used for anything other than the designated purposes.[14] If traditional PHAs spend less than their annual allocated HAP amount, they receive less HAP in subsequent years. If PHAs spend more than their allocated amount, they risk going into "shortfall," meaning they do not have adequate funding to cover their obligations. Shortfalls can result in PHAs being unable to serve additional households or, in extreme cases, terminating assistance for current households.

The MTW demonstration was designed with the assumption that giving PHAs more local control to set policy and invest in programs will allow them to make more efficient use of federal dollars. Each MTW agency has its own funding agreement with HUD that typically provides the same base voucher funding each year, with an inflation adjustment. As long as agencies remain compliant with the requirement to serve "substantially the same" number of households as they assisted before joining MTW, their funding does not go up if they serve more households or go down if they serve fewer households.

[14] The Housing Opportunity Through Modernization Act of 2016 (HOTMA) gave traditional PHAs the flexibility to use up to 20 percent of their Operating Subsidy funds each year for Capital Fund Program activities. HUD issued guidance on how PHAs can use this flexibility on February 28, 2018, through PIH Notice 2018-03 (HA) "Guidance on the Use of Operating Subsidy for Capital Fund Purposes for Subsidy Appropriated and Allocated for Calendar Year 2018 and Subsequent Years." Retrieved from: http://commdevstrategies.com/wp-content/uploads/2018/03/HUD-PIH-Notice-2018-03.pdf.

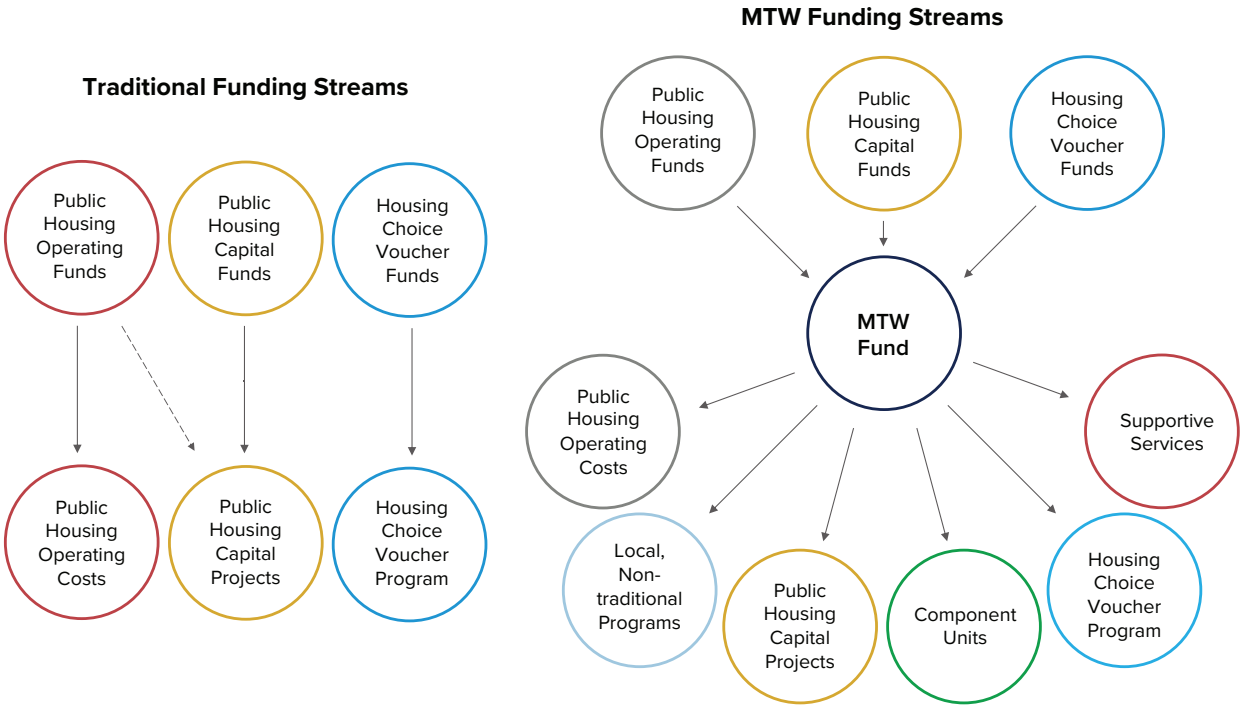
MTW agencies have two mechanisms not available to traditional PHAs that they can use to pursue greater cost effectiveness or other statutory objectives—waiver authority and fund flexibility. Waiver authority means that MTW agencies may be allowed by HUD to waive parts of the U.S. Housing Act of 1937 (as amended) in order to implement innovations intended to achieve one of the three statutory objectives (cost effectiveness, self-sufficiency, and housing choice). For example, through waiver authority, MTW agencies can increase their revenue by increasing the amount that tenants are expected to contribute to their rent or reduce administrative costs by reducing the frequency of Housing Quality Standards (HQS) inspections or income recertifications.

Through waiver authority, MTW agencies can also offer local, non-traditional (LNT) assistance. There are four types of LNT programs: (1) rental subsidy, (2) homeownership, (3) housing development, and (4) service provision.[15] Local, non-traditional rental subsidy programs provide a rental subsidy to a third-party (not a landlord or tenant) who manages intake and administration of the subsidy program. Homeownership programs provide subsidies that help low-income households purchase homes. Housing development programs use MTW funds to acquire, renovate, and/or build units that are not public housing or HCV units, but are still affordable (although not necessarily to the lowest income families typically served by HUD rental assistance). Thus, LNT housing programs may provide shallower subsidies than the regular voucher and public housing programs. Finally, service provision programs provide services to low-income households who are eligible for, but may not receive, housing assistance.

Fund flexibility allows MTW agencies to apply fungibility to the three traditional funding streams—the Public Housing Operating Fund, the Public Housing Capital Fund, and the Housing Choice Voucher Fund (exhibit 3). This allows MTW agencies to reallocate funds across programs, by, for example, using HCV program funds to build or preserve affordable housing. This could allow MTW agencies to shift money from less efficient programs to more efficient ones. They can also use their public housing and voucher funds to improve their balance sheets or provide matching funds to leverage other funding sources for housing development or preservation (Levy, Long, and Edmonds, 2020). Given this fungibility, MTW agencies report their spending on public housing, HCVs, and LNT assistance collectively as MTW program spending, and the fungible funding used for these activities are often referred to as the MTW fund. Note that HUD funding for other programs cannot be used in this way. Most importantly for this study, funding for special purpose vouchers can only be spent on those vouchers and cannot become part of the MTW fund.

[15] HUD Office of Public and Indian Housing Notice PIH-2011-45 (HA) issued August 15, 2011, on the subject of parameters for local, non-traditional activities under the Moving to Work Demonstration Program.

Exhibit 3: Moving to Work Funding Flexibility



Source: Urban Institute analysis of Moving to Work (MTW) Standard Agreement Attachment C, "Statement of Authorizations," retrieved from HUD's MTW portal, https://www.hud.gov/program_offices/public_indian_housing/programs/ph/mtw/mtwsa

Some aspects of the MTW demonstration, however, may not be conducive to greater cost effectiveness. Unlike traditional PHAs, funding for MTW agencies is not directly tied to the number of households assisted in the prior year. This could reduce their motivation to make sure vouchers are fully utilized. In addition, MTW agencies can use their public housing and voucher funding to pay for more robust services, spend more on staff salaries and other administrative costs, or build-up reserves for future use. In the short-term, this use of funds may result in MTW agencies having higher costs per assisted household than traditional PHAs because less of their budget goes directly to housing assistance.

Historically, MTW agencies have also been more protected from Congressional budget cuts than traditional PHAs, which may allow them to receive a greater share of funding without serving more households. For example, some of the original MTW agencies have their Public Housing Operating Subsidy funding frozen at the levels they received when they entered the demonstration, adjusted annually for inflation. As public housing units have been removed from use and federal funding for public housing has declined, these agencies have received a greater share of HUD's overall Public Housing Operating Subsidy budget. Similarly, funding for HCV programs at most MTW agencies is determined based on their MTW agreement rather than based upon the national HAP and administrative fee formulas. HUD applies Congressional budget cuts to the voucher program by applying a proration percentage to the full funding an agency was scheduled to receive. For traditional PHAs, HUD applies a separate proration amount to their HAP funding and their administrative fee funding.

For MTW agencies, the HAP proration rate is applied to both HAP and administrative fee funding. Congress has made deeper cuts to administrative fee assistance than HAP funding. At its lowest point, in 2013, PHAs were receiving 69 percent of full funding for administrative fee expenses and 94 percent of their full funding levels for HAP.[16] Thus, MTW agencies that combine their HAP and administrative fee funding have been less affected by recent cuts.[17]

[16] Federal Register. 2016. "Housing Choice Voucher Program—New Administrative Fee Formula." https://www.federalregister.gov/documents/2016/07/06/2016-15682/housing-choice-voucher-program-new-administrative-fee-formula.

[17] Discussions with MTW program office at HUD headquarters.

Prior Research on Moving to Work and the Cost of Housing Assistance

In this section, we review the relevant literature on the Moving to Work (MTW) demonstration's effects on cost effectiveness. The most rigorous prior studies have compared MTW and traditional public housing agencies (PHAs) on per household spending on specific aspects of providing housing assistance, including program administration, housing assistance payments, public housing operations, and operating reserves, rather than looking at either total PHA expenditures or total HUD spending per assisted household (Buron et al., 2017; GAO, 2018). Generally, these studies show that MTW agencies spend more per assisted household on specific activities than traditional PHAs, but these differences diminish after accounting for higher housing and labor costs in the markets where MTW agencies operate. This suggests that observable differences in costs may be caused by differences between MTW and traditional PHAs unrelated to the MTW demonstration itself. The studies that have tried to compare MTW and traditional PHAs on overall costs find that MTW agencies spend much more per assisted household, but do not account for other factors that may drive spending differences.

Housing Choice Voucher Administrative Costs

Program administration accounts for a small fraction of the total costs of providing housing assistance, but it is an area where MTW status could create potential efficiencies. The MTW demonstration was expected to create efficiencies in program administration because MTW agencies have fewer administrative requirements. An analysis of MTW agencies' annual administrative plans found that most agencies use their flexibility to scale back the frequency of annual Housing Quality Standards (HQS) inspections or income recertifications (Galvez, Simington, and Treskon, 2017).[18] These changes, however, do not typically translate into lower overall administrative costs per assisted household for a few reasons. First, implementing policy changes carries its own costs related to developing the new policy, providing community outreach and education to explain the new policy, and training staff and updating software (Khadduri et al., 2014). Second, MTW PHAs typically use any savings generated from reduced regulation to shift how administrative staff spend their time rather than reduce overall staffing. Officials from several MTW agencies reported that staff were still spending as much time with residents as before their agency joined the demonstration, but the relationship had shifted from one of "auditor or investigator to one of mentor or advocate" (Abravanel et al., 2004).

Two recent studies analyzed the effects of MTW on administrative costs per household in the Housing Choice Voucher (HCV) program as part of their larger MTW evaluations. Abt Associates compared average household costs between MTW and traditional PHAs by matching each MTW PHA to 3–5 traditional

[18] Income recertification is the process through which a PHA determines a family's income for purposes of setting the total tenant payment toward rent. Housing quality inspections are required to ensure that tenant- and project-based housing choice HCVs are used to house families in units that meet HUD housing quality standards.

PHAs that were most similar based on the number of HCV and public housing units, fair market rents, poverty rates, area income, and unemployment. It found that, in 2014, the average MTW agency spent $163 more per assisted household on administrative costs in the HCV program than the average comparable traditional PHA (Buron et al., 2017). The difference in costs was driven primarily by a few MTW agencies that used their funding flexibility to spend administrative funds on resident services. Nearly one-half (15 of 35) of MTW agencies had lower administrative costs per assisted household than their comparison traditional PHAs (Buron et al., 2017). Traditional PHAs cannot use HCV funds for resident services and generally rely on grants or partnerships with non-profits if they offer these services. Excluding resident services, MTW agencies tended to have comparable administrative costs with traditional PHAs (Buron et al., 2017).

The U.S. Government Accountability Office (GAO) also analyzed differences in HCV administrative costs between MTW and traditional PHAs as part of its 2018 report to Congress on the MTW demonstration. Like Abt Associates (Buron et al., 2017), GAO (2018) constructed a comparison group of traditional PHAs similar to MTW agencies based on the number of assisted units, location, and housing market characteristics. Rather than looking at a single year, the GAO report compared median costs per household between MTW agencies and the matched comparison group between 2009 and 2015.[19] GAO estimated that median per household administrative expenditures was $922 for MTW agencies and $642 for traditional PHAs. GAO's estimate of administrative costs includes median spending of $37 per HCV household on resident services for MTW agencies, compared with a median of $0 for traditional PHAs (GAO, 2018).

Housing Choice Voucher Rental Payment Subsidies

Another major focus of the existing research has been PHAs' average spending on Housing Assistance Payments (HAP) per assisted household. Both MTW and traditional PHAs receive HUD funding for HAP, which makes up the largest budget item for most PHAs. For traditional PHAs, this funding must be used to provide rental subsidies to landlords in the HCV program. MTW agencies have the flexibility to shift HAP funds into the public housing operating or capital funds programs, build up reserves, or develop new types of assistance. They can also adjust the amount of subsidy that households in the HCV program receive or provide financial incentives to landlords to participate in the program.

The Center on Budget Policies and Priorities (CBPP) estimated that, in 2010, MTW agencies left 16 percent of their HAP funds unused compared with 4 percent for traditional PHAs. The authors estimated that MTW agencies provided HCV assistance to 45,000 fewer households than they were authorized to assist because they did not fully use their HCV funding for subsidies (Fischer, 2015). Although MTW agencies could have transferred a portion of HCV funds to assist households in local, non-traditional (LNT) or public housing programs, CBPP was not able to track the funds in this way and thus considered the funds unused. CBPP's analysis did not attempt to control for other differences, beyond MTW flexibility, that could have contributed to lower usage rates at MTW agencies.

GAO's report, which accounted for differences in size, location, and market characteristics between agencies, estimated that MTW agencies have a median voucher utilization rate of 93 percent while traditional PHAs have a median utilization rate of 96 percent.

[19] Although they used multiple years of data, they pooled the years together and did not undertake an analysis of changes pre- and post-entry into the MTW demonstration.

In their analysis of utilization, neither GAO's (2018) nor CBPP's report (Fischer, 2015) was able to account for the number of households assisted by MTW agencies using their HAP funds to build or preserve housing or create LNT forms of housing assistance.[20]

The GAO report also found that MTW agencies spend more per household on rental payment subsidies than traditional PHAs. The authors estimated that the median rental payment subsidy was about 25 percent higher at MTW agencies than for comparable agencies—$8,295 per household for MTW agencies and $6,629 per household for the comparison group (GAO, 2018). The 2017 Abt Associates report, however, found no statistically significant differences in average rental payment subsidy costs between MTW and traditional PHAs after adjusting for differences between agency fair market rents and national averages (Buron et al., 2017).

Public Housing Operations

With public housing, program administration and housing provision are funded and frequently examined collectively as public housing operations. Capital improvements are funded separately and have received less research attention. In part because of differences in funding formulas, CBPP estimated that, in 2010, MTW agencies received almost $3,000 more per unit for public housing operations than traditional agencies (Fischer, 2015). This estimate, however, did not account for variations between PHAs in local housing or labor markets. The GAO report, which did attempt to control for some of these differences, found that MTW agencies spent about $1,600 more per unit per year on public housing operations than traditional agencies (GAO, 2018). The Abt Associates report found no statistically significant differences in per unit public housing operations costs between MTW and traditional PHAs after accounting for differences in local wages (Buron et al., 2017).

HUD Funding Levels

Some research suggests that MTW agencies' funding tends to be more predictable and potentially more generous than it is for traditional PHAs. For example, CBPP found that the alternate funding formula 11 MTW agencies receive for public housing operating subsidies accounts for $260 million in additional funding compared with traditional PHAs (Fischer, 2015). In years of reduced appropriations, MTW agencies were still funded based on their MTW funding agreement for both their HCV and public housing programs.[21] By contrast, traditional PHAs are funded according to a formula that accounts for local housing costs, past usage of HUD funds, and current obligations. HUD then prorates each traditional PHA's funding levels to adjust for changes in total funding levels from Congress.

Reserves

MTW agencies can use their flexibility to place more money into reserves, which they can allocate to affordable housing development or preservation, or as a "rainy-day fund" in case of future funding shortfalls. GAO's 2018 report estimated that, as of June 2017, the 39 MTW agencies had $808 million in HCV reserves—more than all of the 2,000 traditional PHAs in their comparison group with a combined $737 million (GAO, 2018). This may indicate MTW agencies are not using as much of their

[20] The GAO (2018) report, which presented the number of households assisted through local, non-traditional activities, explained their inability to capture costs associated with these activities and discussed the limitation and implications of the absence of local, non-traditional spending data in their analysis.

[21] For more information, see Title 24—Housing and Urban Development (2017) §982.503, Payment Standard Amount and Schedule, PIH Notice 2008-15(HA) "Implementation of the Federal Fiscal Year 2008 Funding Provisions for the Housing Choice HCV Program," Notice PIH 2009-13(HA) "Implementation of the Federal Fiscal Year 2009 Funding Provisions for the Housing Choice HCV Program," and PIH Notice 2012-9 "Implementation of the Federal Fiscal Year 2012 Funding Provisions for the Housing Choice HCV Program."

annual funding for direct housing assistance, but it can give them advantages over traditional PHAs in completing deals to build or preserve affordable housing (Abravanel et al., 2004). HUD's data systems do not track PHAs' affordable housing allocations but Abt Associates conducted a survey of PHAs as part of its MTW evaluation and found MTW agencies preserved significantly more affordable housing units than traditional PHAs (Buron et al., 2017).

Total Costs per Assisted Household

Neither the Abt Associates nor the GAO report attempted to estimate the effects of MTW status on total PHA expenditures per assisted household or HUD funding per assisted household. CBPP compared MTW with traditional PHAs on the number of assisted households in the public housing and voucher programs per $100,000 of HUD funding. It found that, for every $100,000 of HUD funding they received, MTW agencies assisted roughly 9 households, while traditional PHAs assisted 15 households (Fischer, 2011). This analysis, however, does not account for differences in size, location, rental market characteristics, or other factors that affect costs and may differ between MTW and traditional PHAs.

