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Moving to Opportunity: The Demonstration's Design and its Effects on Mobility

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Summary. Poverty concentration in urban neighbourhoods may have detrimental long-term effects on residents. The Moving to Opportunity (MTO) experiment in the US randomly assigned high-poverty public housing residents to a programme that subsidised occupancy in non-poor areas, permitting controlled analysis of neighbourhood impacts. In this paper, MTO data are used to answer the following questions. How much impact can a one-time intervention have on the subsequent residential experience of poor families from high-poverty neighbourhoods? It is found that the impacts on subsequent residential experience are statistically and practically significant. Are poor families who move to non-poor neighbourhoods significantly different from poor families who do not, in (usually) unmeasured characteristics? It is found that yes, they are. What difference does moving to a better neighbourhood make? There are large gains in safety, other improvements in neighbourhood quality and no loss in social ties.

Across the US, over 3.5 million poor people live in high-poverty neighbourhoods.[1] A growing literature suggests that such concentration may have detrimental effects on the residents of these areas, especially on children, in terms of both current well-being and future opportunities.[2]

Until recently, researchers could only attempt to infer such effects from observational studies. However, carefully conducted, analyses of observational data are likely to confuse the effects of neighbourhood with the effects of the characteristics of families who live in those two types of residential areas. Residents choose their neighbourhoods purposively, not randomly. These choices may reflect unmeasured characteristics that affect other outcomes as well. The Moving to Opportunity (MTO) demonstration, designed to support direct analysis of neighbourhood impacts by employing random assignment, provides the first opportunity to measure the effects of neighbourhood without these confounding factors.

In this paper we use data from the MTO demonstration to answer the following questions

(1) How much impact can a one-time policy intervention have in the subsequent residential experience of poor families from very high-poverty neighbourhoods? We find that the impact is significant in both statistical and practical terms.
(2) What difference does moving to a better neighbourhood make in the everyday life of poor families—in their sense of safety, their neighbourhood quality, their

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social ties? We find large gains in safety, other improvements in neighbourhood quality and no loss in social ties.

(3) In terms of characteristics not usually measured by social scientists, are poor families who move to non-poor neighbourhoods significantly different from poor families who do not? We find that they are.

This paper describes the MTO experiment and reports how low-income families used (or did not use) their MTO assistance to change the places in which they lived, both initially and over the course of the next 4–7 years. The paper both incorporates and builds on material from chapters 1–3 of Orr *et al.* (2003)[3] and from two papers by Shroder (2002a, 2002b). Our focus is entirely on mobility and on measurable attributes of residential neighbourhood that participation in the experiment changed. Discussion of changes to housing, health, education, income, delinquency and other risky behaviour we leave to other research.[4]

The paper proceeds as follows. We describe first the structure of the experiment, then the characteristics of families that moved and that did not, then how we use the experimental design to estimate programme impacts. We describe the sample, the mobility hypotheses to be tested and the actual mobility experience. Finally, we look at neighbourhood and safety as they are affected by the demonstration.

The Experiment

The Department of Housing and Urban Development (HUD) sponsored the MTO demonstration in five cities—Baltimore, Boston, Chicago, Los Angeles and New York—between 1994 and 1998. To be eligible for MTO, families had to have children under 18 and live in public housing developments or other project-based assisted housing in high-poverty areas (census tracts in which more than 40 per cent of the population were poor in 1990). The public housing authorities (PHAs) in each city targeted particular projects for recruitment and conducted outreach to all eligible households. Interested households were placed on the MTO waiting-lists of the local PHAs in the five demonstration sites. Roughly one-fourth of eligible families applied (Goering *et al.*, 1999, Table 5, p. 32). Eligible applicant families—4608 in all—were randomly assigned to one of three groups

—*The experimental group* received rental assistance vouchers that could be used only in census tracts with 1990 poverty rates below 10 per cent ('low poverty').[5] In each city, a non-profit organisation provided mobility counselling to families in this group to help locate and lease suitable housing in a low-poverty area within the time-limit (generally 90 days) for leasing-up.

—*The Section 8 group* received regular Section 8 vouchers, which could be used anywhere.[6] These families also had a time-limit and they did not receive any mobility counselling.

—*The control group* received no vouchers, but remained eligible for project-based assistance.

Families in the experimental group and the Section 8 group who did not utilise the demonstration vouchers were also eligible to continue to receive project-based assistance.

Using the Experimental Design to Estimate Neighbourhood Effects

For each treatment group, this paper gives impact estimates corresponding to two different questions

—What is the effect of the intervention on the average level of the outcome on the entire treatment group, including those who failed to lease-up with the MTO voucher?

—What is the effect of the MTO treatment on only those who leased-up?[7]

The first estimate, known as the 'intent to treat' (ITT) effect, measures the degree to which the intervention affected the average individual assigned to the experimental or

Section 8 group, including individuals in households that did not lease-up. Operationally, it is simply the coefficient on the dummy variable for treatment group in the regression model. Since treatment group is known to be random, the ITT has a causal interpretation. We may reasonably infer that assignment to treatment *caused* any observed significant difference in outcome.

The size of this ITT estimate will vary with the proportion of families who leased-up. The effect on only those who lease-up is known as the effect of the 'treatment on the treated' (TOT). Operationally, the TOT estimate is the quotient when the ITT estimate is divided by the proportion of lease-ups.[8] It requires the assumption that assignment to treatment had an average effect of zero in any observed outcome on households that did not lease-up. We consider this assumption realistic, as the Section 8 group received no assistance other than the voucher and the experimental group only received the voucher and short-term relocation-focused counselling.