Housing assistance may be more expensive in MTW agencies for reasons unrelated to the MTW demonstration. MTW agencies tend to be larger than traditional PHAs and are more likely to be in areas with high housing and labor costs (Galvez, Gourevitch, and Docter, 2020). Tighter housing markets and higher local wages have been shown to increase the costs per household in the HCV program (Finkel and Buron, 2001; Turnham et al., 2015). Additionally, many MTW agencies, such as the Housing Authority of the City of Pittsburgh and the Chicago Housing Authority, entered the demonstration with a large stock of aging public housing developments, which studies have shown are more expensive to maintain or repair (Stockard et al., 2003).

Limitations of Prior Research

Prior studies that examined the relationship between MTW status and cost effectiveness show that MTW agencies spend more per household than traditional PHAs. None of these studies, however, used data on MTW agencies before they joined the demonstration. Therefore, they were unable to identify the impact of MTW status on the agencies. The high-level findings presented in CBPP's 2011 report (Fischer, 2011) did not control for local differences that influence the cost of housing assistance. The studies conducted by Abt Associates (Buron et al., 2017) and GAO (2018) used sophisticated methods to identify a comparison group of traditional PHAs. These studies did not, however, control for unobserved differences that existed before MTW agencies joined the demonstration. They also did not examine how cost effectiveness or spending at agencies changed after they joined the demonstration. Additionally, these studies were unable to account for shifts in spending between public housing and HCVs or to LNT housing programs. The study described in this report overcomes these limitations, as described in the next section.

Research Questions and Research Design

The existing research has shown that Moving to Work (MTW) agencies spend more per household than traditional public housing agencies (PHAs). The impact of MTW on the agencies, however, had not been determined. Our primary research question therefore asks: What is the effect of participating in the MTW demonstration on the per household cost of providing housing assistance? In this study, the per household cost of assistance, or "cost per household" is defined as the amount of funding a PHA receives from HUD divided by the number of households served by that PHA. Given the existing differences in spending per household, our hypothesis was that MTW status leads to higher costs per household. We tested this against the null hypothesis that there was no impact of MTW on costs per household.

If MTW status leads to higher per household costs, we want to understand why. Based on the prior research into MTW and the costs of assistance more generally, potential reasons for cost differences include the mix of types of housing assistance, the quality of public housing units, housing affordability, and the characteristics of households. Additionally, we want to find out which type of spending changes when agencies join MTW. Following the existing research, we examine changes in per household spending on program administration, resident services, and operating reserves.

This study is fundamentally different from earlier studies. The primary outcome variable covers all households assisted with MTW funds, including through local, non-traditional (LNT) programs. It is therefore not affected if an MTW agency shifts funds from one program to another. The analysis uses many more years of data than previous studies, tracking changes in MTW agencies and traditional PHAs from 2003 through 2017.[22] With this additional data, the analysis examines costs per household at MTW agencies before and after joining MTW. The analysis compares changes in costs that occur when agencies join MTW with changes at traditional PHAs over the same years. It separately examines trends in funding and in the number of assisted households at PHAs before and after they join MTW. The study also investigates whether changes in the mix of program types, housing quality, or affordability explain changes in the average cost per assisted household.

Research Design

The primary outcome measure in this analysis is the cost per household to the Federal government of providing housing assistance. The amount of funding received from HUD is calculated by summing amounts for the public housing operating fund, the public housing capital fund, and the Housing Choice Voucher (HCV) program. The funding amount is divided by the sum of the households served in the public housing and HCV programs to determine the federal cost per household of providing housing assistance. Special purpose vouchers such as HUD-Veterans Affairs Supportive Housing (HUD-VASH) and the Family Unification Program (FUP) are funded distinctly from the HCV program. This funding cannot be included as part of the MTW fund. Therefore, neither funding for special purpose vouchers nor households assisted with special purpose vouchers are included in this analysis. We also include households assisted through LNT programs, which are the unique programs MTW agencies can create to better meet local needs.

[22] GAO's study covers only 2009 to 2015 (and treats the timespan as one time period) and the Abt Associates study (Buron et al., 2017) used only 1 year, 2014.

The cost per household measure was chosen because we believe this measure best captures MTW's statutory objective of "cost effectiveness in Federal expenditures,"[23] and it allows for a fair comparison of MTW with traditional PHAs.[24] Cost reporting requirements differ between MTW and traditional PHAs and have changed over time. For example, traditional PHAs can only use their Housing Assistance Payment (HAP) budget to subsidize the rents of households in the HCV program, while MTW agencies can, and often do, use a portion of this funding for other purposes, which include public housing operations or acquiring or rehabbing affordable housing properties (Levy, Long and Edmonds, 2020). A comparison of average HAP costs per family in the HCV program will make MTW agencies appear less efficient, even if they are using HAP funding to increase the overall number of assisted households by preserving public housing. Furthermore, Financial Data Schedule (FDS) data on PHA expenditures are less complete than revenue data and more difficult to track, particularly for MTW agencies. To circumvent these problems, we define cost per household as the total amount of funding for public housing and HCV programs received from HUD divided by the total number of households served in these programs.

The second improvement over previous studies is that this study uses panel data to observe trends over time, rather than simply comparing MTW agencies with traditional PHAs at one point in time (or, as in the case of the GAO study, summed up over a 6-year period). The data used for this analysis include a data point for each variable for each PHA (both MTW agencies and comparison traditional PHAs) for each fiscal year from 2003 through 2017. Using 15 years of historical data, we can observe trends over time and control statistically for differences between MTW agencies and traditional PHAs that pre-date entry into MTW. The statistical models control for characteristics of individual PHAs, such as size and location, and for national trends, such as changes in the Federal budget for the public housing and HCV programs. This allows us to quantify changes in variables of interest, such as cost per household, that occur after an agency enters or exits the MTW demonstration while controlling for differences between agencies.

We would ideally examine the full history of the MTW demonstration, but data limitations precluded this possibility. After extensive research and collaboration with HUD, we set 2003 as the initial year for analyzing administrative data. This was the first full calendar year for which HUD could provide voucher management data. This voucher data was needed to differentiate between HCV households and households assisted by special purpose vouchers.

Our statistical models, therefore, include the 15-year period from 2003 through 2017 during which 17 new PHAs entered the demonstration, 2 PHAs left, and 1 PHA (the San Diego Housing Commission) exited and re-entered (exhibit 4).[25] Each agency's date of entry into MTW is defined as the date that their first MTW agreement was executed.[26] Exits are defined based on the date on which

[23] Omnibus Consolidated Rescissions and Appropriations Act of 1996. Pub. L. No. 104-134, tit. II, § 204, 110 Stat. 1321, 1321-281 (codified as amended at 42 U.S.C. § 1437f note).

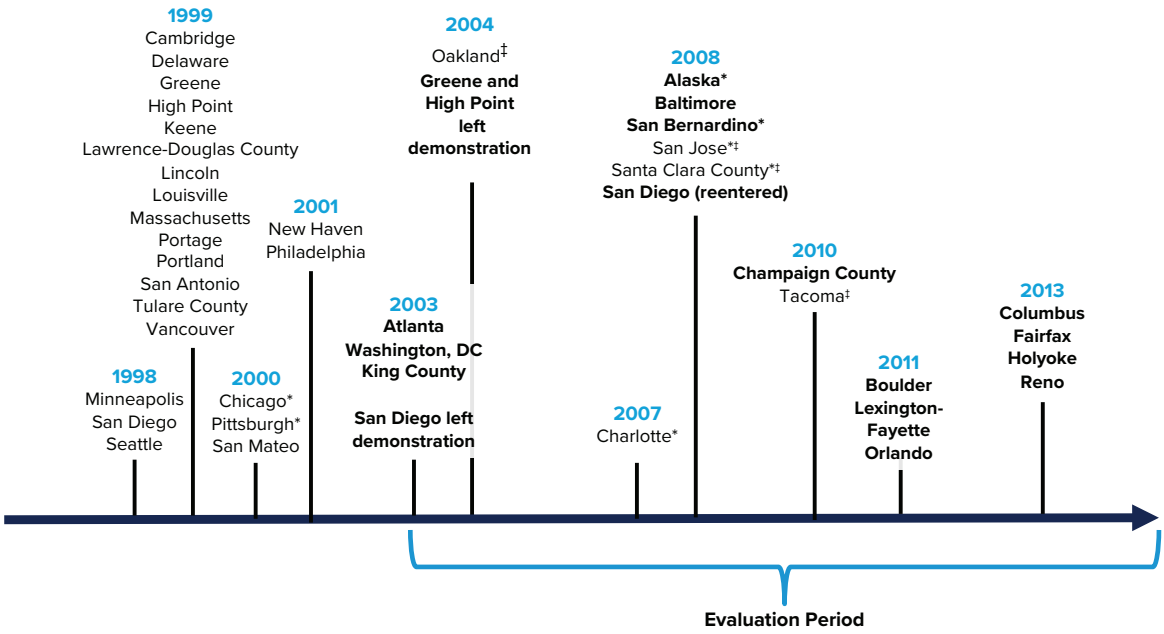
[24] We do not use HCV utilization rates as a key outcome metric as other studies have. Because MTW allows agencies to apply fungibility to public housing and HCV dollars, a metric designed for evaluation of HCVs is not ideal. More importantly, making comparisons between utilization rates at traditional and MTW agencies is problematic. To begin with, the baselines from which utilization is calculated are not equivalent. MTW agencies' baselines are negotiated with HUD as part of their MTW agreement. In contrast, baselines at traditional PHAs are calculated by formula. Traditional PHAs can have their baselines reduced, which makes their utilization rates go up. MTW agencies do not have the same financial incentives to maximize their utilization rates. The demonstration is designed for them to shift funds in ways that meet local needs. If funds are shifted from HCVs, utilization rates will fall even if the quality or quantity of service increases.

[25] Descriptive statistics for these PHAs appear in appendix exhibit C5. Housing Authority of the County of Santa Clara manages all housing programs for the Housing Authority of the City of San Jose; therefore, we treat them as a single agency in our analysis.

[26] In the case of San Diego Housing Commission's re-entry into MTW, we use the date that their 2008 MTW agreement was executed for re-entry.

MTW agreement was terminated. Because our panel data begins with 2003, we do not estimate how MTW status affects cost per household for PHAs that joined prior to 2003, which includes some of the largest MTW agencies such as the Chicago Housing Authority, the Cambridge Housing Authority, Home Forward (Portland, OR), the Housing Authority of the City of Pittsburgh, the Minneapolis Public Housing Authority, and the Seattle Housing Authority.

Exhibit 4: Timeline of Moving to Work Agreements and Evaluation Period (Evaluation Sample in Bold)



* PHAs selected by Congress, not through a competitive process.

‡Impact analyses do not include Oakland Housing Authority, Tacoma Housing Authority, Housing Authority of the County of Santa Clara, or Housing Authority of the City of San Jose because of incomplete data on households in public housing. The 18 public housing agencies included in the impact analyses are Alaska, Atlanta, Baltimore City, Boulder, Champaign, Charlotte, District of Columbia, Columbus (GA), Fairfax County, Greene, High Point (NC), Holyoke, King County, Lexington-Fayette Urban County, Orlando, Reno, San Bernardino, and San Diego. The event study discussed in appendix B includes only 12 public housing agencies due to data limitations (see exhibit B5).

Note: The graphic shows the evaluation period and the year that agencies signed their Moving to Work (MTW) agreement.

Source: Documents retrieved from HUD's MTW portal (https://www.hud.gov/mtw)

Research Questions

This study poses three research questions and eight associated sub-questions which are explained here and summarized in exhibit 5. The data and statistical models employed to answer these questions are described in the sections that follow.

Research Question 1: What is the effect of Moving to Work status on HUD cost per assisted household?

The first research question asks what effect participating in the MTW demonstration has on the per household cost of housing assistance. The answer quantifies the impact of MTW status on the number of dollars spent by HUD per household assisted by a PHA (1a). We then separately determine the impact of MTW status on HUD funding levels (1b), and the number of assisted households PHAs serve (1c), to understand why MTW

status is having its observed effect on the cost per assisted household. Our null hypothesis is that MTW has no impact on cost per household, HUD funding levels, and the number of assisted households.

Research Question 2: Do changes in program mix, housing quality and affordability, or the characteristics of assisted households explain the effect of Moving to Work status on HUD costs per assisted household?

Research question 2 tests whether the estimated impact of MTW status on HUD funding, households served, and cost per household changes after controlling for differences between MTW and traditional PHAs in the mix of public housing, tenant-based, and project-based vouchers in their portfolio (2a); housing affordability and quality (2b); and targeting of assistance to households that may be costlier to serve (2c).[27] Each of the three models tests a different mechanism through which cost per household could change. Each of these factors—housing mix, affordability and quality, and household type—are accounted for in separate models to avoid overlap. For example, PHAs with a greater proportion of public housing units may also serve a higher percentage of large households, increasing the costs of rental assistance.

Research Question 3: Does Moving to Work status affect agencies' total per household operating and housing assistance spending, or per household spending on program administration, tenant services, or operating reserves?

Research question 3 examines how MTW status affects PHA spending per household on different components of providing housing assistance. This contrasts with research questions 1 and 2 which focus on HUD revenue per assisted household. Focusing on revenue from HUD provides a more holistic measure of cost effectiveness than examining expenditures. Differences in expenditure levels between MTW and traditional PHAs, however, have been well documented. Because this is the first study to examine how cost effectiveness changes when an agency joins the MTW demonstration, it also offers the opportunity to provide context to the spending differences described in prior research.

Total per household operating and housing assistance spending is calculated by adding total operating expenditures associated with public housing, the HCV program, or the MTW fund to total housing assistance payments associated with the HCV program or the MTW fund and dividing by the number of assisted households (3a). It includes all reported public housing operations, maintenance and administration spending, and all reported spending on the administration of HCVs and LNT vouchers and units. It does not include capital expenditures, transfers, depreciation, or accounting costs such as bad debts. The measure was defined to provide a point of comparison with prior studies that have examined the impact of MTW status on cost effectiveness.

[27] Research question 1, in contrast, treats all housing assistance as equal and does not account for differences in the level of assistance PHAs provide or the types of households they serve.

We also estimate how MTW status affects spending on administration, tenant services, and operating reserves per household (3b). These three categories of expenditures were identified based on a review of existing literature, conversations with PHA and HUD officials, and available data as areas where MTW status could produce measurable differences in PHA spending or saving.

Exhibit 5: Research Questions

Research Question 1: What is the effect of Moving to Work status on cost per assisted household?
1a. How does MTW status affect the average cost per assisted household?
1b. How does MTW status affect the annual amount of funding PHAs receive from HUD?
1c. How does MTW status affect the annual number of households receiving housing assistance?
Research Question 2: Do changes in program mix, housing quality and affordability, or the characteristics of assisted households explain the effect of Moving to Work status on HUD costs per assisted household?
2a. Do changes in the mix of public housing, tenant-based vouchers, and project-based vouchers in public housing agencies' portfolios explain the relationship between MTW status and cost per assisted household?
2b. Do changes in housing affordability and housing quality explain the relationship between MTW status and cost per assisted household?
2c. Do changes in the proportion of assisted households that may be costlier to serve explain the relationship between MTW status and cost per assisted household?
Research Question 3: Does Moving to Work status affect agencies' total per household operating and housing assistance spending, or per household spending on program administration, tenant services, or operating reserves?
3a. How does MTW status affect PHAs' per household agency expenditures?
3b. How does MTW status affect PHAs' annual per household spending on program administration, tenant services, and operating reserves?

Data Collection and Assembly

This study relies on three HUD administrative datasets: (1) the Financial Data Schedule (FDS) to track HUD funding and public housing agency (PHA) costs, (2) the Office of Public and Indian Housing Information Center (PIC) to track the number of households in public housing, and the characteristics of households in public housing and the voucher program, and (3) the Voucher Management System (VMS) data to track the number of households with vouchers. Data from the Decennial Census (Census), American Community Surveys (ACS), and the Bureau of Labor Statistics (BLS) provide information such as local wages and housing and utility costs. The Public Housing Assessment System (PHAS) provides data on public housing quality. We also include HUD data on the number of households assisted by Moving to Work (MTW) agencies through local, non-traditional (LNT) programs that are not captured in PIC data (a summary of these datasets can be found in exhibit C1 in appendix C). Exhibit 6 summarizes the datasets and variables used in this study.

Exhibit 6: Variables for Analysis and Data Sources

Variable Description	Data Source	Definition / Notes
Outcome Measures		
HUD Funding	FDS	HUD PHA operating grants and capital grants for public capital funds, plus HUD PHA operating grants for public housing operating funds, plus HUD PHA operating grants for the HCV fund
Assisted Households	PIC, VMS, LNT data	Total households assisted through public housing, the HCV program (excluding special purpose vouchers), and LNT programs
Cost per Assisted Household	FDS, PIC, VMS, LNT data	HUD funding/assisted households
Treatment Variable		
MTW Status	Annual Reports, MTW agreements	The treatment variable is equal to one for agencies for years in which they are a part of the MTW demonstration and zero for years in which they are not. If an agency has MTW status for part of a year, the value is a fraction based on the number of months remaining in the calendar year when the agency's MTW agreement is executed. For example, if an agency signs the MTW agreement in September, then MTW status = .25 in the year the agreement was signed because 3 months, or .25 of a year, remain in the calendar year.
Cost Components		
Administrative Costs	FDS	Total operating administrative expenses
Tenant Services Spending	FDS	Total tenant services expenses
Operating Reserves	FDS	Following the formula[a] outlined in PIH notice 2011-055
Total Operating and Housing Assistance Spending	FDS	Total operating expenditures from the public housing, HCV, or the MTW funds plus total housing assistance payments from the HCV and MTW funds
Internal (Endogenous) Cost Drivers		
Percent of Households Using TBVs	VMS	Number of assisted households with TBVs/total assisted households
Percent of Households Using PBV	VMS, PIC	Number of assisted households with PBVs/total assisted households
Percent of Households in Public Housing	VMS, PIC	Number of assisted households in PH/total assisted households

(continued)

Exhibit 6: Variables for Analysis and Data Sources *(continued)*

Variable Description	Data Source	Definition / Notes
Quality of Public Housing	PHAS	Physical Assessment Subsystem (PASS) score
Affordability (Median Rent Burden)	PIC	Median of (total family contribution[b] x 12/total annual income) for new households
Household Size	PIC	Average number of individuals in new households
Median Income	PIC	Median annual total income of new households
High Need Households	PIC	Percent of new, assisted households in which the household head is 62 or older, the household head is disabled, or any other member of the household is disabled
External Cost Drivers		
PHA Fixed Effects	—	PHA dummy variables
Year Fixed Effects	—	Year dummy variables
Average Wage of Local Government Employees	BLS	Average wage of local government employees in the county with the most households assisted by a given MTW agency or traditional PHA reported in PIC in 2003
Median Rent in Service Area	ACS	Population weighted median rent in each year based on the census tracts of residents reported in PIC

ACS = American Community Survey. BLS = Bureau of Labor Statistics. FDS = Financial Data Schedule. LNT = local, non-traditional. MTW = Moving to Work. PBV = project-based voucher. PH = public housing. PHA = public housing agency. PHAS = Public Housing Assessment System. PIC = Office of Public and Indian Housing Information Center. TBV = tenant-based voucher. VMS = Voucher Management System.