All impacts are estimated relative to the control group members, who received no vouchers. ITT estimates indicate the programme's impact on the entire class to whom it is offered. The overall effectiveness of the intervention depends both on the proportion of families who use the voucher and its effects on those who do. Because the experimental group was constrained to use the vouchers only in low-poverty areas, a smaller proportion of these families leased-up than of the Section 8 group families. This lower success rate will offset the presumably greater effects of a lower-poverty environment on the members of the experimental group who did lease-up. TOT estimates indicate the effects of neighbourhood on family outcomes. They reflect the difference in outcomes between similar families in different residential environments.[9]

In both cases, effects are not measured relative to living in public housing, but relative to the outcomes of a set of families that *started out* living in public housing. Many control group families subsequently left public housing. Some even received vouchers through the regular Section 8 programme.[10] We are presenting estimates of the incremental effects of MTO vouchers relative to what treatment group families would have experienced, in the absence of the demonstration.

Sample Definition and Description

The sample used in the interim evaluation includes all 4248 families randomly assigned in the MTO demonstration through to 31 December 1997.[11] The allocation of this sample among the treatment groups, by site and overall, is shown in Table 1. The number of families in each site ranges from 636 families in Baltimore to 1081 in New York City.[12]

As with the MTO programme population as a whole, the racial composition of the interim evaluation sample (Table 2) is heavily African American. Two-thirds of the overall sample is African American and one-third is Hispanic. Baltimore and Chicago have almost entirely

Table 1. Allocation of the interim evaluation sample families by site and treatment group

	Experimental group	Section 8 group	Control group	Total
Baltimore	252	187	197	636
Boston	366	267	326	959
Chicago	460	202	232	894
Los Angeles	250	168	260	678
New York City	401	385	295	1081
All Sites	1729	1209	1310	4248

Source: MTO data system.
Sample: All families randomly assigned through to 31 December 1997.

Table 2. Demographic and socioeconomic characteristics of MTO families at baseline, by random assignment group

	Experimental group	Section 8 group	Control group	All groups
Race/ethnicity of head of household (percentages) [a]				
African American non-Hispanic	62.4	61.9	63.5	62.6
Hispanic	30.3	30.9	29.9	30.4
White non-Hispanic	3.1	2.7	2.6	2.9
American Indian non-Hispanic	0.5	0.3	0.3	0.4
Asian/Pacific Islander non-Hispanic	1.9	2.3	1.3	1.8
Other non-Hispanic	1.8	2.0	2.5	2.1
Sex of head of household (percentages)				
Male	8.5	8.7	8.0	8.4
Female	91.5	91.3	92.0	91.6
Head of household's marital status (percentages)				
Never married	61.7	61.8	63.2	62.2
Married	11.7	11.5	10.5	11.3
Divorced	9.7	9.4	9.3	9.5
Widowed or separated	16.9	17.3	17.0	17.1
Median number of children	3	3	3	3
Average total household income (*US$*)	9385	9189	9337	9314
AFDC as primary income source (*percentages*)	61.1	62.2	61.5	61.6
Head of household currently in school? (percentages)				
Yes	16.0	16.8	15.8	16.2
No	84.0	83.2	84.2	83.8
Head of household a graduate? (percentages)				
High school	42.2	40.6	38.5	40.6
GED	17.8	20.0	22.0	19.7
Neither	40.0	39.4	39.5	39.7
Head of household currently working? (percentages)				
Full-time	16.1	16.0	16.3	16.1
Part-time	12.8	11.1	10.3	11.6
Not working	71.1	72.6	73.4	72.2
Working for benefits	0.0	0.2	0.1	0.1

Notes: The respondent to the baseline survey was usually the same person as the sample adult for the interim evaluation. Household income was defined following the rules for Section 8 eligibility. Percentages may not add to 100 because of rounding. Data are weighted as described in Orr *et al.* (2003, Appendix B).

[a]Respondent self-reports. A number of African American respondents skipped the ethnicity question and are not included in the distribution reported. Many Hispanics used the 'other' category for the race question.

Source: MTO participant baseline survey.

Sample: Adults from families randomly assigned through to 31 December 1997.

African American samples while the other three sites have 40–50 per cent Hispanic families. Only Boston enrolled a significant number of non-Hispanic White families. Women headed most MTO households at baseline, although in Los Angeles some households had male heads and two parents present. The median number of children was three.

Families in the demonstration had average cash incomes of about $9300 when they entered the programme. About 60 per cent depended on Aid to Families with Dependent Children (AFDC) or Temporary Assistance

for Needy Families (TANF) as their primary income source. Approximately 70 per cent were not working at enrolment. About 40 per cent of the household heads had neither high school diploma nor GED, although about 16 per cent were then in school. In Table 2, the figures for each of the randomly assigned groups are very similar on all these characteristics. The random assignment process resulted in three groups with no differences greater than chance would produce.

A survey at baseline asked participants their motivations for joining a mobility programme. At least three-fourths of the respondents indicated that getting away from drugs and gangs was the most or second-most important reason. High rates of victimisation were reported on a range of crimes.[13] About half indicated they wanted to relocate to areas with better schools for their children, while nearly half the sample mentioned getting better housing as the first or second reason for wanting to move.

Data were collected from sample adults in each family between December 2001 and September 2002. An intensive effort involving more than 100 interviewers achieved high response rates for both adults and children.[14] When responses for the full sample are combined with the weighted responses for the sub-sample of hard-to-find households, the effective response rate for the interim evaluation was 90 per cent for the adults and 89 per cent for the children.

Hypotheses about Mobility and Neighbourhood in MTO

Initial hypotheses about mobility concerned what families would do after random assignment

—It was expected that the experimental group families would have some difficulty in finding units in low-poverty locations. Mobility counselling was provided to help meet those challenges.
—Section 8 group families were expected to succeed in using their vouchers at a higher rate than the experimental group families.
—Control group families were expected largely to remain in their project-based subsidised housing.

Among the hypotheses about later mobility were these

—After the minimum initial year required in their low-poverty locations, experimental group families might choose to move again. Now unconstrained as to location, their choices would be broader. Experience with safer neighbourhoods, better schools and other opportunities could lead these families to stay in lower-poverty neighbourhoods, even if they left their initial units. But they might 'regress to the mean'—move to higher-poverty neighbourhoods.
—Sample members in the Section 8 group would be expected to remain primarily in medium-poverty areas, based on earlier analyses.[15]
—Rent increases, unit conversions, building sales or other features of the private market could lead to greater subsequent mobility for both treatment groups than for controls.

For families in the voucher groups, subsequent moves could also result from changes in peoples' lives related to MTO, like employment and earnings. Moves by the control group are also of interest. All members of the control group volunteered for MTO, which means they were interested in moving out. Even without MTO, changes in income, family composition or other personal factors might lead them to leave public housing on their own and control group families might have received vouchers outside the demonstration.

Since the mid 1990s, changes to public housing, especially the HOPE VI programme demolitions, have brought more mobility to public housing residents than would have been observed at an earlier period. Some private project-based developments have also undergone change, notably conversion to vouchers.[16] We report the mobility impacts of MTO above and beyond the experience of control group members.

Hypotheses about Neighbourhood Conditions and Safety in MTO

Moves to low-poverty areas would be expected to change many other aspects of the neighbourhood environment, not just the proportion of the residents living in poverty. Neighbourhoods should be better-maintained and safer. Physical decay, social disorder and the sense of danger characteristic of high-poverty urban areas should be absent. Those living in low-poverty areas should not need to be alert for gunfire, concerned about the hazards posed by abandoned buildings or empty lots, or worried about getting children safely home from school. These kinds of changes in neighbourhood were hypothesised to be the source of immediate improvements in the lives of the experimental group families.

Data Sources and Measures

Data on Mobility

HUD tracked all the randomly assigned families from the point of enrolment in the demonstration, in order to ensure that mid-term and long-term outcomes could be measured across all three groups. The tracking efforts drew on public and private automated databases,[17] periodic mailings to the families at last known addresses and two brief surveys (canvasses) conducted in 1997 and 2000.

From these sources and the interim evaluation household survey, we assembled longitudinal information about the mobility history of each sample member, including the sequence of all residential moves from the point of random assignment to the time of the interim data collection, the location of each confirmed dwelling in the chain of moves and the duration of stay in each confirmed dwelling. We used Census data from 1990 and 2000 to characterise the surrounding neighbourhood for each dwelling in the chain of moves. The key measures of residential mobility outcomes included neighbourhood characteristics of each location, according to the Census; adult respondent's interaction with the community; adult respondent's assessment of the neighbourhood; adult respondent's reasons for leaving/staying in the community, including landlord willingness to continue leasing the unit to the respondent.

Data on Neighbourhood Conditions and Safety

The mobility data are the source of information on where the adult sample members were living in 2002. As with earlier addresses, we linked 'current' addresses to Census data about the characteristics of the neighbourhoods (census tracts).

Two other sources of data are available on neighbourhood conditions and safety for the MTO interim evaluation. Adult sample members were surveyed about current conditions, including some items directly comparable with baseline measures. In addition, standardised observational data on housing units and neighbourhoods were recorded by field interviewers who visited the sample members during 2002.

Baseline Conditions and Initial Lease-ups

MTO recruited families from public and assisted housing from among the poorest census tracts of five central cities. The 1990 and 2000 Census data characterise the families' locations at the time they joined MTO. On average, more than half the populations in these tracts were living in poverty. A single, female parent headed nearly three-fourths of the families in these tracts. More than 30 per cent of all residents were high school dropouts. Unemployment was over 25 per cent and labour force participation was low for both men (55 per cent) and women (38 per cent). More than 40 per cent of the families had no member working.

Those who joined MTO reported very high levels of dissatisfaction with their neighbourhoods. Drug and gang activity and high rates of crime victimisation were powerful motivators.

Lease-up Rates

All families randomly assigned in MTO to the experimental group and the Section 8 group

were offered housing vouchers, but not all used them.[18] As shown in Figure 1, some 47 per cent of the families assigned to the experimental group in the interim evaluation sample moved under the programme, while 62 per cent of the families assigned to the Section 8 group participated. The sample thus contains 1566 programme movers out of 4248 families.[19]

Lease-up rates ranged from 47 to 79 per cent for the Section 8 group across the 5 sites, due to housing market differences and other factors. Lease-up rates for the experimental group (ranging from 33 to 67 per cent) were also affected by differences in the counselling provided through MTO. The non-profit counselling organisations varied in the breadth and intensity of their services, in the extent to which they included non-housing as well as housing-related assistance and in the degree to which they acted as advocates for their clients.[20]

Two prior research efforts examined the factors affecting lease-ups in the MTO programme (Feins *et al.*, 1997; Shroder, 2002a). Some findings from the latter research were summarised above in the discussion of Tables 1 and 2. Both papers report that the vacancy rate in the housing market and the practices of the counselling agencies influenced the lease-up rates and that demographic characteristics (size and composition of household, ethnicity of the head) also influenced the initial lease-up.

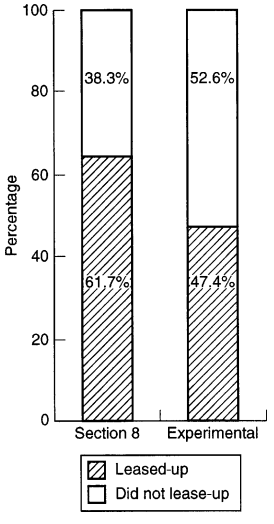

Figure 1. MTO programme lease-up rates, by group. *Note*: Weighted data. *Source*: MTO tracking logs.

MTO Lease-up Data Confirm the Selection Bias Problem

Nearly the entire literature on neighbourhood effects is subject to severe criticism on methodological grounds, because mobility is not random. Consider the extreme case of mobility between countries. The typical immigrant from a developing country to the US is not an average resident of the home country; therefore, the differences in outcomes that immigrants experience relative to those who remain behind are only partially attributable to differences in environment. In the same way, it has long been thought (see, for example, Evans *et al.*, 1992) that self-selection into neighbourhoods results in biased estimates of neighbourhood effects.