[a] The sum of FDS line items 111 Cash Unrestricted, 114 Cash Tenant Security Deposits, 120 Total Receivables, 131 Investments Unrestricted, 142 Prepaid Expenses and Other Assets, 144 Inter-program – due from, and 145 Assets Held for Sale, minus the difference between line 310 Total Current Liabilities and line 343 Current Portion of Long-term Debt-capital Projects.

[b] For MTW agencies, the family contribution toward rent variable is constructed by HUD and includes the family's contribution toward utilities when applicable. This variable is not included in the standard PIC data and was provided by HUD for the purposes of this study. To calculate the annual family contribution toward rent for non-MTW agencies, we multiply the monthly contribution toward rent as reported in PIC by 12 and divide this by the total household adjusted income in PIC.

Sources: Administrative data from HUD include FDS, PIC, VMS, and PHAS; Public use data include the Decennial Census (Census), ACS, and BLS Quarterly Census of Employment and Wages; LNT data was provided by the HUD MTW office and calculated based on data reported by agencies on form 50900; New households are identified using action code flags in PIC

Variable Calculations

HUD Cost per Assisted Household

We calculate cost per assisted household by dividing HUD funding by the number of assisted households. To focus on the impact of MTW, we identify funding sources that are eligible for MTW fund flexibility and the households assisted with those funds. These funding sources and households go into the calculation of cost per household; other funding sources, such as special purpose voucher funding, and the households supported by them, are excluded.

HUD Funding

Our measure of HUD funding, therefore, includes HUD PHA operating grants and capital grants for public capital funds, HUD PHA operating grants for public housing operating funds, and HUD PHA operating grants for the Housing Choice Voucher (HCV) program. All funding data is collected from the FDS, adjusted from fiscal year to calendar year, and converted from nominal dollars to 2015 dollars using the Consumer Price Index for all Urban Consumers (CPI-U). (See exhibit C2 for details on calculations using FDS data.)

Number of Assisted Households

We count the number of assisted households

as the sum of those served through public housing, HCVs, and, for MTW agencies, LNT programs. To do so, we combine public housing data from PIC and voucher data from VMS. Voucher-assisted households appear in PIC as well, but it is not possible to exclude households assisted by special purpose vouchers using PIC data. We solved this problem by using VMS data, which does allow us to exclude special purpose vouchers, to count the number of households assisted through the HCV program. We add the number of households assisted in public housing to the number in the HCV program to get the total for traditional PHAs. As noted below, for MTW agencies, we also include the households served in LNT programs in the total.

To count the number of households in public housing, we first classified each household in the annual PIC based on their assistance program and action code. We then removed records that appear in multiple annual files but have the same effective date for the action code. Next, we weighted households by the number of months in which they received assistance using the dates associated with new admissions and exits. To count the number of households using VMS, we sum monthly voucher counts for voucher types funded through the HCV funding stream and then divide by 12 to get an annualized number of voucher households.

For MTW agencies, we add the number of households served through LNT programs. These LNT data were aggregated by HUD from MTW annual reports and HUD Form 50900. The data include households served through rental subsidies, housing development programs, and homeownership assistance. The data do not include households receiving services only. Per the instructions for HUD Form 50900, households served are calculated by dividing the number of unit months leased by the number of months in the "Plan Year." According to instructions on the 50900, the definition of MTW households served includes all households that receive housing assistance, directly or indirectly, using any amount of MTW funds. Further, the 50900 instructs MTW agencies to estimate the number of households served in "instances when a local, non-traditional program provides a certain subsidy level but does not specify a number of units/households to be served." We display the number of households assisted by MTW agencies, through public housing, tenant-based vouchers, project-based vouchers, and LNT assistance in exhibit C3.

In this way, we include households assisted through LNT programs that are funded using MTW fund flexibility and exclude households assisted through HUD special purpose voucher programs (such as the Family Unification Program or HUD-Department of Veterans Affairs [VA] Supportive Housing [HUD-VASH]) that are not covered by MTW agreements and not funded through public housing operating, public housing capital, or the traditional HCV funding streams.

Measures of the Type and Quality of Housing Assistance

To find out whether changes in the mix of program types, housing affordability, and housing quality explain the relationship between MTW status and cost per assisted household, we use data from PIC, VMS, and PHAS.

Type of Housing Assistance

Type of housing assistance is measured as the mix of program types, that is, the percent of assisted households in (1) public housing, (2) tenant-based vouchers, and (3) project-based vouchers.

Housing Affordability

Housing affordability is measured as the percent of household income that the median assisted household spends on housing. We calculate this from PIC, using the total contribution that a household puts toward rent and utilities on an annual basis divided by its annual household income. This metric is calculated using both public housing residents and HCV-assisted households.

Housing Quality

Housing quality is measured by the most recent physical assessment subsystem (PASS) score from PHAS. This score measures the housing quality of all the public housing units that the PHA manages.[28] We do not have a comparable measure of housing quality in the HCV program.

Costliness of Households Served

To assess whether MTW agencies are assisting households that are costlier to serve, we use three metrics: (1) the median income, as a percent of the area median income (AMI), of newly admitted households,[29] (2) the percent of newly admitted households with an elderly head of household, disabled head of household, or disabled family member, and (3) average household size.[30] We calculate these variables directly from PIC data using all public housing and voucher households that are identified as new admissions based on their action code.

Measures of Public Housing Agency Spending

Given available data, we determined that it is not advisable to construct a primary cost-efficiency measure using expenditure data.[31] Nevertheless, important questions remain about whether and how MTW status is associated with agency spending.

Total Expenditure

We calculate total expenditure by summing total operating expenditures from the public housing, HCV, or the MTW funds plus total housing assistance payments from the HCV and MTW funds in FDS.

Administrative Costs and Tenant Services Spending

We calculate administrative costs and tenant services by totaling these spending categories from the funds associated with HCV and public housing operations for traditional agencies, and for MTW agencies with the MTW funds.

Operating Reserves

Additionally, we calculate operating reserves based upon the guidance provided in PIH notice 2011-055. The specific FDS line items we use appear in appendix C (exhibit C2).

External Cost Drivers

Several demographic and area characteristics influence the costs of providing housing assistance. To control for variables that are constant over time, such as where the PHA is located, our statistical models include PHA-level dummy variables. To control for external cost drivers that change over time and are likely to differ among PHAs, we include the following variables in our statistical models.

[28] The Real Estate Assessment Center (REAC) determines PASS scores for both individual developments and PHAs as a whole. Neither score is available every year. We use the most recent PHA-wide PASS score in our analysis.

[29] For this metric, we divide the household income reported in PIC by the area median income reported in PIC and take the median value for newly admitted households.

[30] We focus on newly admitted households so that households admitted prior to a PHA joining MTW do not bias our results because those could be endogenous to MTW status and other variables in our model.

[31] Revenue data in FDS appear to be more complete than spending data; moreover, it is not possible to track expenditures transferred out of the MTW fund to an MTW agency's other lines of business but still spent to benefit assisted households.

- Median rent, as reported in the Census/ACS, to control for varying housing market trends that affect the overall cost of assistance. We retrieved Census and ACS data from the National Historical Geographic Information System (NHGIS) at the census tract level for the years 2000, 2010 (Census), and 2011–2015 (ACS 5-year average).
- We control for differing trends in wages across PHA service areas using the BLS-reported, county-level annual average pay in local government (all industries). Counties are mapped to PHAs based on household-level county variables in the PIC. Each county in the United States is assigned to the PHA that serves the most households in the area. State-level data are used where county-level data are incomplete or missing.

Sample Construction

We merged data from PIC, VMS, LNT, and FDS with regional wage data from BLS and regional demographic data from the census and ACS to construct a balanced panel dataset—a dataset with every PHA in every year—of 3,726 PHAs and 55,890 observations. PHAs that do not appear at least once in PIC and at least once in FDS are excluded, as are PHAs for which either county wage or local rent data were unavailable.[32]

After constructing this initial dataset, we made several adjustments to account for missing or incomplete data. Data issues were present in both MTW and traditional PHAs, particularly in the early years of our analysis and may represent early challenges PHAs faced in capturing administrative data and reporting it to HUD. There are 8,338 observations in which total reported funding is zero. We assume that all instances of missing or zero reported funding are in error. We assume that year-over-year changes in total funding of more than 50 percent are evidence of bad data and we treat this data as missing, increasing the number of observations with missing funding data to 14,589. Using the same criteria for the household data from PIC and VMS, there are 29,684 observations with zero, "bad," or missing household counts in either PIC or VMS. In most cases, this is because the PHA does not provide both public housing and HCVs.

Our primary analysis focuses only on agencies that served at least 750 households in 2003. This subset includes 756 agencies and 11,340 observations. In this group, there were 1,376 observations of missing or bad funding data and 1,844 observations with zero, bad, or missing household counts in either PIC or VMS. Among the 21 PHAs that joined MTW during the analysis period, representing 315 observations, 50 observations had bad or missing funding data and 96 observations had bad" or missing PIC or VMS data.

We filled in for missing, zero revenue, and bad data points from PIC, VMS, and FDS using nearest neighbor interpolation and extrapolation.[33] Aside from the robustness checks described in appendix C, no adjustments were made to the LNT data. We flagged 130 PHAs, including 6 MTW agencies, for which only 1 year of either public housing, voucher, or revenue data was available. We assumed that if either public housing or voucher data are missing in every year, the PHA does not provide that form of assistance. Because interpolation and extrapolation can induce additional error to the statistical model, we check the robustness of our results using multiple imputation (see appendix B for a detailed description of this method and the results).

[32] PHAs only appear in PIC or VMS when public housing or HCV households are reported. PHAs may appear in FDS to report funding streams other than those for public housing operations, public housing capital improvements, and HCVs.

[33] Linear interpolation produced less plausible values including some negative values in the earlier part of the sample period.

After interpolating missing values from PIC, VMS, and FDS, we constructed the measures of number of assisted households, total HUD funding, and cost per assisted household as described in exhibit 6. For consistency, we converted the FDS data from fiscal to calendar year by using a weighted average of the 2 fiscal years that overlap each calendar year. Because data from the 2018 fiscal year were not available for all agencies, we used 2017 fiscal year data for calendar year 2017.

Finally, we excluded the 19 PHAs that entered the MTW demonstration before 2003 and remained in the program through the observation period. The resulting dataset includes 3,695 PHAs and 55,425 observations. For all our analyses, we compare MTW agencies only with traditional PHAs that had at least 750 assisted households in 2003. Excluding smaller agencies and those with only 1 year of reliable public housing, voucher, or revenue data reduces the sample to 727 PHAs—18 MTW agencies and 709 traditional PHAs—and 10,905 observations.

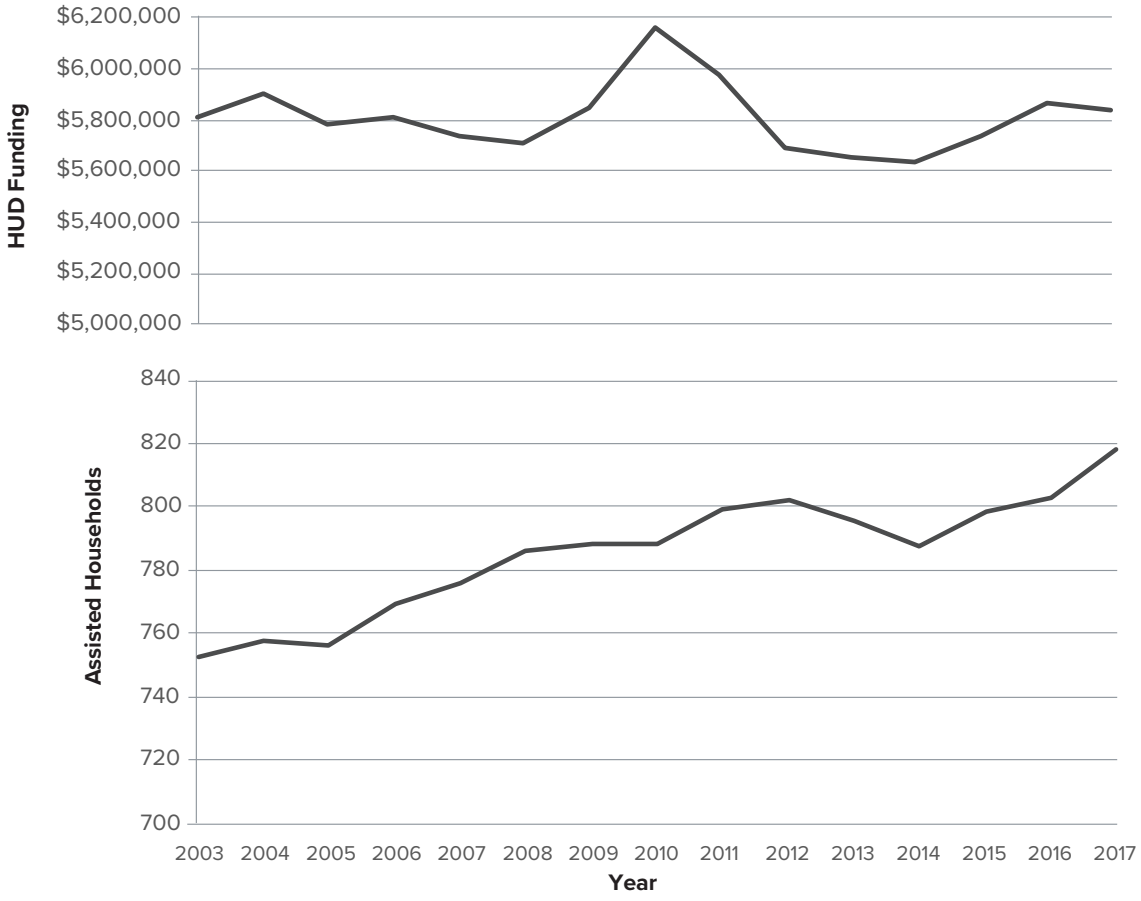
Identifying the Comparison Group

Our statistical model is based on a comparison of trends between MTW and traditional PHAs. In this section, we provide descriptive analysis of trends in costs per household among traditional PHAs and MTW agencies, which provides context for the results from the statistical models.

The analysis period for our study, 2003 to 2017, includes both the increases in annual appropriations from the 2009 stimulus package and the decreases in appropriations from sequestration. During this period, MTW agencies received an increasing proportion of HUD funding and served a higher proportion of assisted households relative to traditional PHAs.

Our analysis of agency-reported data in FDS shows the average level of HUD funding for traditional PHAs rose from $5.8 million in 2003 to a peak of $6.2 million in 2010 before declining to $5.6 million in 2014. As of 2017, average annual funding for traditional PHAs was almost exactly the same as it was in 2003. Analysis of PIC and VMS data show that the number of assisted households generally increased over this time (exhibit 7), with a slight decline in the number of assisted households between 2011 and 2014.

Exhibit 7: Average Levels of HUD Funding and Assisted Households at Traditional Public Housing Agencies (2003–2017)



PHA = public housing agency.

Notes: Traditional PHAs include all 3,674 PHAs that never joined the Moving to Work demonstration. Values displayed are constant 2015 dollars adjusted using Bureau of Labor Statistics Consumer Price Index for all Urban Consumers.

Sources: Urban Institute analysis of HUD Financial Data Schedule and Public and Indian Housing Information Center datasets

Comparing Moving to Work Agencies with Traditional Public Housing Agencies

This analysis assumes that MTW agencies were similar to traditional agencies, or at least followed similar trends, prior to joining the demonstration. Even before joining, however, future MTW agencies tended to be larger and have higher costs per household than other traditional PHAs (see exhibit 8). In 2003, these pre-MTW agencies were more than 10 times larger than the average traditional PHA and received $8,500 in HUD funding for each household they served, compared with $5,925 in HUD cost per assisted household for PHAs that never became MTW agencies. The smallest agency that would join MTW after 2003 assisted an average of 938 households before joining. The average traditional PHA, however, assisted only 772 households in 2003.

MTW agencies are more similar to large traditional PHAs—those with more than 750 assisted households—than to small traditional PHAs (exhibit 8). Large traditional PHAs that never became MTW agencies served an average of 3,020 assisted households in 2003

and received $7,148 in HUD funding for each assisted household compared with $8,500 received by future MTW agencies. MTW agencies' mix of housing assistance provided to households also more closely aligns with the larger traditional PHAs than with smaller traditional PHAs, which can be seen in exhibit C7 in appendix C.

Exhibit 8: Number of Assisted Households, HUD Funding, and HUD Cost per Household by Public Housing Agencies' Future Moving to Work Status, 2003

	Future MTW Agencies	All Traditional PHAs	Large Traditional PHAs
	12 PHAs	3,547 PHAs	709 PHAs
Average Number of Assisted Households	7,168	772	3,020
Average HUD Funding	$47,639,566	$5,968,952	$25,046,414
Average HUD Cost per Assisted Household	$8,500	$5,925	$7,148

MTW = Moving to Work. PHA = public housing agency.