We can confirm this suspicion from the MTO experiment. Although vouchers to subsidise rents in private housing were offered to 2938 households in the MTO and Section 8 groups, for various reasons a little over half of the experimental group families and over a third of the Section 8 households did not use them—that is, they failed to 'lease-up'.[21]

The initial lease-up patterns from the MTO experiment strongly confirm that self-selection plays a large role in mobility, at least in the short run; variables not usually observable to analysts significantly influence such mobility and these variables may plausibly be correlated with important outcome variables. Table 3 shows the logit coefficients for the effect of selected baseline demographic and attitudinal variables, and rental market characteristics, on the probability of lease-up in the different treatment groups. Table 4 gives the logit coefficients when the two treatment groups (the experimental and Section 8 groups) are combined.[22]

Attitudinal variables had striking effects on mobility. 'Uncertainty' about finding an

Table 3. Effect of demographic and attitudinal variables on the probability of lease-up, by Treatment Group (logistic regression: dependent variable = 1 if family leases-up)

	Experimental group ($n = 1740$)		Section 8 group ($n = 1308$)	
	Coefficient	Std error	Coefficient	Std error
Probability of acceptance indicators				
Metro area vacancy rate	0.247***	0.073	0.533***	0.103
Size of household	−0.258***	0.082	−0.245***	0.091
Number of school-age children	0.108	0.081	0.148	0.101
Number of pre-school children	0.084	0.095	0.423***	0.109
Uncertainty about finding an apartment	−0.056	0.058	−0.153**	0.071
Hispanic head	−0.387***	0.143	−0.214	0.160
Net benefit indicators				
Uncertainty about liking a new neighbourhood	−0.194***	0.062	−0.121	0.077
Belongs to a church within 15 minutes of origin project	−0.045	0.117	−0.438***	0.136
Has many friends in neighbourhood	−0.066	0.162	−0.405**	0.203
Comfort with children in nearly all-White school	0.243**	0.113	0.120	0.137
Dissatisfaction with neighborhood	0.176***	0.066	0.184**	0.080
Feel very good about moving	0.140	0.145	0.465***	0.175
Preferred distance from origin	0.181***	0.061	−0.153**	0.074
Housing condition	0.091	0.074	0.209**	0.092
Head attended school last week	0.407**	0.180	0.219	0.221
Previously applied (Boston only)	0.657***	0.224	0.607**	0.273
Cost indicators				
Hourly wage	0.013	0.026	−0.015	0.028
Weekly hours of work	−0.008	0.006	0.001	0.007
SSI/SSDI/SS Survivor benefits	−0.322**	0.132	−0.304*	0.160
Car or licence	0.161**	0.075	0.082	0.091
Years in metro area	−0.011**	0.005	−0.013**	0.006
Intensity of counselling services	0.030**	0.012		
Controls				
Baltimore	−0.504*	0.265	−0.282	0.301
Boston	−0.162	0.236	−0.227	0.245
Chicago	−0.818**	0.350	−0.749**	0.357
Los Angeles	−0.429	0.296	0.040	0.316
Constant	−1.629**	0.646	−2.268***	0.675

Note: Reference groups: New York experimental group and New York Section 8 group.
***indicates significant at the 1 per cent level; **indicates significant at the 5 per cent level; *indicates significant at the 10 per cent level.

apartment and liking a new neighbourhood are negatively related to lease-up. 'Feeling good' about moving and 'dissatisfaction' with current neighbourhood are positively correlated with success. Positive social ties (church membership) to current neighbourhood are predictive of failure to lease-up, as is discomfort with sending one's child to a majority-White school.

It is hardly likely that other social and economic outcomes are unrelated to ambivalence, ambition, connections and risk aversion; yet

Table 4. Effect of demographic and attitudinal variables on the probability of lease-up, two treatment groups combined (logistic regression: dependent variable = 1 if family leases-up)

	Combined sample (experimental and Section 8 groups) ($N = 3048$)	
	Coefficient	Std error
Probability of acceptance indicators		
Metro area vacancy rate	0.305***	0.057
Size of household	−0.250***	0.060
Number of school-age children	0.127*	0.067
Number of pre-school children	0.228***	0.070
Uncertainty about finding an apartment	−0.082*	0.044
Hispanic head	−0.270***	0.105
Uncertainty about liking a new neighbourhood	−0.167***	0.047
Belongs to a church within 15 minutes of origin project	−0.227***	0.087
Has many friends in neighbourhood	−0.201	0.124
Comfort with children in nearly all-White school	0.189**	0.086
Net benefit indicators		
Housing condition	0.121**	0.056
Dissatisfaction with neighbourhood	0.176***	0.050
Preferred distance from origin	0.042	0.364
Feel very good about moving	0.268**	0.110
Head attended school last week	0.346**	0.137
Previously applied (Boston only)	0.606***	0.171
Cost indicators		
Hourly wage	0.006	0.019
Weekly hours of work	−0.004	0.004
SSI/SSDI/SS Survivor benefits	−0.283***	0.100
Car or licence	0.135**	0.057
Years in metro area	−0.011***	0.004
Assigned to MTO	−10.302***	0.251
Intensity of counselling services	0.025***	0.008
Controls		
Baltimore	−0.260	0.193
Boston	−0.178	0.161
Chicago	−0.707***	0.228
Los Angeles	−0.069	0.206
Constant	−0.756*	0.052

Note: Reference groups: New York Section 8 group.
***indicates significant at the 1 per cent level; **indicates significant at the 5 per cent level; *indicates significant at the 10 per cent level.

mobility is plainly related to all of them. In quantitative observational data, an analyst is unlikely to have measures of these characteristics or other influential attitudinal factors available as controls. However, the random assignment of a household in this experiment to one of the three groups is essentially uncorrelated with the background characteristics. Accordingly, MTO offers a unique research platform for unbiased measurement of neighbourhood effects.

Sample Mobility in the Follow-up Period

In the 4–7 years after random assignment, the interim evaluation sample was quite mobile.[23] Table 5 divides the adult sample members into those who leased-up (moved from their

Table 5. Geographical mobility in the interim evaluation adult sample by treatment group (percentages)

	Experimental group	Section 8 group	Control group	Total
Leased-up	47.4	61.7	N/A	36.9
Did not lease-up				
Moved	35.0	22.7	69.6	42.2
Stayed	17.5	15.7	30.4	21.0
All adults	100	100	100	100

Notes: Data are weighted as described in Appendix B of Orr *et al.* (2003). Numbers may not sum to 100 due to rounding. Mobility patterns in this table are for the full period since random assignment.
Source: MTO data system, adult survey.
Sample: Adults from families randomly assigned through to 31 December 1997.

baseline locations with the vouchers MTO provided) and those who did not lease-up. The latter group is further divided between those who moved subsequently (left their baseline homes without help from MTO) and those who stayed at their baseline locations through 2002.

Just 30 per cent of families assigned to the control group were still at their baseline addresses in 2002. The high percentages of movers in the control group (69.6 per cent) and among the experimental and Section 8 group families who did not move with the MTO vouchers (35 per cent and 22.7 per cent respectively) result in part from federal and local efforts to deal with distressed public housing. These efforts included the HOPE VI programme, vacancy consolidation (demolition) efforts and local comprehensive modernisation projects. At baseline, 22 per cent of sample control group members lived in developments that were scheduled for action by these programmes during the period in which the MTO programme was recruiting and enroling families. In short, some families in all three groups who did not lease-up through MTO but did move subsequently were required to move by the housing authorities.[24]

Some 16–17 per cent of the experimental and Section 8 groups were still in baseline locations at the 2002 follow-up. Total mobility rates for these two groups were thus roughly equal. Initial lease-up for the Section 8 group was larger than the initial lease-up rate for the experimental group, but a larger proportion of the experimental group subsequently moved on their own.

Programme Moves: Experimental Group

Members of the experimental group who leased-up through MTO found the initial moves to low-poverty areas both satisfying and challenging. Respondents in the qualitative study frequently described the improvement in safety as the most important aspect of their moves (Popkin *et al.*, 2001). However, some households experienced a loss of access to convenient transport, free recreational activities, health care, shopping and church that those in more central locations enjoyed. MTO families moved from large public housing developments to single-family homes, duplexes, townhouses and apartment complexes. Experimental group movers were more likely than Section 8 movers to live in single-family homes or townhouses (Popkin *et al.*, 2001). Most experimental group respondents in the qualitative sample rented from small landlords rather than large management companies.

Table 6 shows the poverty rate of the neighbourhoods to which experimental group families moved with their MTO vouchers. In the first panel, we see the poverty rates measured in 1990 Census data—the same data used to identify low-poverty areas when the demonstration was operating. The first panel shows that there was substantial

Table 6. Neighbourhood poverty rate at time of first lease-up

	LT (percentages)						
Programme movers	10%	10–15%	15–20%	20–30%	30–40%	40% +	Mean
Poverty rate in 1990 Census							
Experimental group ($n = 813$)	89.0	7.6	1.4	1.4	0.5	0.2	7.5
Section 8 group ($n = 735$)	10.7	12.9	14.1	24.1	21.1	17.2	26.9
Poverty rate in 2000 Census							
Experimental group ($n = 815$)	38.9	33.2	17.9	8.8	0.5	0.6	12.4
Section 8 Group ($n = 737$)	5.9	7.6	15.0	28.8	24.0	18.7	28.4
Estimated poverty rate at time of move [a]							
Experimental group ($n = 813$)	50.7	33.8	12.2	2.3	0.6	0.4	10.8
Section 8 group ($n = 735$)	6.9	7.9	14.9	29.3	21.2	19.9	27.8

Notes: Data are weighted as described in Appendix B of Orr *et al.* (2003).

[a]Estimates were made using a simple linear interpolation over the decade between the 1990 census and 2000 census. For example, if the 1990 poverty rate in the destination census tract was 8 per cent but in the 2000 census it was 12 per cent, over the decade the rate was assumed to change by 0.4 per cent per year. For a lease-up in 1995 in this tract, the estimated poverty rate at that time would be about 10 per cent. (The formula used the actual date of the programme move and estimated the poverty rate based on days elapsed from 1 April 1990.)

Source: MTO data system; 1990 and 2000 census-tract-level data.

Sample: Adults from families randomly assigned through to 31 December 1997.

compliance with the locational constraint, with 89 per cent of the experimental group making programme moves to areas with less than 10 per cent poverty and 94 per cent moving to areas with less than 11 per cent poverty.[25]

Census 2000 data, however, indicate a rather different pattern. The second panel of Table 6 shows the poverty rates for the same locations as the first panel, but with poverty measured in April 2000 rather than April 1990. These figures are quite different from the previous ones. They show that only about 40 per cent of the experimental group's programme move locations were still low-poverty areas in 2000, although 90 per cent were still in areas of less than 20 per cent poverty.

We used the 1990 and 2000 poverty rates to estimate the actual poverty rates in the census tracts at the time the experimental families leased-up. These estimates are shown in the third panel of Table 6. These estimates are linear interpolations from the change in poverty rates over the decade. Just half of the moves were to areas estimated as really having had poverty rates below 10 per cent at the time of the move and another third were to areas of 10–15 per cent poverty at the time. All told, 97 per cent were to areas with less than 20 per cent poverty.

The 1990s saw a reduction in the proportion of poor people living in high-poverty census tracts in many US cities (Jargowsky, 2003; Kingsley and Pettit, 2003). However, balancing the 5 per cent reduction in the concentrated poverty tracts were increases of 5 per cent in the tracts with 10–30 per cent poverty rates (Kingsley and Pettit, 2003, p. 3). Most salient to MTO, the share of the metropolitan poor living in census tracts with poverty rates of 10–20 per cent increased by 2 percentage points over the decade.