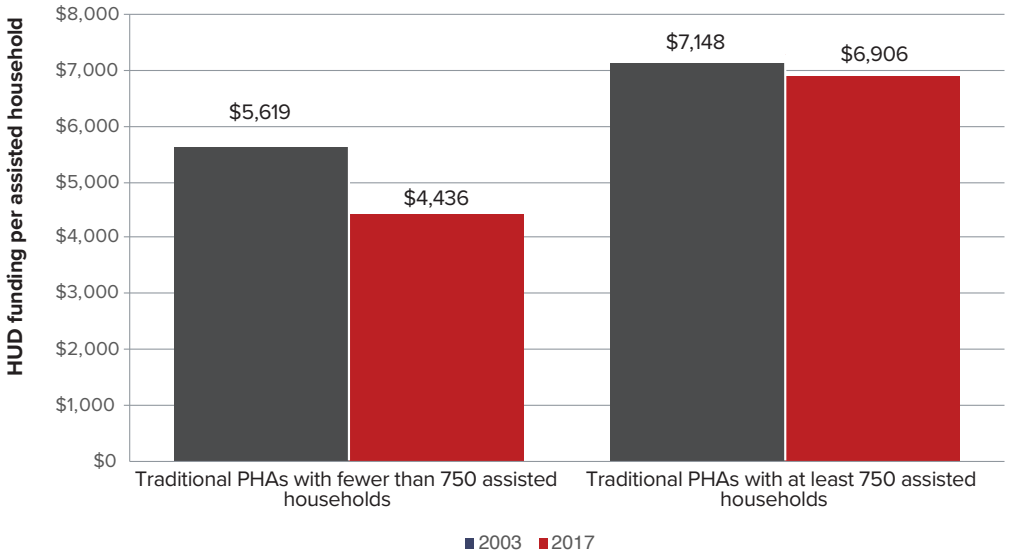
Notes: Dollar values are constant 2015 dollars adjusted using Bureau of Labor Statistics Consumer Price Index for all Urban Consumers. Traditional PHAs include 3,547 PHAs that never joined the MTW demonstration. Large traditional PHAs include only traditional PHAs that had more than 750 assisted households in 2003. Analysis excludes agencies that joined MTW before 2003. Analysis also excludes Oakland Housing Authority, Tacoma Housing Authority, Housing Authority of the County of Santa Clara, and Housing Authority of the City of San Jose because of incomplete data on households in public housing. Future MTW agencies further exclude Atlanta Housing Authority, District of Columbia Housing Authority, and King County Housing Authority who joined MTW in 2003 and therefore do not have a full year of pre-MTW data.

Sources: Urban Institute analysis of HUD Public and Indian Housing Information Center dataset; HUD Financial Data Schedule dataset; U.S. Census Bureau Data

MTW agencies are also more like large traditional PHAs than small ones in terms of trends in cost per assisted household (exhibit 9). During the analysis period, there was a large divergence in trends between large and small traditional PHAs. For traditional PHAs assisting at least 750 households in 2003, HUD cost per assisted household was mostly flat, decreasing slightly from $7,148 to $6,906 or 3.4 percent. For traditional PHAs assisting fewer than 750 households in 2003, cost per assisted household decreased much more drastically, from $5,619 to $4,436, a 21-percent decline. It appears that smaller traditional PHAs received less funding during this period, but still served the same number of households.[34]

[34] The decline in cost per assisted household among small PHAs is a noteworthy trend that is outside the scope of our research questions. A HUD study on administrative fees in the HCV program suggests that many of these smaller agencies are receiving additional subsidies from local government that allowed them to keep serving a similar number of assisted households despite cuts in funding from HUD (Turnham et al., 2015).

Exhibit 9: HUD Cost per Assisted Household in 2003 and 2017, by Public Housing Agency Size



PHA = public housing agency.

Notes: Traditional PHAs include 3,547 PHAs that never joined the Moving to Work demonstration. PHAs are classified as having over or under 750 assisted households based on the number of households served in 2003. Values displayed are constant 2015 dollars adjusted using Bureau of Labor Statistics Consumer Price Index for all Urban Consumers.

Sources: Urban Institute analysis of HUD Financial Data Schedule and Public and Indian Housing Information Center datasets

Estimation Methods

To show the impact of participating in the Moving to Work (MTW) demonstration on cost per household and other outcomes, we used a statistical model that accounted for differences between agencies at baseline.[35] This model captures how receiving MTW status changed each outcome measure relative to what would have happened if the public housing agency (PHA) had not joined the MTW demonstration. The models use a PHA's fixed effects to control for urbanity, rurality, and other time-invariant characteristics of the PHA, including factors that may make a PHA more or less likely to join the MTW demonstration. These fixed effects also control for the average mix of tenant-based vouchers, project-based vouchers, and public housing administered by the PHA.

The models also include year fixed effects to control for national-level trends that may affect how much funding PHAs get from HUD and how much it costs to provide rental assistance. Because the period of study includes times of economic expansion and contraction as well as periods of more and less generous government funding, it is important that the regression model does not assume that national trends are static, smooth, or linear.

In addition to controlling for national trends, the models include two control variables to capture factors that change over time that may affect the costs of providing housing assistance: (1) median rent, and (2) the local public sector wages in each PHA's service area. Including these variables allowed us to control for whether MTW agencies operated in areas where external cost drivers (such as the price of housing) were rising or falling faster than at the average PHA. These variables were chosen because prior research has shown that an area's median rent and local public sector wages impact per household costs of providing housing assistance (Finkel and Buron, 2001; Turnham et al., 2015).

Because MTW agencies are more similar to large traditional PHAs than to small ones, as shown in the previous section "Comparing MTW Agencies with Traditional PHAs," we included in the sample only those traditional PHAs that had at least 750 assisted households in 2003.[36]

Estimation Method for Research Question 1: What is the effect of Moving to Work status on cost per assisted household?

To determine the impact of the MTW demonstration on cost per household, we estimate the following fixed effects panel regression including MTW agencies and traditional PHAs with 750 households or more in 2003:

$$Outcome_{it} = \beta * MTW_{it} + \gamma * ExternalCostDrivers_{it} + \lambda_t + \alpha_i + \epsilon_{it} \qquad (1)$$

That is, each of our outcome variables for PHA *i* in year *t* (the natural log of HUD funding, the natural log of assisted households, the natural log of cost per assisted household) is a function of MTW status, external drivers of cost—median rent and local public sector wages ($ExternalCostDrivers_{it}$), year fixed effects (λ_t), PHA fixed effects (α_i), and an idiosyncratic residual (ϵ_{it}), clustered at the PHA level and robust to arbitrary forms of misspecification. MTW_{it} equals 1 for PHA *i* in year *t* if the agency is an MTW agency in that year as defined by having a signed agreement; in the year that the agreement is

[35] See appendix C (exhibit C4) for a list of the research questions and which regression model was used to answer it.

[36] See appendix B for sensitivity analyses showing that the model estimates do not change when the comparison group includes PHAs with more than 150 units ; however, if the smallest PHAs (fewer than 150 units) are included in the comparison group, the results do change.

signed, we set MTW_{it} equal to the fraction of the year remaining at the date of the second (HUD or PHA) signature. Variables measured in dollars and households are log-transformed before they enter the equation; this accounts for the skewness of their distributions and produces estimates of the MTW effect in percentage terms. The measure of cost per household is also log-transformed before entering the equation.

The coefficient β approximates the percentage change in average cost per household associated with entering the MTW demonstration (a coefficient of 0.1 indicates a 10-percent change). A positive and significant estimated value for β implies higher cost per household. We also use equation 1 to estimate the impact of MTW status on the amount of funding a PHA gets from HUD and on the number of assisted households it serves.

Understanding the Timing of Changes in Cost per Household

To better understand the timing of MTW's impact on cost per assisted household, we use an event-study regression to isolate the impact of the MTW demonstration the year in which the MTW agreement was executed, 1 year after joining the demonstration, 2 years after, and then all other years after joining the demonstration. In this model, we also estimate whether the trends at MTW agencies were diverging from trends in traditional PHAs in the years before they signed the MTW agreement. The event study model takes the following form:

$$Outcome_{it} = \delta_1 D_{i(t+2)} + \delta_2 D_{i(t+1)} + \delta_3 D_{it} + \delta_4 D_{i(t-1)} + \delta_5 D_{i(t-2)} + \delta_6 MTW_{i(t+3)} + \gamma * Controls_{it} + \lambda_t + \alpha_i + \epsilon_{it} \quad (2)$$

Here, we replace the indicator for MTW status with a series of dummy variables $D_{i(t+2)}$ to $D_{i(t-2)}$ indicating 2 years before, 1 year before, the year of, the year after, and 2 years or more after a PHA's first MTW agreement is executed. The variable $MTW_{i(t+3)}$ is equal to 1 for MTW agencies beginning in the third year after entry into the demonstration. That is, it estimates long term effects. Again, the model includes external drivers of cost ($Controls_{it}$), year fixed effects (λ_t), PHA fixed effects (α_i), and an idiosyncratic residual (ϵ_{it}) clustered at the PHA level and robust to arbitrary forms of misspecification.

Estimation Method for Research Question 2: Do changes in program mix, housing quality and affordability, or the characteristics of assisted households explain the effect of Moving to Work status on HUD costs per assisted household?

To explore whether internal cost drivers, including program mix, housing quality and affordability, and the characteristics of assisted households, explain the relationship between MTW status and per household cost, we add the following variables for these measures to the main model shown previously:

$$Outcome_{it} = \beta' * MTW_{it} + \delta_1 * InternalCostDrivers_{it} + \gamma * ExternalCostDrivers_{it} + \lambda_t + \alpha_i + \epsilon_{it} \quad (3)$$

where the outcome measure is the natural log of cost per assisted household. Here, the primary outcome measure is a function of a set of PHA factors, external cost drivers, year fixed effects (λ_t), PHA fixed effects (α_i), and an idiosyncratic residual (ϵ_{it}) clustered at the PHA level and robust to arbitrary forms of misspecification. Of interest here is whether and how the coefficient on MTW status changes once these endogenous characteristics are included. If the effect disappears, this suggests that changes in cost per household related to MTW status may be due to changes in program mix, housing quality and affordability, and household

characteristics rather than simply due to serving fewer or more of the same households at the same quality level.

Question 2a asks about the influence of program mix on cost per household. To answer this question, the PHA factors are the percent of total households funded with tenant-based vouchers and the percent of total households funded with project-based vouchers (omitting the percent of households in public housing as the reference group). Question 2b asks about housing affordability and housing quality. We include the median rent burden of households in the Office of Public and Indian Housing Information Center (PIC) as a measure of affordability, and public housing physical inspection scores from the Public Housing Assessment System (PHAS) as a measure of housing quality. Finally, for question 2c, we look at three factors related to the ability of PHAs to reach households that may require more resources to serve: (1) the median income as a percent of the area median income (AMI) of newly admitted households (those entering the public housing or voucher program each year), (2) average household size for newly admitted households, and (3) the percent of newly admitted households with an elderly head of household, disabled head of household, or disabled family member. Each of these sets of cost drivers is associated with a mechanism through which MTW could affect cost per household. At the same time, these measures are interrelated. For example, the percent of households with an elderly or disabled head of household or a disabled family member could affect the decisions an agency makes about its mix of public housing and the Housing Choice Voucher (HCV) program as well as its spending on administration and tenant services, which would also have an impact on overall cost per household. To explore each mechanism separately, we isolate each set of cost drivers in a distinct model.

The MTW effect (β') estimated in this way can be interpreted as the change in cost per household *beyond or that is not driven by changes in the internal cost drivers included in the regression*. We then test whether the estimated impact of MTW has changed when these factors are added to the model (whether β' = β). For example, if the value of coefficient β is not the same for research question 2a, as it is for our primary research question, 1a, we can conclude that changes in program mix explain at least some of the differences, or the lack of a difference between MTW agencies and traditional PHAs, in cost per household.

Estimation Method for Research Question 3: Does Moving to Work status affect agencies' total per household operating and housing assistance spending, or per household spending on program administration, tenant services, or operating reserves?

To better understand how MTW status affects per household spending on specific spending categories, we estimate equation 1 with four left-hand-side measures: (1) total expenditures per assisted household, (2) spending on tenant services per assisted household, (3) administrative costs per assisted household, and (4) changes in operating reserves per assisted household. We take the natural log of total per household operating and housing assistance and per household spending on program administration before they enter the model. Because tenant services are frequently zero, and reserve balances can be negative, we do not take the natural log of these measures and instead estimate a linear relationship on dollars per household.

Robustness Checks

We undertook several robustness checks where we altered our regression choices to ensure that none of these choices is driving our results. First, as an alternative to dropping PHAs that serve fewer households, we used propensity score matching to limit the size of our comparison group. We estimated effects using a five-to-one match and using all large PHAs with propensity scores within the range calculated for MTW PHAs (that is, with common support). Second, we tested the sensitivity of our results to an alternative methodology for addressing the large amount of missing data. We undertook multiple imputation (rather than nearest-neighbor interpolation and extrapolation) to be sure that our interpolation assumptions were not creating errors in our estimates. Third, we tested whether removing or discounting local, non-traditional units from our count of assisted households impacts our estimates. Fourth, we relaxed the model to allow each PHA to follow a unique linear time trend. We also conducted a sensitivity analysis to test whether our results change when using different size cutoffs for defining the group of comparison traditional PHAs. Results are generally consistent with the primary models and confirm the findings reported here. Details on these methods and the results of these analyses can be found in appendix B.

Findings

Moving to Work (MTW) status has no impact on overall cost effectiveness, as agencies receive more HUD funding but use that funding to assist more households. MTW status is accompanied by increased reserve balances.

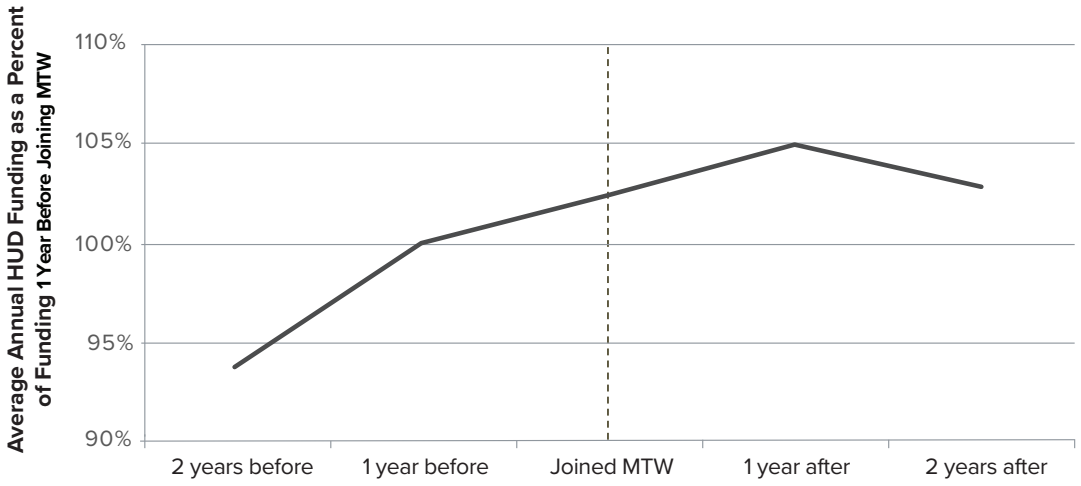
MTW status is associated with a small increase in cost per assisted household that is not statistically significant, suggesting that there is no overall impact of MTW status on cost effectiveness. MTW agencies experience an increase in HUD funding after joining the demonstration, but also a commensurate increase in the number of assisted households. These results do not change after controlling for program mix, housing quality and affordability, or the characteristics of assisted households. MTW status is not associated with a statistically significant change in per household expenditures overall or spending on administrative costs or tenant services. MTW status is, however, associated with a large, statistically significant increase in the amount per household held in reserves.

This section first displays descriptive statistics for MTW and traditional public housing agencies (PHAs) and then shows the results from the statistical models that formally test our hypotheses.

Public Housing Agency Trends Before and After Joining Moving to Work

The following three exhibits show trends within MTW agencies—before controlling for baseline characteristics, national trends, or exogenous cost drivers—in HUD funding, assisted households, and HUD costs per assisted household before and after joining the MTW demonstration. The year before each agency joined the demonstration is the baseline year and the trendline measures percent change from the prior year and over the 3 subsequent years. Exhibit 10 shows that annual HUD funding begins to increase in the year prior to joining, then continues to increase until 1 year after joining before declining slightly 2 years after joining.

Exhibit 10: Moving to Work Agencies' Average HUD Funding Before and After Joining Moving to Work



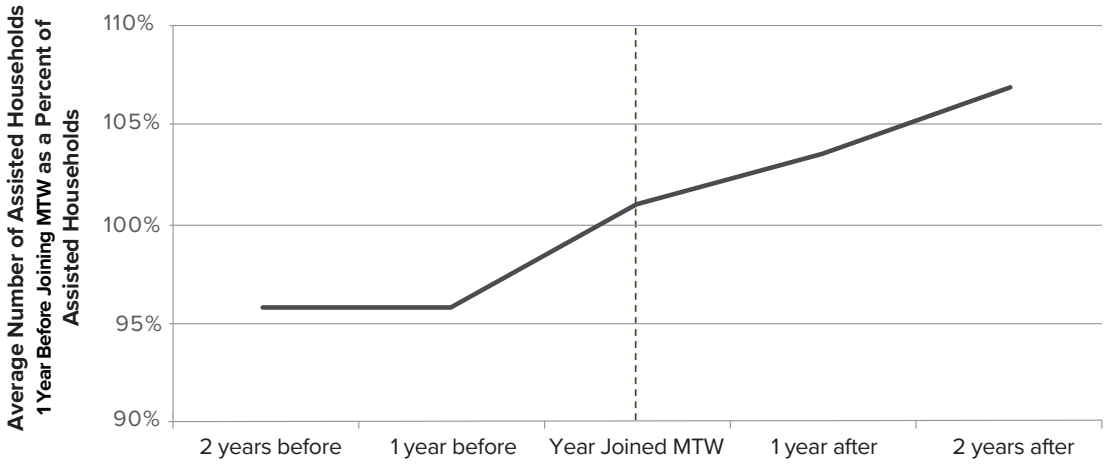
MTW = Moving to Work.

Notes: Vertical dotted line and "year joined MTW'' represent the year in which public housing agencies (PHAs) execute their first MTW contract. This figure includes only agencies with at least 750 households and excludes agencies that joined MTW before 2005 or after 2015, because they need to have 2 years of data before joining MTW and 2 years of data after joining MTW to enter this equation. Exhibit C5 in appendix C displays the average number of assisted households, HUD funding, and cost per household before and after MTW status for each of the 17 PHAs that joined MTW between 2003 and 2013.

Sources: Urban Institute Analysis of HUD Office of Public and Indian Housing Information Center, Financial Data Schedule, and Voucher Management System data

The annual number of assisted households also increases the year that an agency joins MTW, then continues to increase 1 and 2 years after (exhibit 11).