In Table 7, we categorise the neighbourhoods to which experimental group families

Table 7. Changing neighbourhood at time of first lease-up? (percentages)

Programme movers	Decreasing poverty rate, 1990–2000	Stable poverty rate, 1990–2000	Increasing poverty rate, 1990–2000	Total
Experimental group ($n = 813$)	1.2	54.3	44.6	100
Section 8 group ($n = 735$)	18.0	46.3	35.7	100

Notes: Data are weighted as described in Appendix B of Orr *et al.* (2003). Stable poverty rates are defined as tract-level poverty rates changing less than 5 per cent in either direction between 1990 and 2000. Decreasing poverty rates are tract-level rates that fell 5 or more percentage points in the decade, while increasing poverty rates are tract-level rates that rose 5 or more percentage points in the decade.
Sources: MTO data system; 1990 and 2000 census-tract-level data.
Sample: Adults from families randomly assigned through to 31 December 1997.

actually moved by the changes in poverty rates during the decade from 1990 to 2000. We have broken the distribution into three categories—decreasing poverty rates, stable poverty rates and increasing poverty rates. Stable areas are defined as census tracts with changes of no more than 5 percentage points in either direction during the decade.

Just under half had increasing poverty rates through the 1990s, probably because experimental group families found it easier to rent units in neighbourhoods experiencing some reduced demand for their rental stock. Landlords in these tracts might be more willing to rent to families on Section 8 or families from public housing than they would have been otherwise.[26]

The dynamics of neighbourhood change differed among the five MTO sites. In Boston and Chicago, about 30 per cent of the experimental group programme movers chose neighbourhoods with increasing poverty, as did 41 per cent of their counterparts in Baltimore and just over half the Los Angeles experimental group lease-ups.[27] The site with the highest proportion (60 per cent) leasing-up in tracts with rising poverty was New York. By the time of the 2000 Census, only one-third of the lease-up locations in New York had poverty rates under 10 per cent.[28]

Programme Moves: Section 8 Group

Most of the 60 per cent of Section 8 group adults who moved with the MTO voucher leased-up in areas with poverty rates of 20 per cent or more. Indeed, almost one-fifth of them leased-up in concentrated poverty areas (40 per cent plus). Only a small share of the Section 8 group (about 10 per cent) leased in census tracts with poverty rates below 10 per cent. Table 7 shows that almost 20 per cent of the families moved to neighbourhoods characterised by decreases in poverty after 1990 and about 45 per cent moved to areas with stable poverty rates. As the areas chosen had much higher initial poverty rates, this does not mean that the Section 8 group chose more promising communities.

Control Group Mobility

We now turn to the mobility of the sample members after random assignment. The experience of the control group serves as our benchmark. The control group families started out in high-poverty census tracts (40 per cent or more persons living in poverty according to the 1990 census).[29] Table 8 shows that, by 2002, only 48 per cent of the control group lived in concentrated poverty areas. This decline is largely due to movement by controls; two-thirds moved between random assignment and 2002. Of the control movers, in 2002 66 per cent lived in areas with somewhat lower poverty rates than at baseline and 24 per cent lived in areas with less than 20 per cent poverty. Note in Table 8 the similarity in patterns for the stayers in all three groups and for the non-programme movers in all three groups.[30]

Table 8. Census 2000 poverty rate of current residential location (percentage distributions, weighted data)

	Under 10	10–15	15–20	20–30	30–40	40 +	Mean
Control group							
Stayed in place ($n = 343$)	0	0	0	3.4	17.2	79.4	51.1%
Moved ($n = 793$)	5.4	8.1	10.0	20.0	22.7	33.8	33.6%
Total control group ($n = 1136$)	3.8	5.7	7.0	15.0	21.1	47.6	38.9%
Experimental group							
Did not lease-up	2.7	4.3	6.5	13.1	26.4	47.0	39.6%
Stayed ($n = 267$)	0	0	0	3.1	24.7	72.1	49.1%
Moved ($n = 518$)	4.1	6.5	9.8	18.3	27.3	34.1	34.6%
Leased-up	25.3	19.1	15.7	18.5	11.7	9.7	20.0%
Did not move again ($n = 245$)	38.4	33.1	14.4	12.9	0.6	0.6	12.6%
Moved again ($n = 456$)	18.2	11.6	16.4	21.5	17.7	14.6	24.0%
Total experimental group ($n = 1485$)	13.3	11.3	10.8	15.7	19.5	29.4	30.4%
Section 8 group							
Did not lease-up	2.8	7.2	6.3	11.6	23.7	48.4	38.3%
Stayed ($n = 166$)	0	0	0	3.1	26.3	70.6	46.8%
Moved ($n = 242$)	4.7	12.1	10.6	17.5	21.9	33.2	32.5%
Leased-up	6.4	9.2	15.0	26.3	23.2	20.0	28.6%
Did not move again ($n = 215$)	5.1	6.5	15.6	27.5	22.6	22.8	29.1%
Moved again ($n = 426$)	7.0	10.6	14.6	25.7	23.5	18.6	28.4%
Total Section 8 group ($n = 1050$)	5.0	8.4	11.6	20.6	23.4	31.1	32.4%

Notes: Data are weighted as described in Appendix B of Orr *et al.* (2003). Measured at the census-tract level.
Source: MTO data system.
Sample: Adults from families randomly assigned through to 31 December 1997.

Stayers in the control group were still concentrated in high-poverty neighbourhoods in 2002, but 40 per cent of them were in census tracts that had decreased in poverty over the previous decade. The same was true for a smaller share of the control group movers (26 per cent). Overall, 44 per cent of the control group adults were living in areas with stable poverty rates from 1990 to 2000.

Subsequent Moves

MTO demonstration rules required that *experimental group* families sign 1-year leases for the units they rented with programme vouchers. After that year, the families could stay or move as they wished within the rules of the Section 8 programme. In 2002, about one-third of the experimental group programme movers remained in the same census tract as their initial move, although perhaps not at the same address.

Among the two-thirds who moved again after the first lease-up, there was a tendency to move to somewhat higher poverty neighbourhoods. The main reasons they moved again were leasing problems (22 per cent), conflicts with their landlords (20 per cent) and desiring a bigger or better apartment (18 per cent). 'Leasing problems' included an owner's refusal to renew the lease, or a PHA's refusal to approve the unit as

satisfactory under the minimum standards of the voucher programme. Safety was a small but not insignificant reason (9 per cent) for second moves.

Two-thirds of the families that leased-up in the *Section 8 group* were living in different locations by the time of the interim evaluation. The survey data indicate that programme movers' motivations for leaving their initial homes differed somewhat between the experimental and Section 8 groups. For the Section 8 group, safety issues (23 per cent) and building issues (13 per cent) figured prominently, while landlord problems did not.[31]

Geographical Mobility and Neighbourhood Racial Composition

MTO did not address issues of racial or ethnic concentration directly, but it has roots in court-ordered racial desegregation programmes in public housing. The origin public housing developments of the participants were all highly concentrated in racial and ethnic terms as well as in poverty.

Table 9 summarises the racial and ethnic make-up of the census tracts where the sample lived in 2002. The measure combines racial minorities with Hispanic ethnicity into total percentage minority population. In 2002, the vast majority of sample members (87 per cent) lived in areas of extremely high minority concentration (80 per cent or more). Only a handful of the adults (2 per cent) lived in areas with less than 20 per cent minority population and just 8 per cent lived in areas with less than 40 per cent minority population. The pattern appeared to differ only slightly by random assignment group. About 10 per cent of the experimental group and 6 per cent for the Section 8 group lived in areas with less than 40 per cent minority population. Thus, sample members

Table 9. Census 2000 percentage minority of current residential location (percentage distributions)

	Under 20	20–40	40–60	60–80	Over 80	Mean
Control group						
Stayed in place ($n = 343$)	0	2.4	3.1	5.2	89.3	93.8%
Moved ($n = 793$)	2.6	5.3	6.5	10.1	75.4	85.3%
Total ($n = 1136$)	1.8	4.4	5.5	8.7	79.6	87.8%
Experimental group						
Did not lease-up	1.5	3.0	4.7	6.0	84.9	90.2%
Stayed ($n = 267$)	0	1.1	4.2	2.5	92.2	94.2%
Moved ($n = 518$)	2.3	3.9	5.0	7.8	81.1	88.1%
Leased-up	5.7	10.5	10.9	13.5	59.4	75.4%
Did not move again ($n = 245$)	7.5	17.0	11.0	19.3	45.2	68.0%
Moved again ($n = 456$)	4.7	7.1	10.8	10.3	67.1	79.4%
Total ($n = 1486$)	3.5	6.5	7.6	9.5	72.9	83.2%
Section 8 group						
Did not lease-up	2.4	5.4	6.1	7.4	78.7	86.7%
Stayed ($n = 166$)	0	2.7	8.6	2.7	85.9	91.4%
Moved ($n = 242$)	4.0	7.6	4.0	10.6	73.8	83.5%
Leased-up	2.2	3.2	9.6	9.0	76.0	85.5%
Did not move again ($n = 215$)	1.4	1.4	8.5	9.9	78.8	87.6%
Moved again ($n = 426$)	2.5	4.2	10.2	8.6	74.6	84.4%
Total ($n = 1049$)	2.2	4.2	8.2	8.4	77.0	86.0%

Notes: Data are weighted as described in Appendix B of Orr *et al.* (2003). Measured at the census-tract level.
Source: MTO data system.
Sample: Adults from families randomly assigned through to 31 December 1997.

from all groups were living in highly segregated neighbourhoods, although the areas might differ in their poverty rates.

The low-poverty areas initially chosen by experimental group movers in the interim evaluation sample were considerably less segregated, with an average minority population of 51 per cent according to the 1990 Census. However, by 2000, these same areas had an average minority population of 67 per cent. This pattern varied little by site.

Impacts of the Experiment on Geographical Mobility at Follow-up

The impact estimates we find are significantly lower than they would have been if neighbourhood conditions had not improved for the controls. These improvements reflect both controls' mobility and some positive change in the origin tracts. The neighbourhoods where control group members lived in 2002 had average poverty rates just under 40 per cent. Compared with the baseline neighbourhoods, the areas had lower unemployment, higher labour force participation and fewer families with no workers. Two-thirds of all households in these areas had wage or salary income and 30 per cent of the adults had more than a high school education. Perhaps most striking, the areas had much higher rates of owner-occupied housing (23 per cent compared with 10 per cent).

Thus, even without MTO, the residential locations of the participants, as proxied by control group neighbourhoods in 2002, would have been considerably better than they were when these families joined MTO. Even so, mobility patterns for the two treatment groups differ in a statistically significant way from the mobility patterns of the control group. Table 10 shows the extent to which MTO's premise—moving families from high-poverty areas to low—was attained.

After random assignment, some experimental group movers moved towards higher poverty locations, while control group families moved towards lower poverty areas. However, Table 10 shows that, even with these moves, families that moved to low-poverty areas are still in neighbourhoods with considerably lower poverty rates than control families. The Section 8 group families' neighbourhoods fall in between. The first panel of Table 10 shows the effects on poverty rates for the whole sample and for specific sub-groups within it.[32] The 2002 neighbourhoods of the control group had an average poverty rate of 38.7 per cent. Being assigned to the experimental group lowered the average poverty rate by 8 points, while for the Section 8 group the intent-to-treat effect is 6.5 points. The treatment-on-treated estimates indicate that the initial low-poverty location constraint resulted in the experimental group living in neighbourhoods with poverty rates 17 percentage points lower than they would have without their involvement in MTO. The TOT effect estimate in the Section 8 group was an 11-percentage-point reduction in the poverty rate.

Impacts on racial/ethnic segregation were smaller. The lower panel of Table 10 tests for differences relative to the control group in the percentage minority of the sample members' current residential locations. Only the experimental group showed a significant impact on this outcome, with reductions in minority population of 4 per cent (ITT) and 10 per cent (TOT) relative to the neighbourhoods where control group adults were living. However, the control mean for percentage minority population is very high. On average, control group adults were living in areas of about 88 per cent minority population in 2002.