Exhibit 11: Moving to Work Agencies' Average Number of Assisted Households Before and After Joining Moving to Work



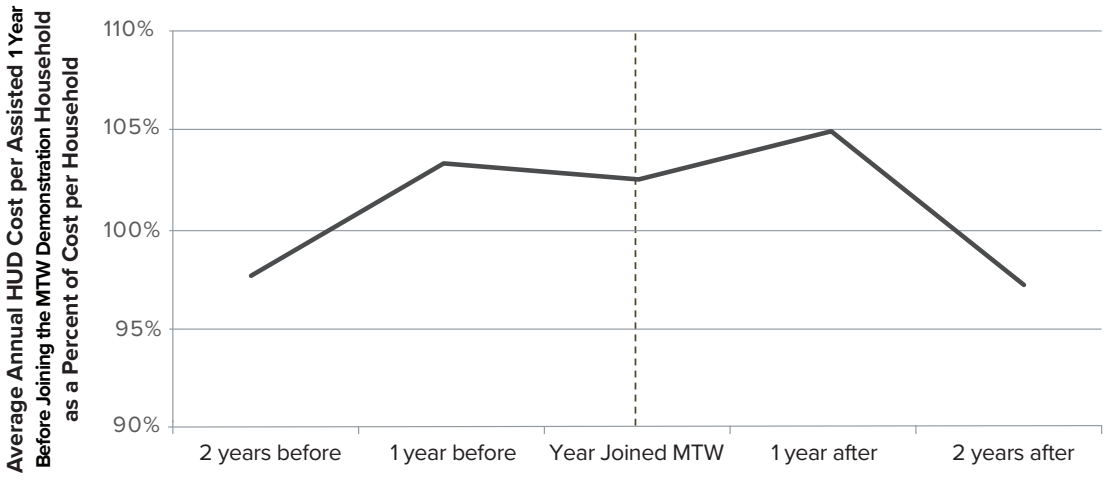
MTW = Moving to Work.

Notes: Vertical dotted line and "year joined MTW'' represent the year in which public housing agencies execute their first MTW contract. This figure includes only agencies with at least 750 households and excludes agencies that joined MTW before 2005 or after 2015, because they need to have 2 years of data before joining MTW and 2 years of data after joining MTW to enter this equation.

Sources: Urban Institute analysis of HUD Office of Public and Indian Housing Information Center and Voucher Management System data

Exhibit 12 shows changes in average cost per assisted households before and after joining the MTW demonstration. MTW agencies experience an increase in cost per household the year before they join the demonstration, a slight dip the year that they join, a slight increase the next year, and then a decrease to below pre-MTW levels 2 years after joining the demonstration.

Exhibit 12: Moving to Work Agencies' Average HUD Cost per Household Before and After Joining Moving to Work



MTW = Moving to Work.

Notes: Vertical dotted line and "year joined MTW" represent the year in which public housing agencies execute their first MTW contract. This figure includes only agencies with at least 750 households and excludes agencies that joined MTW before 2005 or after 2015, because they need to have 2 years of data before joining MTW and 2 years of data after joining MTW to enter this equation.

Sources: Urban Institute Analysis of HUD Office of Public and Indian Housing Information Center, Financial Data Schedule, and Voucher Management System data

These findings suggest that MTW status is correlated with increased funding levels and number of assisted households. It also suggests there is a short adjustment period where cost per household increases the first year after joining MTW and then declines. The extent to which these trends are driven by MTW status, contemporaneous changes, or national trends and the timing of agency entry into the demonstration is less clear. The statistical analyses shown in the following section disentangle the impact of the MTW demonstration from these other factors.

Effect of the Moving to Work Demonstration on HUD Cost per Assisted Household

Controlling for baseline characteristics, national trends, and exogenous cost drivers, we find no statistically significant relationship between MTW status and cost per assisted household. Results from our statistical analysis show that MTW status is associated with a small and statistically insignificant increase in cost per assisted household of 1.3 percent (exhibit 13).

Exhibit 13: The Effect of Moving to Work on HUD Cost per Assisted Household, HUD Funding, and Number of Assisted Households

	Cost per Assisted Household	HUD Funding	Assisted Households
Impact of MTW	**0.013**	**0.106*** **	**0.092*** **
	(0.030)	**(0.024)**	**(0.028)**
Control Variables			
Area Median Rent	0.298***	0.144**	-0.154***
	(0.071)	(0.060)	(0.047)
Government Wage	0.048*	0.023	-0.025
	(0.026)	(0.026)	(0.020)
Number of PHAs	727	727	727
Adjusted Within R-Squared	0.096	0.083	0.039
Observations	10,905	10,905	10,905

* p<0.10, ** p<0.05, *** p<0.01.

MTW = Moving to Work. PHA = public housing agency.

Notes: Standard errors (listed in parentheses) are heteroskedastic robust and clustered at the PHA level. Data cover 2003–2017. Regressions include only agencies with at least 750 households and exclude agencies that joined MTW before 2003. Impact analyses do not include Oakland Housing Authority, Tacoma Housing Authority, Housing Authority of the County of Santa Clara, and Housing Authority of the City of San Jose because of incomplete data on households in public housing. Regression includes year and PHA fixed effects. Cost per assisted household, HUD funding, assisted households, area median rent, and government wages enter the regression in logged form.

Sources: Urban Institute Analysis of HUD's Office of Public and Indian Housing Information Center, Financial Data Schedule, and Voucher Management System data

This lack of impact on cost per household is a result of increases in both the level of HUD funding and the number of assisted households for agencies after they join MTW. PHAs receive, on average, 11 percent more funding from HUD after joining the MTW demonstration and assist 10 percent more households (exhibit 13).[37] Because these effects are of similar size, they have offsetting impacts on our primary outcome variable of cost per assisted household.

These findings are strong and robust. We conducted several analyses to determine if different, but potentially defensible, methodological choices for the statistical models would change the results. These statistical analyses produced the same results even under the following conditions:

- Instead of using all larger traditional agencies for the comparison group, we used both propensity score matching and trimming to common propensity score support to create comparison groups.
- Instead of using linear interpolation to fill in bad and missing data, we used multiple imputation.
- Instead of including local, non-traditional (LNT) households as a full household, we weighted them to 50 percent and removed them altogether.
- Instead of including controls for median rent in the service area and government wages in the county, we used no control variables.

Two additional analyses supported the primary finding that there is no statistically

[37] Because outcome measures entered the regression in log form, percentage change is calculated by exponentiating the coefficient and subtracting 1. For example, the coefficient for HUD funding is 0.106 and the estimated percentage change is (e^0.106)-1=0.112 or 11 percent.

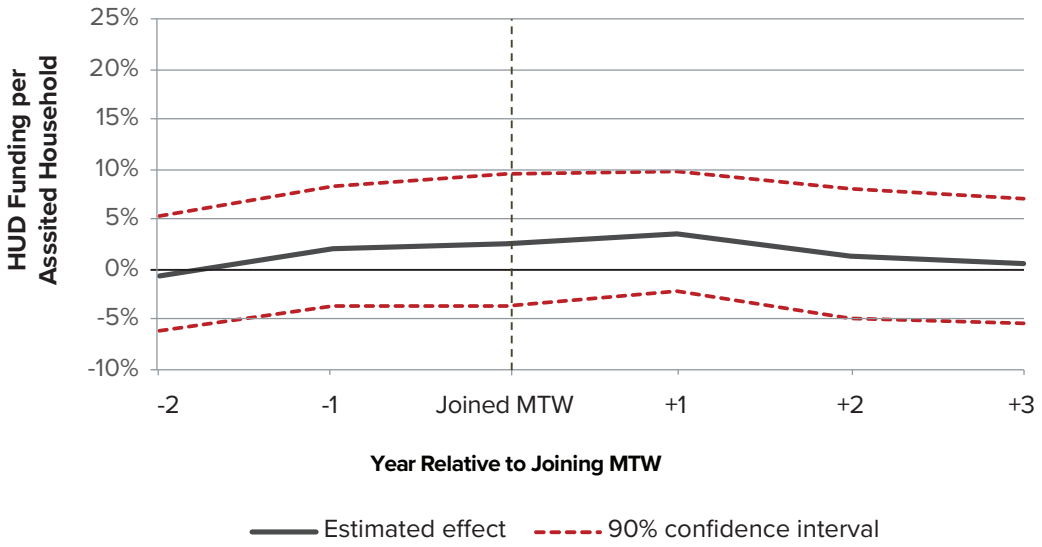
significant relationship between MTW status and cost per household, but also found no relationship between MTW status and either HUD funding or the number of assisted households:

- Instead of assuming that all agencies follow parallel trends over time, we relaxed the statistical model to allow each agency its own unique linear trend over time.
- Instead of including all years, we used a smaller sample period, from 2009 to 2017.

All of these robustness checks confirm that MTW status does not affect agencies' cost effectiveness. (See appendix B for all of these results). That is, the estimated relationship shown in exhibit 13 stays the same when the data are analyzed in different ways.

We also used an event study framework to estimate the effect of MTW status for each year relative to when agencies joined the demonstration. We find no significant differences in cost effectiveness in any year before or after joining the MTW demonstration (exhibit 14). Exhibit 15 shows the effects of MTW status, by year, on HUD revenue and households assisted. Consistent with the trends section (exhibits 9, 10, and 11), HUD funding begins to rise the year before PHAs officially enter the MTW demonstration (although this effect is not statistically significant at $\alpha=0.1$), and continues to rise after the agency joins MTW, with the largest increase 1 year after joining (exhibit 15). The number of assisted households served by the PHA also increases 1 year before joining the demonstration (statistically significant at $\alpha=0.1$) and continues to rise after joining but more smoothly than funding, which peaks the year after joining. Full results from this model can be found in appendix B, exhibit B5.

Exhibit 14: The Effect of Moving to Work on HUD Cost per Household Over Time, Using Public Housing Agencies With at Least 750 Assisted Households (2003) as a Comparison Group (Percent Change)



MTW = Moving to Work. PHA = public housing agency.

Notes: Vertical dotted line and "Year joined MTW" represent the year in which PHAs execute their first MTW contract. The solid line represents the point estimate and the dashed lines on either side of this estimate represent the 90-percent confidence interval. Estimates are converted from log form to percent change. Regressions include only agencies with at least 750 households and exclude agencies that joined MTW before 2005 or after 2015, because they need to have 2 years of data prior to joining MTW and 3 years of data after joining enter this equation. Impact analyses do not include Oakland Housing Authority, Tacoma Housing Authority, Housing Authority of the County of Santa Clara, and Housing Authority of the City of San Jose because of incomplete data on households in public housing. All regressions include year and PHA fixed effects. Median rent and government wages are included as control variables. HUD cost per household, area median rent, and government wages enter the regression in logged form.

Sources: Urban Institute Analysis of HUD Office of Public and Indian Housing Information Center, Financial Data Schedule, and Voucher Management System data

Exhibit 15: The Effect of Moving to Work on HUD Funding and Number of Assisted Households (Percent Change)

MTW = Moving to Work.

Notes: Vertical dotted line and "Year joined MTW" represent the year in which public housing agencies execute their first MTW contract. The solid line represents the point estimate and the dashed lines on either side of this estimate represent the 90-percent confidence interval. Estimates are converted from log form to percent change. Regressions include only agencies with at least 750 households and exclude agencies that joined MTW before 2005 or after 2015, because they need to have 2 years of data prior to joining MTW and 3 years of data after joining enter this equation. Impact analyses do not include Oakland Housing Authority, Tacoma Housing Authority, Housing Authority of the County of Santa Clara, and Housing Authority of the City of San Jose because of incomplete data on households in public housing. All regressions include year and PHA fixed effects. Median rent and government wages are included as control variables. HUD cost per household, area median rent, and government wages enter the regression in logged form.

Sources: Urban Institute Analysis of HUD Office of Public and Indian Housing Information Center, Financial Data Schedule, and Voucher Management System data

The increase in the number of assisted households the year before PHAs sign their MTW agreement is both a surprising empirical fact and a potential cause of bias to our main regression model. If the changes in HUD revenue and assisted households are part of longer-term trends within future MTW agencies that pre-date joining the demonstration, the alternative model in which we allow each agency its own unique linear trend over time would provide the better approximation of the impact of MTW on agencies. As described above, this PHA-specific time trend model also finds no relationship between MTW status and cost per assisted household (exhibit B4).

Effect of the Moving to Work Demonstration Controlling for Program Mix, Housing Quality and Affordability, and Household Characteristics

To better understand the mechanisms through which MTW status may impact cost effectiveness, we ran three additional regression models, accounting for, respectively, (1) changes in program mix, (2) housing quality and affordability, and (3) household characteristics. Because our primary finding was of no impact, this analysis tests whether MTW agencies maintain their cost effectiveness by altering their portfolio

of assisted units, the quality or affordability of the housing they provide, or the types of households they assist. We determine that accounting for these factors does not alter our primary finding of no significant relationship between MTW status and cost per assisted household. In other words, MTW agencies are not maintaining their cost effectiveness by shifting their portfolio to lower-cost assistance programs, offering lower quality or less affordable housing assistance, or providing assistance to lower need households.

Exhibit 16 displays the results of our main model from equation 1 (column 1), followed by the same model plus additional variables that control for:

- the percent of households assisted through tenant-based and project-based HCVs rather than through public housing (column 2),
- public housing Physical Assessment Subsystem (PASS) inspection scores and affordability (column 3), and
- characteristics that define whether residents may be more expensive to serve (column 4).[38]

Exhibit 16: The Effect of Moving to Work on HUD Cost per Assisted Household Controlling for Program Mix, Quality and Affordability, and Household Characteristics

	(1) Main Regression	(2) Controlling for Program Mix	(3) Controlling for Housing Quality and Affordability	(4) Controlling for Household Characteristics
Impact of MTW	**0.013**	**0.008**	**0.015**	**0.014**
	(0.030)	**(0.025)**	**(0.031)**	**(0.029)**
Percent tenant-based HCV holder	-	0.613***	-	-
		(0.075)		
Percent project-based HCV holder	-	0.643***	-	-
		(0.107)		
Quality of public housing	-	-	-0.001	-
			(0.001)	
Affordability (median rent burden)	-	-	-0.007**	-
			(0.003)	
Median income (new residents)	-	-	-	-0.040***
				(0.011)
High need households (new residents)	-	-	-	0.000
				(0.000)
Household size (new residents)	-	-	-	0.018**
				(0.008)
Observations	10,905	10,905	8,775	10,905

* p<0.10, ** p<0.05, *** p<0.01.

HCV = Housing Choice Voucher. MTV = Moving to Work.

Notes: There is no statistically significant difference between the four coefficients for the impact of MTW status on cost per household. Standard errors (listed in parentheses) are heteroskedastic robust and clustered at the public housing agency (PHA) level. Regressions include only agencies with at least 750 households and exclude agencies that joined MTW before 2003. Impact analyses do not include Oakland Housing Authority, Tacoma Housing Authority, Housing Authority of the County of Santa Clara, and Housing Authority of the City of San Jose because of incomplete data on households in public housing. Regression includes year and PHA fixed effects. Median rent and government wages are included as control variables. Cost per assisted household, HUD funding, assisted households, area median rent, and government wages enter the regression in logged form. Regression (3) only includes PHAs with public housing units.

Sources: Urban Institute analysis of HUD Financial Data Schedule (FDS) and the Office of Public and Indian Housing Information Center (PIC) datasets

[38] Coefficients on these control variables should not be interpreted as causal impacts. Additional research is needed to determine the true causal impact of each variable on costs per household.

To understand the influence of each of these additional variables on cost effectiveness, readers should compare the numbers in the top row (Impact of MTW) in columns 2, 3, and 4 with the number in column 1. For example, column 2 (Controlling for Program Mix), shows that, controlling for changes in the percentage of assisted households in tenant-based vouchers, project-based vouchers, and public housing, joining the MTW demonstration is associated with a 0.8-percent increase in costs per assisted household. This slightly decreases the impact of MTW on cost per household from our original model (column 1), which shows an increase in costs per household of 1.3 percent. This indicates that accounting for shifts in agencies' portfolio of assisted units after joining MTW slightly reduces the estimated impact of MTW status on costs per household. Conversely, columns 3 and 4 show that accounting for housing affordability and quality (column 3) and the characteristics of assisted households (column 4) slightly increases the effect of MTW status on costs per household. The differences in all cases, however, are very small and are not statistically significant. From this we conclude that the relationship between MTW status and cost effectiveness is not being driven by changes that occur after they join the demonstration to PHAs' program mix, the quality or affordability of housing assistance, or the types of households served.

Effect of the Moving to Work Demonstration on per Household Spending by Public Housing Agencies

Exhibit 17 shows descriptive statistics for MTW and traditional PHAs of similar size in total per household spending, spending on administrative costs, spending on tenant services, and operating reserves in 2003, prior to when agencies in our sample joined the demonstration. It reveals that, compared with traditional PHAs, MTW agencies spent more per assisted household and stored more dollars in reserves before joining the demonstration.

Exhibit 17: Per Household Total Expenditure, Administrative Costs, Tenant Services Spending, and Operating Reserves, 2003

	Total Expenditure (Operating and Housing Assistance) per Assisted Household	Administrative Costs per Assisted Household	Tenant Services Spending per Assisted Household	Operating Reserves per Assisted Household
MTW PHAs Included in Regression Analysis	$6,639	$1,337	$109	$473
Traditional PHAs That Served at Least 750 Households in 2003	$5,574	$985	$64	$396

MTW = Moving to Work. PHA = public housing agency.

Notes: Values displayed are constant 2015 dollars adjusted using Bureau of Labor Statistics Consumer Price Index for all Urban Consumers. Regressions include only agencies with at least 750 households and exclude agencies that joined MTW before 2003. Analyses do not include Oakland Housing Authority, Tacoma Housing Authority, Housing Authority of the County of Santa Clara, and Housing Authority of the City of San Jose because of incomplete data on households in public housing. Regression includes year and public housing agency fixed effects. Cost per assisted household, HUD funding, assisted households, area median rent, and government wages enter the regression in logged form.

Sources: Urban Institute analysis of HUD's Office of Public and Indian Housing Information Center dataset; HUD Financial Data Schedule (FDS dataset); and U.S. Census Bureau Data

Exhibit 18 shows estimates of the impact of Moving to Work status on public housing authorities' total operating and housing assistance spending per assisted household, administrative costs per household, tenant services per household, and operating reserves per household, accounting for the baseline differences displayed in exhibit 17. The model uses the natural log of total expenditures and administrative costs to estimate the impact in terms of percentage change. Because tenant services spending is often zero and operating reserves can be negative, the model estimates a linear relationship for these variables.

Results of the model of MTW's impact on total expenditures per household are consistent with findings of cost per household discussed previously. MTW status is not associated with an increase in PHAs' total operating and housing assistance spending per assisted household. Statistical models are unable to determine the relationship between MTW status and either administrative costs per household or tenant services spending per household because the standard errors are very large. The standard estimating error for the tenant services model is about $25 per household, more than one-fourth of the average spending level. This is probably because most PHAs spend nothing on tenant services and a small number of agencies spend a lot on tenant services.

In contrast, the analysis also shows that MTW status increases the funds that agencies hold in operating reserves by about $840 per assisted household. This increase is statistically significant at the .01 level. This finding suggests that MTW agencies are able to find some efficiencies that allow them to build up their operating reserves while serving roughly the same number of assisted households per dollar of HUD funding as they did before. It is unclear from our analysis, however, what those efficiencies are since they are not spending less on other components of providing rental assistance.

Exhibit 18: The Effect of Moving to Work on per Household Total Expenditures, Administrative Costs, Tenant Services Spending, and Operating Reserves

	Total Expenditures (Operating and Housing Assistance) per Assisted Household	Administrative Costs per Assisted Household	Tenant Services Spending per Assisted Household	Operating Reserves per Assisted Household
Impact of MTW	**0.003**	**0.137**	**22.4**	**839*** **
	(0.048)	(0.098)	(25.0)	(197)
Median Rent	0.061	0.073	17.3	96.9
	(0.146)	(0.091)	(24.7)	(170)
Government Wage	0.111	0.060	-21.5	114
	(0.080)	(0.048)	(18.8)	(119)
Observations	10,905	10,905	10,905	10,905

* p<0.10, ** p<0.05, *** p<0.01.

MTW = Moving to Work.

Notes: Standard errors are heteroskedastic robust and clustered at the public housing agency (PHA) level and listed in parentheses. Regressions exclude agencies that joined MTW before 2003 and agencies that had fewer than 750 assisted households in 2003. Impact analyses do not include Oakland Housing Authority, Tacoma Housing Authority, Housing Authority of the County of Santa Clara, or Housing Authority of the City of San Jose because of incomplete data on households in public housing. All regressions include year and PHA fixed effects. Total expenditures per assisted household, administrative costs per assisted household, median rent, and government wage enter our regression equation in natural log form, tenant services spending per assisted households and operating reserves enter our regression equation non-transformed. We turn all zero values to 0.0001 before taking the natural log. The natural logs of median rent and government wages are included as control variables.

Sources: Urban Institute Analysis of HUD's Office of Public and Indian Housing Information Center, Financial Data Schedule, and Voucher Management System data

Discussion

This study provides new insights into the relationship between MTW status and cost effectiveness and opens doors for other avenues of research. First, it shows that MTW agencies had higher costs, as measured by HUD revenue per assisted household, than traditional PHAs before they joined the demonstration. Thus, the higher costs observed at MTW agencies in prior studies are probably because MTW agencies tend to be located in large urban areas with higher labor and housing costs and not because of the regulatory or financial flexibility offered by the demonstration.

Second, although MTW status is not associated with a change in the per household costs of rental assistance, it is associated with both an increase in HUD revenue and an increase in assisted households. Surprisingly, agencies began assisting more households the year before they joined the demonstration. This may be part of a longer-term trend at agencies that would go on to join the MTW demonstration. Or, agencies may have changed their behavior in anticipation of MTW status. There is often a lag between when agencies are selected into MTW and when they execute their agreements. During this time, agencies may have adjusted their actions in response to the MTW funding formula. Generally, MTW agencies are funded in the HCV program based on the number of households they were assisting when they joined the demonstration, with an adjustment for inflation and changes in housing costs. Thus, agencies could increase the base funding in their MTW contracts by increasing the number of assisted households they served when they joined MTW. Additional qualitative data collection with MTW agency staff would be useful to determine if they were intentionally serving more households in anticipation of their MTW contracts. In

addition, we find evidence of an adjustment period where cost per assisted household increases slightly 1 year after PHAs join the demonstration, although the trend is not statistically significant.

Third, although MTW status did not affect the overall costs to HUD of providing rental assistance, it has allowed agencies to significantly increase the amount of money held in reserves. The Financial Data Schedule (FDS) system is not set up to track how PHAs spend their reserves, so we were not able to track this spending for this study. Interviews with a convenience sample of MTW agencies suggest that these reserves can be useful in financing the construction or preservation of affordable housing. Furthermore, holding additional reserves may allow MTW agencies greater access to financing or lower interest rates when they seek to acquire or develop additional housing units. The increase in reserves could be a sign that MTW agencies are reducing their capital outlays in the short term and building reserves to fund larger capital projects in later years. Supporters of MTW may cite this as evidence that MTW improves agencies' financial position and thereby helps them to preserve or increase the community's stock of affordable housing while maintaining the same level of cost per household. Detractors may argue that the money MTW agencies hold in reserves would be better spent assisting more households through rental subsidies.

It is important to note that we only examine MTW-eligible funding and therefore do not assess whether MTW status affects how much funding PHAs receive from other programs. For example, MTW status might help PHAs receive more funding because they can use their flexibility to hire grant writers or because they can leverage funding to receive additional loans or grants from public or private funders. This may be what allows them to build their operating reserves without reducing their cost-effectiveness. Conversely, traditional PHAs may be able to use other funding opportunities to pay for the enhanced services or development activities that MTW agencies pay for with their funding flexibility.

Finally, our findings may inform thinking about how to strike the right balance between federal regulation and local control. The finding that MTW status does not significantly impact cost effectiveness could be taken as evidence that strict regulation of PHAs is not necessary to manage costs, at least among high performing agencies. Conversely, our finding of no impact of MTW may reflect a lack of contrast in the regulatory environment between MTW and traditional PHAs. During our analysis period, HUD was establishing more uniform standards and monitoring for MTW agencies while also relaxing certain regulatory requirements for traditional PHAs.

Limitations

The analysis reported here is limited by the non-experimental process through which agencies join MTW, a lack of data on behavior within each agency, and the exclusion of agencies that entered MTW prior to 2003. It also does not address the relationship between cost-effectiveness and the MTW demonstration's other goals.

Lack of random assignment to MTW status limits our ability to estimate the causal impact of the demonstration. PHAs were chosen for MTW through selection processes that shifted from year-to-year before becoming more standardized in the later years of the demonstration. In some years, PHAs self-selected into the demonstration by applying to join. PHAs that applied for the MTW demonstration may be systematically different in unobservable and unaccounted for ways from agencies that did not try to join the demonstration. For instance, they may have leadership with high levels of motivation to

improve their agencies.

Data availability constrains the analysis in three important ways. First, the analysis only includes agencies that joined or exited the MTW demonstration since 2003, and for whom there are enough years of accurate data. It therefore excludes the first agencies to join MTW, some of which have been singled out by critics of the demonstration for not using enough of their budget on housing assistance (Fischer, 2015). It also excludes some of the largest MTW agencies and agencies with the most ambitious MTW activities, such as the Chicago Housing Authority, Home Forward (Portland, OR), and the Cambridge Housing Authority. We do not know how including these agencies would affect our results. Second, inconsistent data reduces the accuracy and precision of our estimates. Reliance on imputing missing and incomplete data adds uncertainty to our estimates. Third, FDS data do not fully differentiate between spending on public housing, vouchers, or local, non-traditional (LNT) assistance at MTW agencies and do not allow us to track the flow of funds across accounts. It is not possible to examine shifts in spending that could make agencies more or less cost-effective, the sources of funding used to increase operating reserves, or the expenditures associated with the draw-down of reserves.

Finally, the study focuses only on cost effectiveness and defines cost effectiveness based on number of households served. This measure is not the only possible measure of cost effectiveness, but we chose it because it reflects federal costs and includes all funding sources and all households served with this funding and allows for fair comparison between MTW agencies and traditional PHAs. A further limitation is that this measure of cost effectiveness does not take into account the other two statutory objectives, which are (1) promoting employment and economic self-sufficiency, and (2) increasing housing choices for low-income families. MTW agencies are not required to pursue cost effectiveness over and above the other objectives.

Conclusion

The MTW agencies included in our analysis received higher levels of HUD funding after joining the demonstration and also were able to increase the total number of assisted households served, resulting in no significant change in overall cost per household. These agencies also experienced a large increase in dollars per household held in reserves, suggesting that they were able to increase their savings while still serving roughly the same number of assisted households per dollar of HUD funding as before joining the demonstration.

Future studies should examine cost effectiveness in tandem with self-sufficiency or housing choice to determine the overall effect of the MTW demonstration on its three statutory objectives. Future studies should also estimate the relationship between MTW status and the number of affordable units within the PHA's service area to determine whether MTW agencies use their reserves to increase the supply of affordable housing more than other similar agencies.

The findings in this study do not contradict prior studies showing that MTW agencies spend more per household, but rather show that this higher level of cost per household existed prior to entering the MTW demonstration and that the demonstration itself was not the cause.

Appendix A: History of the Moving to Work Demonstration

Most Moving to Work (MTW) public housing agencies (PHAs) entered the demonstration through a competitive application process. The initial 1996 applicant pool was scored based on a number of characteristics, including the housing agency's performance, capability, and proposed MTW plan. A cohort of 24 PHAs was selected from that group to join the MTW demonstration, and 19 PHAs ultimately signed agreements.[39] That process, however, involved some ambiguity; not all high-scoring PHAs were selected to join and three PHAs were chosen based on their proposed activities, despite not being amongst the highest performing applicants: the San Diego Housing Commission, the Vancouver Housing Authority, and the Minneapolis Public Housing Authority (Cadik and Nogic, 2010).

In 2000, a second invitation to apply was issued to fill six open spots in the demonstration.[40] Most of the PHAs from the initial cohort were small- or medium-sized PHAs; however, the second round targeted applications from large PHAs with more than 2,500 units "that [were] undertaking or plan[ned] to undertake a substantial transformation of their public housing stock and management systems" (2000-52 [HA]).[41] This cohort was not scored based on the housing agency's performance.

Three MTW agencies left the original demonstration in late 2003 and early 2004—the Greene Metropolitan Housing Authority; the High Point Housing Authority, North Carolina; and the San Diego Housing Commission. In 2008, the San Diego Housing Commission returned to the demonstration. Also, in 2008, the Housing Authority of Baltimore City transitioned from the Jobs Plus demonstration to be a full MTW agency. Nine PHAs were selected during the three subsequent application periods—2009, 2010, and 2012—and all were required to be designated High Performing PHAs with no more than 5,000 units (Office of Public and Indian Housing [PIH] Notices 2009-29 (HA), 2010-29 (HA), PIH-2012-16).

In addition to the competitive selection process, PHAs could be named by Congress and invited to join the demonstration through an Appropriations Act. This occurred with seven PHAs: the Charlotte Housing Authority and the Housing Authority of the City of Pittsburgh in 1999; the Chicago Housing Authority in 2000; and the Alaska Housing Finance Corporation, Housing Authority of the County of San Bernardino, and Housing Authority of the County of Santa Clara/ Housing Authority of the City of San Jose in 2008.

When the demonstration began, each agency worked with HUD to create a unique MTW agreement that specified the tasks and activities that the agency planned to implement and the waivers from regulations and statutes that they needed to carry out those activities. As the demonstration progressed, however, HUD recognized the need for standardization and developed and executed the "MTW Standard Agreement"

[39] See HUD's "History of Moving to Work (MTW)" for more information: www.hud.gov/program_offices/public_indian_housing/programs/ph/mtw/history.

[40] The original MTW demonstration included 24 spots for MTW agencies and 6 spots for Jobs-Plus agencies. Five of the selected MTW agencies and one selected Jobs-Plus agency did not ultimately join the demonstration: Birmingham, Cherokee Nation, Los Angeles County, Stevens Point, Tampa, and the Utah Consortium. The five Jobs Plus agencies were Housing Authority of Baltimore City, Chattanooga, Cuyahoga, Dayton, and the City of Los Angeles. See HUD's "History of Moving to Work (MTW)" for more information: www.hud.gov/program_offices/public_indian_housing/programs/ph/mtw/history. For more information on HUD's Jobs-Plus initiative, see: https://www.hud.gov/program_offices/public_indian_housing/jpi.

[41] The six PHAs chosen in 2000 were Atlanta Housing Authority, District of Columbia, King County Housing Authority, Housing Authority of the City of New Haven, Oakland Housing Authority, and Philadelphia Housing Authority.

in 2008. Starting that year, any agency that joined the demonstration signed this agreement, which allows for waivers from a common set of rules and regulations. Amendments to the standard agreement may nevertheless vary across agencies, including the Community-Specific Attachment D amendments. A full list of MTW agencies, the dates in which they joined the demonstration, and the authorization information, appear in exhibit A1.

Exhibit A1: History of Moving to Work Agency Involvement

MTW Agency	Year Accepted	MTW Active Date	Date Terminated	Authorization Information
Alaska Housing Finance Corporation	2008	6/24/2008	-	Appropriations Act (2008)
Atlanta Housing Authority	2000	9/25/2003	-	PIH Notice 2000-52
Housing Authority of Baltimore City	2008	12/24/2008	-	Appropriations Act (1996)
Boulder Housing Partners	2010	11/10/2011	-	PIH Notice 2009-29
Cambridge Housing Authority	1996	4/9/1999	-	Appropriations Act (1996)
Housing Authority of Champaign County	2009	10/17/2010	-	PIH Notice 2009-29
Charlotte Housing Authority	1999	12/21/2007	-	Appropriation Act (1999)
Chicago Housing Authority	2000	2/6/2000	-	PIH Notice 2000-52
Housing Authority of Columbus, Georgia	2012	7/3/2013	-	PIH Notice 2012-16
Delaware State Housing Authority	1996	5/14/1999	-	Appropriations Act (1996)
District of Columbia Housing Authority	2000	7/25/2003	-	PIH Notice 2000-52
Fairfax County Redevelopment and Housing Authority	2012	11/7/2013	-	PIH Notice 2012-16
Greene Metropolitan Housing Authority	1996	3/3/1999	3/3/2004	Appropriations Act (1996)
High Point Housing Authority	1996	3/29/1999	3/29/2004	Appropriations Act (1996)
Holyoke Housing Authority	2012	9/6/2013	-	PIH Notice 2012-16
Keene Housing	1996	4/21/1999	-	Appropriations Act (1996)
King County Housing Authority	2000	9/8/2003	-	PIH Notice 2000-52
Lawrence-Douglas County Housing Authority	1996	3/30/1999	-	Appropriations Act (1996)
Lexington-Fayette Urban County Housing Authority	2010	11/10/2011	-	PIH Notice 2009-29
Lincoln Housing Authority	1996	5/21/1999	-	Appropriations Act (1996)
Louisville Metropolitan Housing Authority	1996	8/2/1999	-	Appropriations Act (1996)
Massachusetts Department of Housing and Community Development	1996	4/21/1999	-	Appropriations Act (1996)
Minneapolis Public Housing Authority	1996	8/27/1998	-	Appropriations Act (1996)
Housing Authority of the City of New Haven	2000	9/28/2001	-	PIH Notice 2000-52
Oakland Housing Authority	2000	3/31/2004	-	PIH Notice 2000-52
Orlando Housing Authority	2009	1/7/2011	-	PIH Notice 2009-29
Philadelphia Housing Authority	2000	2/14/2001	-	PIH Notice 2000-52
Housing Authority of the City of Pittsburgh	1999	11/17/2000	-	Appropriation Act (1999)
Portage Metropolitan Housing Authority	1996	3/15/1999	-	Appropriations Act (1996)
Home Forward (formerly Housing Authority of Portland)	1996	1/13/1999	-	Appropriations Act (1996)

(continued)

Exhibit A1: History of Moving to Work Agency Involvement *(continued)*

MTW Agency	Year Accepted	MTW Active Date	Date Terminated	Authorization Information
Reno Housing Authority	2012	6/27/2013	-	PIH Notice 2012-16
San Antonio Housing Authority	1996	8/25/1999	-	Appropriations Act (1996)
Housing Authority of the County of San Bernardino	2008	3/14/2008	-	Appropriations Act (2008)
San Diego Housing Commission	1996	12/8/1998; 1/14/2009	12/8/2003	Appropriations Act (1996); Appropriations Act (2008)
Housing Authority of the City of San Jose	2008	2/26/2008	-	Appropriations Act (2008)
Housing Authority of the County of San Mateo	1996	5/1/2000	-	Appropriations Act (1996)
Housing Authority of the County of Santa Clara	2008	2/26/2008	-	Appropriations Act (2008)
Seattle Housing Authority	1996	12/30/1998	-	Appropriations Act (1996)
Tacoma Housing Authority	2009	8/23/2010	-	PIH Notice 2009-29
Tulare County Housing Authority	1996	4/5/1999	-	Appropriations Act (1996)
Vancouver Housing Authority	1996	4/21/1999	-	Appropriations Act (1996)

MTW = Moving to Work. PIH = Office of Public and Indian Housing.

Notes: San Antonio Housing Authority originally implemented a small demonstration at one public housing site, and later expanded to the entire public housing agency. Housing Authority of Baltimore City was originally part of the Jobs Plus demonstration and transitioned to the MTW demonstration in 2008. San Diego completed their original demonstration in 2003 and rejoined in 2008.

Source: Documents retrieved from HUD's MTW portal (www.hud.gov/program_offices/public_indian_housing/programs/ph/mtw)

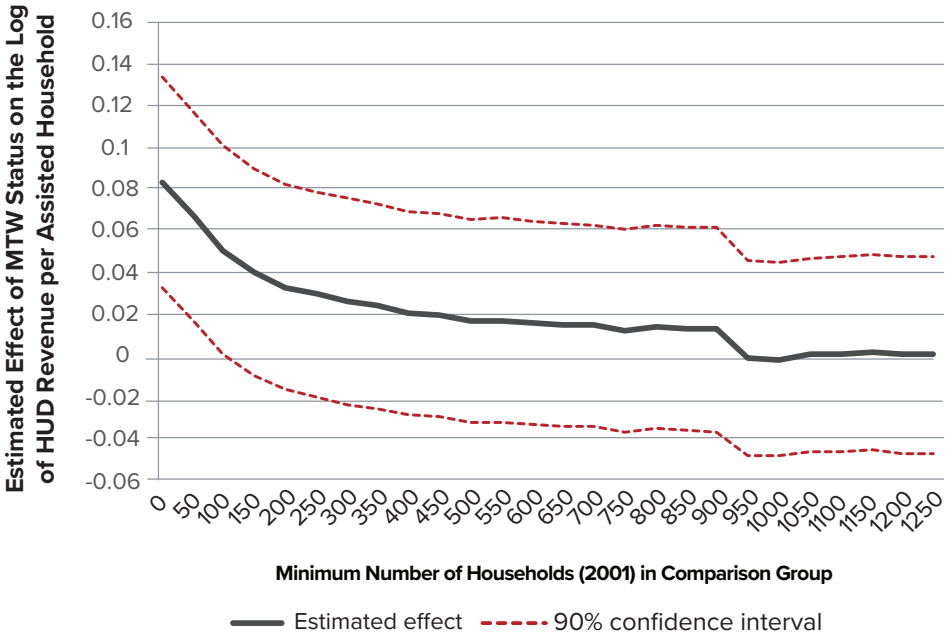
Appendix B: Additional Analyses

This section describes additional analyses that support or provide additional context to those included in the body of this report. We first describe the analysis used to understand the ramifications of choosing a size threshold for the comparison with traditional public housing agencies (PHAs). Next, we describe the analyses used to examine the robustness of our results. We then provide the full results of the event study analysis. Finally, we show how results would differ if we had used a repeated cross-section design that did not account for unobservable differences between PHAs.

Alternate Size Thresholds for Comparison Traditional Public Housing Agencies

To better understand how the population of traditional PHAs in our sample impacts our estimates, we performed a sensitivity analysis using alternative thresholds for the minimum number of assisted households that we required of PHAs in our comparison group. Specifically, we re-estimated equation 1 with progressively smaller samples of traditional PHAs, dropping agencies with fewer than *n* households in 2001 with *n* ranging from 0 to 1,000 in increments of 50. As soon as the smallest agencies were removed from the sample, the relationship between Moving to Work (MTW) status and cost per household became statistically insignificant at the α=0.1 level. The results of this analysis are shown in exhibits B1 and B2.

Exhibit B1: Sensitivity of Estimates to Alternative Comparison Groups



MTW = Moving to Work.

Notes: Standard errors are heteroskedastic robust and clustered at the public housing agency (PHA) level. The solid blue line represents the point estimate and the dotted lines on either side of this estimate represent the 90-percent confidence interval. Regressions exclude agencies that joined MTW before 2003. Comparison groups were determined using the number of assisted households in 2003. Impact analyses do not include Oakland Housing Authority, Tacoma Housing Authority, Housing Authority of the County of Santa Clara, or Housing Authority of the City of San Jose because of incomplete data on households in public housing. All regressions include year and PHA fixed effects. Median rent and government wages are included as control variables.

Sources: Urban Institute analysis of HUD Financial Data Schedule, and the Office of Public and Indian Housing Information Center datasets

Exhibit B2: Sensitivity of Estimates to Alternative Comparison Groups

Minimum Number of Households	Cost per Assisted Household		HUD Funding		Assisted Households		Observations
	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error	
No Minimum	**0.084*** **	**(0.031)**	**0.167*** **	**(0.026)**	**0.083*** **	**(0.027)**	**53,475**
50	0.068**	(0.031)	0.161***	(0.025)	0.093***	(0.027)	44,085
100	0.052*	(0.030)	0.153***	(0.025)	0.101***	(0.027)	36,705
150	0.041	(0.030)	0.145***	(0.025)	0.104***	(0.027)	31,260
200	0.034	(0.030)	0.139***	(0.025)	0.105***	(0.027)	27,690
250	0.031	(0.030)	0.135***	(0.025)	0.104***	(0.027)	24,810
300	0.027	(0.030)	0.131***	(0.026)	0.104***	(0.027)	22,350
350	0.025	(0.030)	0.128***	(0.025)	0.103***	(0.027)	20,325
400	0.022	(0.030)	0.126***	(0.025)	0.104***	(0.027)	18,435
450	0.021	(0.030)	0.122***	(0.025)	0.101***	(0.028)	17,070
500	0.018	(0.030)	0.117***	(0.025)	0.099***	(0.028)	15,840
550	0.018	(0.030)	0.113***	(0.025)	0.095***	(0.028)	14,445
600	0.017	(0.030)	0.111***	(0.025)	0.094***	(0.028)	13,350
650	0.016	(0.030)	0.109***	(0.024)	0.093***	(0.028)	12,495
700	0.016	(0.030)	0.108***	(0.024)	0.092***	(0.028)	11,715
750	**0.013**	**(0.030)**	**0.106*** **	**(0.024)**	**0.093*** **	**(0.028)**	**10,905**
800	0.015	(0.030)	0.107***	(0.024)	0.092***	(0.028)	10,380
850	0.015	(0.030)	0.106***	(0.024)	0.092***	(0.028)	9,780
900	0.013	(0.030)	0.105***	(0.024)	0.091***	(0.028)	9,360
950	0	(0.030)	0.096***	(0.024)	0.096***	(0.030)	8,865
1000	0	(0.030)	0.095***	(0.024)	0.095***	(0.030)	8,445

* p<0.10, ** p<0.05, *** p<0.01.

Notes: Standard errors (listed in parentheses) are heteroskedastic robust and clustered at the public housing agency (PHA) level. Regressions include only agencies with at least 750 households and exclude agencies that joined Moving to Work before 2003. Impact analyses do not include Oakland Housing Authority, Tacoma Housing Authority, Housing Authority of the County of Santa Clara, or Housing Authority of the City of San Jose because of incomplete data on households in public housing. Regression includes year and PHA fixed effects. Median rent and government wages are included as control variables and logged as well. Cost per assisted household, HUD funding, assisted households, area median rent, and government wages enter the regression in logged form.

Sources: Urban Institute analysis of HUD Financial Data Schedule, and the Office of Public and Indian Housing Information Center datasets

Robustness Checks

Using Propensity Score Matching

Because MTW PHAs were not chosen at random, any analysis is at risk of selection bias. This difficulty is because characteristics that make an agency more likely to become an MTW agency might be correlated with outcomes of interest, such as cost per household. In other words, PHAs that already are making changes to increase effectiveness may be the ones that choose to become MTW PHAs. If we compare MTW PHAs with traditional PHAs without correcting for this, the former may appear to be more cost-effective not because of MTW, but because those PHAs already were improving cost effectiveness.

The fixed-effects model controlled for the possibility that MTW PHAs systematically were more or less efficient than the average PHA prior to joining the demonstration. It did

not control for the possibility that some of the MTW PHAs are fundamentally different from the traditional PHAs, however, and would not have been expected to follow parallel trends in the absence of MTW flexibility. This issue could arise not only if there is selection bias, but also if some of the MTW PHAs (and traditional PHAs) simply do not have good comparisons in the other group.

We used propensity scores in two ways to ensure that the MTW and traditional PHAs used in our robustness checking statistical models were similar. The propensity score refers to the probability that a PHA is an MTW agency. First, we created a matched comparison group and, second, we trimmed the data to ensure common support. In both instances, we estimate the probability of MTW status using the Public Housing Assessment System (PHAS) public housing scores and demographic characteristics of the PHA service area. A full list of variables used to determine the propensity score appear in exhibit B3. We then assigned each agency a propensity score representing the estimated probability that the agency might have been an MTW agency. To create a matched dataset, we assigned each MTW PHA the five traditional PHAs with the closest propensity scores. We then limited the dataset to the MTW PHAs and each PHA's five "nearest neighbors." We allowed traditional PHAs to appear more than once if they are the nearest neighbor to more than one MTW PHA. To trim the dataset, we excluded PHAs from the analysis if they are MTW agencies with higher propensity scores than any traditional PHAs or are traditional PHAs with lower propensity scores than any MTW agency. Dropping these PHAs from the analysis limits the precision of estimates but better addresses the concern of selection bias.

Exhibit B3: Variables Used to Determine the Propensity Score

	Data Source	Definition/Notes
Housing Quality	SEMAP and PHAS	Average of FASS score and SEMAP scores 5, 6, 9, 11, and 12, weighted by assisted households in public housing and HCV
Average wage in the construction industry	BLS	Average across counties in the service area
Average wage of local government employees	BLS	Average across counties in the service area
Median income of service area	ACS	Population weighted based on residents in PIC
Median rent in service area	ACS	Population weighted based on residents in PIC
Poverty rate of service area	ACS	Population weighted based on residents in PIC
Percent of service area population over age 60	ACS	Population weighted based on residents in PIC
Population of service area	ACS	Average census tract population for census tracts served by the PHA (census tracts served defined by PIC data)
Population density of service area	ACS	Average census tract population density for census tracts served by the PHA
Rental vacancy rate of service area	ACS	Population weighted based on residents in PIC

ACS =American Community Survey. BLS = Bureau of Labor Statistics. FASS = Financial Assessment. HCV = Housing Choice Voucher. PHA = public housing agency. PHAS = Public Housing Assessment System. PIC = Office of Public and Indian Housing Information Center. SEMAP = Section Eight Management Assessment Program.

Estimating equation 1 using these two, alternative comparison group, reaffirms the results shown in exhibit 12. There is no statistically significant relationship between MTW status and cost per household (exhibit B4). MTW status is associated with an increase in HUD funding and the number of assisted households (exhibit B4). Increases in

funding and assisted households are around the same size, leaving cost per assisted household unaffected.

Exhibit B4: Robustness Check Results

	Cost per Assisted Household	HUD Funding	Assisted Households	Number of Observations
Pscore Matching	-0.001	0.100***	0.101***	1,800
	(0.031)	(0.024)	(0.030)	
Pscore Trimming	0.010	0.095***	0.085***	10,710
	(0.032)	(0.024)	(0.029)	
Multiple Imputation	0.021	0.106***	0.085***	10,965
	(0.031)	(0.024)	(0.029)	
Excluding LNT Households	0.041	0.106***	0.065**	10,905
	(0.027)	(0.024)	(0.026)	
Weighting LNT Households at 50%	0.026	0.106***	0.080***	10,905
	(0.028)	(0.024)	(0.026)	
PHA-Specific Time Trends	0.009	0.015	0.006	10,905
	(0.049)	(0.034)	(0.029)	
Excluding Controls for Median Rent and Government Wage	0.019	0.108***	0.090***	10,905
	(0.031)	(0.026)	(0.027)	
Excluding Observation of 2008 or Earlier	0.020	0.017	-0.003	6,543
	(0.051)	(0.053)	(0.026)	

* p<0.10, ** p<0.05, *** p<0.01.

LNT = local, non-traditional. PHA = public housing agency.

Notes: Standard errors (listed in parentheses) are heteroskedastic robust and clustered at the PHA level. Regressions include only agencies with at least 750 households and exclude agencies that joined Moving to Work before 2003. Impact analyses do not include Oakland Housing Authority, Tacoma Housing Authority, Housing Authority of the County of Santa Clara, or Housing Authority of the City of San Jose because of incomplete data on households in public housing. Regressions include year and PHA fixed effects. Median rent and government wages are included as control variables. Cost per assisted household, HUD funding, assisted households, area median rent, and government wages enter the regression in logged form.

Source: Urban Institute analysis

Multiple Imputation

The analysis described in this report used nearest-neighbor interpolation and extrapolation to address the issue of missing data. In the estimates displayed in exhibit 12, we take these imputed values as given. This assumption may lead to underestimates of standard errors, however, therefore overstating the precision of our results. As a robustness check, we use multiple imputation to re-estimate any results that are found to be statistically significant in the base model.

Multiple imputation iterates the imputation process to provide a more reliable estimate of a model's precision (Raghunathan et al., 2001).

Multiple imputation involves threes steps. First, where data are missing, multiple sets of potential values are imputed for each observation. Second, the analysis is repeated over each set of potential values. Third, the estimates are pooled to create a single estimate of coefficients and their standard errors. Because our estimates are based on panel data, we used chained equations

to impute missing values. We iterated our analysis, estimating each equation 10 times, then employed a two-stage estimator (von Hippel, 2018) to determine the minimum number of imputations needed for replicable estimates of standard errors. Following the estimator, we then iterated the analysis 48 times.

Estimating equation 1 using multiple imputation, also reaffirms the results shown in exhibit 12. There is no statistically significant relationship between MTW status and cost per household (exhibit B4). MTW status is associated with an increase in HUD funding and the number of assisted households (exhibit B4). Increases in funding and assisted households are around the same size, leaving cost per assisted household unaffected.

Weighting Counts of Local, Non-Traditional Housing

The data described in this report include families served through local, non-traditional (LNT) rental subsidies, LNT development programs, and LNT homeownership assistance. Because these activities are funded with MTW funds, excluding them from the analysis would make it appear that MTW PHAs used their HUD funding less efficiently. It is also important to consider, however, that LNT assistance may be shallower than traditional housing assistance. It is possible that MTW PHAs that engage in many LNT activities could appear more cost-effective, simply by providing a smaller subsidy or shorter-term housing assistance. By performing robustness checks with LNT households weighted at 50 percent and excluded entirely, we confirm that these issues do not affect our results. These robustness checks show that MTW status corresponds to an increase in the number of assisted households even before counting households assisted through LNT programs (exhibit B4). Moreover, our main finding, that there is no statistically significant impact on cost per household associated with MTW, holds even with LNT households excluded.

Public Housing Agency-Specific Time Trends

We relaxed the assumption of parallel trends for MTW and traditional PHAs and allowed each PHA its own specific, long-term, linear time trend. To do this we updated equation 1 as follows:

$$Outcome_{it} = \beta * MTW_{it} + \gamma * Controls_{it} + \lambda_t + (\alpha_i * (Year_t - 2000)) + \epsilon_{it} \qquad (1)$$

That is, we allowed each agency to follow a linear path through time and allow individual year effects to perturb this path. This allows each agency its own long-term trajectory and allows us to control for national economic and policy changes.

Estimates from the model with PHA-specific time trends reaffirm that MTW-status is not associated with cost per assisted household. The inclusion of PHA-specific time trends, however, reduces the estimated relationships between MTW status and both funding and the number of assisted households to near zero (exhibit B4).

Excluding Controls for Median Rent and Government Wage

To fully understand the relationship between MTW status and cost effectiveness we want to control for any differences between agencies that could affect both per household costs and MTW status. We do not want to control for factors that could affect per household costs, however, and are, themselves, affected by MTW status. Our approach was to use fixed effects to control for differences between agencies that do not change over time and also to control for changes in local rents and wages that change each year and affect

per household costs. These variables are appropriate controls under the assumption that PHAs do not have enough influence to affect the median price of rent in their service area or the average wage of a public-sector employee in their county. To ensure that the results in this report were not reliant on this assumption, we also estimated an alternative version of equation 1 without these two control variables.

The estimates from the model without these controls are very similar to those shown in exhibit 12. That is, they reaffirm the finding that MTW status is not associated with per household costs and the findings that MTW status is associated with an increase in both revenue from HUD and households assisted (exhibit B4).

Excluding Observation of 2008 or Earlier

Our analysis of the Office of Public and Indian Housing Information Center (PIC), the Voucher Management System (VMS), and the Financial Data Schedule (FDS) datasets, described in the data collection and assembly section, revealed many instances in which agencies did not report some household, voucher, or financial data which led to missing or bad observations in our analytic dataset. This was particularly an issue for data in PIC and FDS prior to 2009. We, therefore, repeated the analysis described in the body of this report using only data from 2009 onward.

Results of this analysis reaffirm that MTW-status is not associated with cost per assisted household. Using this shorter time period, however, reduces the estimated relationships between MTW status and both funding and the number of assisted households to near zero (exhibit B4).

Event Study

Exhibit B5 displays the coefficients for the event study described in the findings section of this report and displayed graphically in exhibits 13 and 14.

Exhibit B5: Event Study Results for RQ1 Using Public Housing Agencies With at Least 750 Assisted Households (2003) as a Comparison Group

	Cost per Assisted Households	HUD Funding	Assisted Households
2 Years Before	-0.007	0.016	0.023
	(0.037)	(0.035)	(0.020)
1 Year Before	0.031	0.088*	0.058**
	(0.040)	(0.050)	(0.026)
Year Joined MTW	0.039	0.130***	0.092***
	(0.044)	(0.049)	(0.033)
1 Year After	0.05	0.149***	0.099**
	(0.040)	(0.048)	(0.042)
2 Years After	0.021	0.121***	0.100**
	(0.043)	(0.023)	(0.047)
3 Years and More After	0.009	0.138***	0.130***
	(0.042)	(0.039)	(0.039)
Median Rent	0.292***	0.137**	-0.154***

(continued)

Exhibit B5: Event Study Results for RQ1 Using Public Housing Agencies With at Least 750 Assisted Households (2003) as a Comparison Group *(continued)*

	Cost per Assisted Households	HUD Funding	Assisted Households
	(0.072)	(0.060)	(0.048)
Government Wage	0.043*	0.02	-0.023
	(0.026)	(0.026)	(0.020)
Adjusted R-Squared	0.096	0.084	0.040

* p<0.10, ** p<0.05, *** p<0.01.

MTW = Moving to Work.

Notes: Standard errors (listed in parentheses) are heteroskedastic robust and clustered at the public housing agency (PHA) level. Regressions include only agencies with at least 750 households and exclude agencies that joined MTW before 2005 or after 2015, because they need to have 2 years of data prior to joining MTW and 3 years of data after joining enter this equation. Impact analyses do not include Oakland Housing Authority, Tacoma Housing Authority, Housing Authority of the County of Santa Clara, or Housing Authority of the City of San Jose because of incomplete data on households in public housing. All regressions include year and PHA fixed effects. Median rent and government wages are included as control variables. HUD cost per household, area median rent, and government wages enter the regression in logged form.

Sources: Urban Institute Analysis of HUD's Office of Public and Indian Housing Information Center, Financial Data Schedule, and Voucher Management System data

Repeated Cross Sectional Estimates

The fixed-effects model presented in this report accounts for pre-existing differences between MTW and traditional PHAs in both internal and external factors affecting the costs of providing housing assistance. This is a primary contribution of this study and differentiates it from the existing literature. This approach is not the only difference between this and prior studies, however. To better understand why the findings in this study differ from those in prior studies, we estimated the relationship between MTW status and cost per assisted household, HUD funding, and the number of assisted households in a repeated cross-section model without fixed effects. We estimate this cross-sectional model both with the sample described in the body of this report and with the propensity matched sample described earlier in this appendix.

These results show that, on average, after controlling for local rents and wages, the cost to HUD of providing rental assistance is 20 to 25 percent higher at MTW agencies than at comparison traditional PHAs (exhibit B6). The results align with prior research and highlight the importance of accounting for pre-existing, unobservable differences between MTW agencies and traditional PHAs.

Exhibit B6: Repeated Cross-Sectional Estimation

	Cost per Assisted Households	HUD Funding	Assisted Households	Number of Observations
Cross-Sectional Estimate (No Fixed Effects)	0.197***	1.498***	1.301***	10,905
	(0.067)	(0.224)	(0.177)	
Pscore Cross-Sectional	0.233***	1.381***	1.148***	1,800
	(0.066)	(0.024)	(0.021)	

* p<0.10, ** p<0.05, *** p<0.01

Notes: Standard errors (listed in parentheses) are heteroskedastic robust and clustered at the public housing agency level. Regressions include only on households in public housing. Median rent and government wages are included as control variables.

Cost per assisted household, HUD funding, assisted households, area median rent, and government wages enter the regression in logged form.

Source: Urban Institute analysis

Appendix C: Supplemental Exhibits

Exhibit C1: Data Sources

Source	Years	Geographic Level of Aggregation	Description
FDS	2000–2017*	PHA	Financial data for all PHAs
PIC	1995–2017	Household Level	Public housing household counts, characteristics of residents in HCV-assisted housing and public housing
VMS	2003–2017	Household Level	HCV household counts
Decennial Census/ACS	1990, 2000, 2010, 2011–2016**	Census Tract	Demographic and housing data
BLS	2000–2017	County (Wages)	Annual wages for employees in construction and local government
		National (CPI)	CPI-U
PHAS	1999–2016	PHA	Public Housing Quality Measures
LNT Household Counts	2009–2017	PHA	Number of households assisted through local, non-traditional rental subsidy, homeownership, and housing development programs aggregated by the MTW office from Form 50900

*FDS data was available through the 2016 fiscal year. We used weighted averages to adjust fiscal year data for 2001 to 2016 to calendar year data for 2003 to 2016. We used FY2017 as calendar year 2017.

**ACS data at the census tract level is only available until 2013 because these data come in the 5-year estimates and are most accurate for the middle year, for which 2011–2016 was the latest dataset available.

ACS = American Community Survey. BLS = Bureau of Labor Statistics. CPI = Consumer Price Index. CPI-U = CPI all urban consumers. FDS = Financial Data Schedule. HCV = Housing Choice Voucher. LNT = local, non-traditional. MTV = Moving to Work. PHA = public housing agency. PHAS = Public Housing Assessment System. PIC = Office of Public and Indian Housing Information Center. PIH = Office of Public and Indian Housing. VMS = Voucher Management System.

Exhibit C2: Variable Calculations From Financial Data Schedule Data

Variable Calculations	Form Item Number(s)	Form Item Description	Program IDs	
			(MTW)	(Traditional)
Funding Received from HUD	70600 70610	HUD PHA Operating Grants Capital Grants	14.OPS 14.CFP 14.HCV	14.850 14.872 14.871
Total Operating Expenditures	96900	Total Operating Expenses	14.OPS 14.850 14.871 14.872 14.881	14.850 14.871 14.872
HAP Expenditures	97300	Housing Assistance Payments	14.HCV 14.871 14.881	14.871
Administrative Costs	91000	Total Operating - Administrative	14.850 14.871	14.850 14.871
Tenant Services Spending	92500	Total Tenant Services	14.881 14.850 14.871 14.881	14.850 14.871
Operating Reserves security deposits net of allowance for doubtful accounts	111	Cash – unrestricted	14.OPS 14.CFP 14.HCV 14.850 14.871 14.872	14.850 14.871 14.872 14.850
	114	Cash – tenant security deposits		
	120	Total receivables, net of allowance for doubtful accounts		
	131	Investments - unrestricted		
	142	Prepaid expenses and other assets		
	144	Inter-program - due from		
	145	Assets held for sale		
	-310	Total current liabilities		
	343	Current portion of long-term debt - capital projects/mortgage revenue bonds		

MTW = Moving to Work. HAP = housing assistance payments.

Notes: Form Items refer to cost and revenue line-items listed in the Financial Data Schedule Line Definition Guide. Each cost or revenue line-item is associated with a specific program. 14.OPS is the public housing operations fund for MTW agencies; 14.CFP is the public housing capital fund for MTW agencies; 14.HCV is the HCV fund for MTW agencies; 14.850 is the code for public housing funds associated with specific developments, at MTW agencies and traditional PHAs; 14.872 is the public housing capital fund, associated with specific developments, at MTW agencies and traditional PHAs; 14.871 is the HCV fund at traditional PHAs and a fund specifically for the HCV program at MTW agencies; 14.881 is the MTW fund.

Source: Author Selections from Financial Assessment Subsystem – Public Housing; "Financial Data Schedule Line Definition Guide" Office of Public and Indian Housing, Real Estate Assessment Center: Washington, D.C.

Exhibit C3: Analysis of Assisted Households

Assisted Household Subgroup	Definition	Included When Calculating Number of Assisted Households?	Included When Calculating Characteristics?
New Households in Public Housing (PIC)	Households with action codes identifying them as "New Admission" or "Historical Adjustment" and program type is "Public Housing"	Yes, weighted by months following the effective date of the admission action	Yes, unweighted
Households Exiting from Public Housing (PIC)	Households with action codes identifying them as "End Participation" and program type is "Public Housing"	Yes, weighted by the number of months preceding the effective date of the exit action	No
Households in Public Housing (PIC)	Households with any action codes except those that signify a new or existing household that have the program type "Public Housing".	Yes, unweighted	No
New Households in Voucher Programs (PIC)	Households with action codes identifying them as "New Admission" or "Historical Adjustment" and program type is "Project Based Vouchers", "Tenant Based Vouchers", "Section 8 Certificates", "Home Ownership Vouchers", or "Section 8 Vouchers"	No	Yes, unweighted
Housing Choice Voucher Households (VMS)	Sum of the following VMS fields: "fldAOV", "fldLIT", "fldHOV", "fldPVP", "fldH6S8"V, "fldRad1", "fldRad2"0, "fldTenPro", and "fldThu2HcvLsd". For MTW PHAs also include "fldMTW".	Yes, unit months leased divide by 12	No
Number of Local, Non-Traditional Households	Unadjusted data from the MTW office	Yes	No

MTW = Moving to Work. PHA = public housing agency. PIC = Office of Public and Indian Housing Information Center. VMS = Voucher Management System.

Note: Household characteristics include rent burden, household size, income, and an indicator for high needs households.

Exhibit C4: Research Question and Regression Specifications

Research Question	Specification
1a. How does Moving to Work (MTW) status affect the average cost per assisted household?	1
1b. How does MTW status affect the amount of funding PHAs receive from HUD?	1
1c. How does MTW status affect the number of households receiving housing assistance?	1
2a. Do changes in the mix of public housing, tenant-based HCVs, and project-based HCVs in PHAs' portfolios explain the relationship between MTW status and cost per assisted household?	2
2b. Do changes in housing affordability and housing quality explain the relationship between MTW status and cost per assisted household?	2
2c. Do changes in the proportion of assisted households that may be costlier to serve explain the relationship between MTW status and cost per assisted household?	2
3a. How does MTW status affect per household spending of HUD funds?	1
3b. How does MTW status affect administrative costs, tenant services spending, and operating reserves?	1

HCVs = Housing Choice Vouchers. MTW = Moving to Work. PHA = public housing agency.

Exhibit C5: Number of Assisted Households, HUD Funding, HUD Cost per Assisted Household, Operating Reserves per Assisted Household, and Number of Local, Non-Traditional Units, by Moving to Work Agency (Agencies That Joined Moving to Work After 2003)

MTW PHA	Average Over Years Before or After Joining the Moving to Work Demonstration									
	Assisted Households		HUD Funding		HUD Cost per Assisted Household		Operating Reserves per Assisted Household		Local, Non-Traditional	
	Before	After	Before	After	Before	After	Before	After	Before	After
Alaska Housing Finance Corporation	5,859	6,926	$45,768,704	$48,778,172	$7,829	$7,120	$27	$250	0	165
Boulder Housing Partners (formerly Boulder Housing Authority)	938	973	$6,916,967	$8,746,265	$7,383	$9,020	$183	$1,039	0	2
Reno Housing Authority	3,386	3,157	$21,089,224	$19,053,016	$6,233	$6,042	$295	$271	0	0
Fairfax County Redevelopment & Housing Authority	4,217	4,466	$48,755,804	$55,649,592	$11,547	$12,465	$869	$929	0	0
Holyoke Housing Authority	1,910	2,253	$13,110,089	$14,631,226	$6,888	$6,496	$216	$481	0	0
Housing Authority of Baltimore City	19,513	25,517	$219,493,120	$287,322,752	$11,247	$11,264	$947	$2,140	0	102
Housing Authority of Champaign County	1,787	2,242	$16,447,823	$17,553,896	$9,103	$7,840	$792	$1,738	0	0
Lexington-Fayette Urban County Housing Authority	3,321	4,063	$21,658,528	$22,267,436	$6,531	$5,566	$302	$448	0	371
Housing Authority of the City of Charlotte	6,715	8,309	$58,935,520	$78,364,464	$8,799	$9,654	$786	$4,001	0	1,056

(continued)

Exhibit C5: Number of Assisted Households, HUD Funding, HUD Cost per Assisted Household, Operating Reserves per Assisted Household, and Number of Local, Non-Traditional Units, by Moving to Work Agency (Agencies That Joined Moving to Work After 2003)*(continued)*

MTW PHA	Average Over Years Before or After Joining the Moving to Work Demonstration									
	Assisted Households		HUD Funding		HUD Cost per Assisted Household		Operating Reserves per Assisted Household		Local, Non-Traditional	
	Before	After	Before	After	Before	After	Before	After	Before	After
Housing Authority of the City of Columbus	3,831	3,838	$24,018,726	$26,630,692	$6,271	$7,006	$70	$949	0	0
Housing Authority of the County of San Bernardino	10,310	9,860	$77,639,200	$87,146,208	$7,540	$8,869	$161	$709	0	0
Orlando Housing Authority	4,174	5,084	$31,832,704	$32,149,234	$7,624	$6,777	$283	$836	0	638
San Diego Housing Commission	14,494	15,635	$150,974,704	$163,972,448	$10,428	$10,489	$415	$1,159	0	285

MTW = Moving to Work. PHA = public housing agency.

Notes: Calculations are based on data from 2003 to 2017. This exhibit includes only MTW PHAs who joined the demonstration after 2003. Atlanta Housing Authority, District of Columbia Housing Authority, and King County Housing Authority joined MTW in 2003 and therefore do not have a full year of pre-MTW data. This exhibit does not include Oakland Housing Authority, Tacoma Housing Authority, Housing Authority of the County of Santa Clara, or Housing Authority of the City of San Jose because of incomplete data on households in public housing. This exhibit only includes the San Diego Housing Commission's second entrance into the MTW demonstration. See exhibit C6 for descriptives for PHAs who left the MTW demonstration after 2003.

Sources: Urban Institute analysis of HUD Office of Public and Indian Housing Information Center dataset; Urban Institute analysis of HUD Financial Data Schedule dataset

Exhibit C6: Number of Assisted Households, HUD Funding, HUD Cost per Assisted Household, Operating Reserves per Assisted Household, and Number of Local, Non-Traditional Units, by Moving to Work Agency (Agencies That Left Moving to Work After 2003)

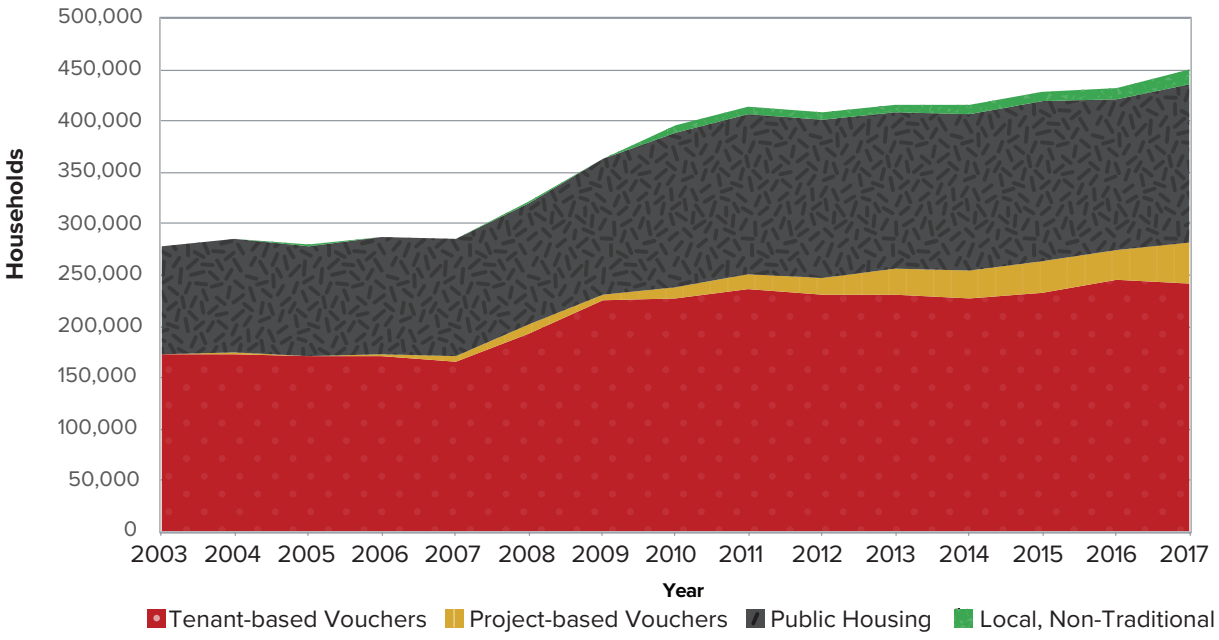
MTW PHA	Average Over Years Before or After Leaving the Moving to Work Demonstration									
	Assisted Households		HUD Funding		HUD Cost per Assisted Household		Operating Reserves per Assisted Household		Local, Non-Traditional	
	Before	After	Before	After	Before	After	Before	After	Before	After
Greene Metropolitan Housing Authority	1,851	1,924	$10,532,833	$9,730,697	$5,692	$5,068	$154	$232	0	0
High Point Housing Authority	2,444	2,531	$14,599,260	$14,737,273	$5,973	$5,837	$742	$282	0	0
San Diego Housing Commission	13,540	14,815	$144,973,984	$152,892,864	$10,707	$10,329	$248	$457	0	0

MTW = Moving to Work. PHA = public housing agency.

Notes: This exhibit only includes the three PHAs that exited the MTW demonstration between 2003 and 2015. The San Diego Housing Commission later re-entered the MTW demonstration, and the years after reentering the demonstration are excluded in the exhibit above.

Sources: Urban Institute analysis of HUD Office of Public and Indian Housing Information Center dataset; Urban Institute analysis of HUD Financial Data Schedule dataset

Exhibit C7: Households Assisted by Moving to Work Agencies, by Program, 2003 to 2017



Notes: The number of Moving to Work (MTW) public housing agencies increased from 25 in 2003 to 39 in 2017, driving the increase in the total number of households assisted by MTW agencies. Nearest neighbor interpolation was used to impute household counts for voucher and public housing assistance for years in which data in the Public and Indian Housing Information Center (PIC) or the Voucher Management System (VMS) were missing or under-reported assistance. Local, non-traditional (LNT) data, which were not adjusted, were available from 2009 to 2017.

Sources: Urban Institute analysis of HUD PIC dataset; HUD VMS dataset; HUD LNT data

Exhibit C8: Moving to Work Agency Characteristics Compared with All Traditional Public Housing Agencies and Traditional Public Housing Agencies with More Than 750 Assisted Households, 2003

	MTW Agencies Included in Analysis, 2003	Traditional PHAs, 2003	Traditional PHAs With More Than 750 Assisted Households, 2003
	N=18	N=3,547	N=707
Average Number of Assisted households	6,843	772***	3,020***
Average HUD Revenue	$69,376,573	$5,968,952***	$25,046,414***
Average Cost per Assisted Household	$8,824	$5,925***	$7,148***
Average % in Public Housing	36%	62%***	34%
Average % in Housing Choice Vouchers	64%	38%***	66%
Average % in Tenant Based Vouchers	64%	38%***	66%
Average % in Project Based Vouchers	0%	0%	0%
Average Family Size	2.6	2.2***	2.4
Average Share of "Hard to Serve" Households	38%	45%	40%
Average Total Operating and Housing Assistance Spending per Assisted Household	$6,639	$3,518***	$5,574
Average Tenant Services Expenditures per Household Served	$109	$63	$64*
Average Admin Expenses per Household Served	$1,337	$1,237	$985***
Average Reserves Balance per Household Served	$473	$307	$396
Average Population Density	5,999	2,237***	5,236
Average Median Rent Burden	28%	27%*	28%
Average Median Income of New Residents	14%	18%**	15%
Average PASS Score	25	27	26

* p<0.10, ** p<0.05, *** p<0.01

MTW = Moving to Work. PASS = Physical Assessment Subsystem. PHA = public housing agency.

Notes: Traditional PHAs include 3,547 PHAs that never joined the MTW demonstration. Large traditional PHAs include only traditional PHAs that had more than 750 assisted households in 2003. Analysis excludes agencies that joined MTW before 2003. Analysis also excludes Oakland Housing Authority, Tacoma Housing Authority, Housing Authority of the County of Santa Clara, or Housing Authority of the City of San Jose because of incomplete data on households in public housing. Not all of the PHAs are represented in the average median rent burden, average median income of new residents, and average Physical Assessment Subsystem, or PASS, score measures due to data availability. Dollar values are constant 2015 dollars adjusted using Bureau of Labor Statistics Consumer Price Index for all Urban Consumers. T-tests were performed on sample means, comparing traditional PHAs with MTW agencies. As in the regression analysis, T-tests were performed on the natural log of the following: number of assisted households, HUD revenue, cost per assisted household, total operating and housing assistance spending per assisted household, and administrative costs per assisted household.

Sources: Urban Institute analysis of HUD Public and Indian Housing Information Center dataset; HUD Financial Data Schedule dataset; U.S. Census Bureau data

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