Duration of Exposure to Lower-poverty Neighbourhoods

Table 11 shows MTO's impacts on exposure to neighbourhoods with different poverty levels. Assignment to the experimental group materially reduced the amount of time sample members spent in concentrated poverty areas and increased the time spent in areas with poverty rates of less than 20 per cent. The TOT effect is −32 months, relative to the control group, in time spent in concentrated poverty neighbourhoods, or 47 per cent of the time between random assignment and

Table 10. MTO mobility outcomes, part 1

Outcome	Control mean	Experimental vs control		Section 8 vs control	
		ITT	TOT	ITT	TOT
Average 2000 Census poverty rate of current location (n = 3670)					
All racial/ethnic groups	0.386	−0.080*	−0.172*	−0.062*	−0.103*
		(0.008)	(0.017)	(0.008)	(0.014)
African Americans	0.401	−0.084*	−0.178*	−0.069*	−0.108*
		(0.010)	(0.021)	(0.011)	(0.017)
Hispanics	0.365	−0.067*	−0.141*	−0.050*	−0.089*
		(0.013)	(0.027)	(0.013)	(0.023)
All minorities	0.389	−0.079*	−0.172*	−0.063*	−0.103*
		(0.008)	(0.017)	(0.008)	(0.014)
Lived in early HOPE VI development at baseline	0.379	−0.054*	−0.127*	−0.049*	−0.076*
		(0.013)	(0.031)	(0.013)	(0.021)
Average 2000 Census percentage minority of current location (n = 3670)					
All racial/ethnic groups	0.876	−0.045*	−0.096*	−0.013	−0.022
		(0.008)	(0.017)	(0.009)	(0.014)
African Americans	0.912	−0.048*	−0.103*	−0.025	−0.039
		(0.011)	(0.023)	(0.013)	(0.020)
Hispanics	0.845	−0.019	−0.040	0.009	0.017
		(0.022)	(0.045)	(0.021)	(0.037)
All minorities	0.883	−0.036*	−0.078*	−0.013	−0.021
		(0.010)	(0.021)	(0.011)	(0.017)
Lived in early HOPE VI development at baseline	0.875	−0.029	−0.068	−0.012	−0.018
		(0.015)	(0.035)	(0.016)	(0.024)

Notes: ITT = intent-to-treat; TOT = treatment-on-treated. Control means and impact estimates are regression-adjusted with robust standard errors. Sub-group impacts were estimated in a single equation using interactions with treatment indicators. See Appendix B of Orr *et al.* (2003) for detailed explanation of estimation procedures.

Sources: Household survey; other locating data, 2000 Census-tract-level data.

Sample: Adults from families randomly assigned through to 31 December 1997.

*=$p < 0.05$ on *t*-test. Robust standard errors are shown in parentheses.

follow-up. There is a corresponding increase in the time spent in areas with poverty rates of less than 20 per cent.

Assignment to the Section 8 group also reduced the time spent in concentrated-poverty neighbourhoods compared with the control group. TOT effect is −25 months, or 35 per cent of the time since random assignment. Assignment to the Section 8 group tends to shift people to somewhat poorer neighbourhoods than assignment to the experimental group. It primarily increases time in neighbourhoods with poverty rates of 10–30 per cent, whereas the experimental treatment increases are concentrated in neighbourhoods with poverty rates below 20 per cent.

Table 12 illustrates the impact of the experiment on neighbourhood in 2002 along various dimensions of social integration. The first set of measures, in the upper panel, comes from census-tract statistics. Assignment to treatment raised exposure to employed adults, two-parent families, home-owning neighbours and better-educated neighbours. Impacts tend to be large relative to the control mean and are larger for the experimental group than the Section 8 group, which are nonetheless usually significant.

The second set of measures, in the lower panel, comes from survey data. Assignment to treatment did not affect the number of close friends that adults in the experiment had and, in the Section 8 group, did not affect the level of education or earnings of those friends. Members of the experimental group, however, were more likely to have friends with college educations and earnings over $30 000 a year.

Table 11. MTO mobility outcomes, Part 2

Outcome	Control mean	Experimental vs control		Section 8 vs control	
		ITT	TOT	ITT	TOT
Number of months since random assignment living in areas with poverty rates (n = 4248)					
Below 10 per cent	2.8	9.3*	19.6*	1.2*	2.0*
		(0.6)	(1.3)	(0.5)	(0.8)
At least 10 per cent but less than 20 per cent	6.4	8.5*	17.9*	5.8*	9.4*
		(0.7)	(1.5)	(0.8)	(1.3)
At least 20 per cent but less than 30 per cent	7.1	0.4	0.9	6.6*	10.7*
		(0.6)	(1.2)	(0.8)	(1.3)
At least 30 per cent but less than 40 per cent	14.7	−2.8*	−6.0*	1.6	2.6
		(0.8)	(1.7)	(1.0)	(1.6)
40 per cent or above	41.0	−15.4*	−32.4*	−15.2*	−24.6*
		(1.0)	(2.1)	(1.1)	(1.8)
Proportion of months since random assignment living in areas with poverty rates (n = 4248)					
Below 10 per cent	0.039	0.128*	0.270*	0.020*	0.032*
		(0.011)	(0.023)	(0.009)	(0.014)
At least 10 per cent but less than 20 per cent	0.085	0.123*	0.259*	0.084*	0.136*
		(0.010)	(0.021)	(0.011)	(0.017)
At least 20 per cent but less than 30 per cent	0.094	0.008	0.017	0.089*	0.144*
		(0.008)	(0.017)	(0.011)	(0.017)
At least 30 per cent but less than 40 per cent	0.195	−0.038*	−0.081*	0.033*	0.053*
		(0.014)	(0.029)	(0.015)	(0.025)
40 per cent or above	0.583	−0.224*	−0.472*	−0.216*	−0.351*
		(0.014)	(0.030)	(0.015)	(0.025)

Notes: ITT = intent-to-treat; TOT = treatment-on-treated. Control means and impact estimates are regression-adjusted with robust standard errors. Sub-group impacts were estimated in a single equation using interactions with treatment indicators. See Appendix B of Orr *et al.* (2003) for detailed explanation of estimation procedures. Poverty rates have been interpolated to reflect the part of the decade 1990 to 2000 when the sample lived in these locations.

Sources: Household survey; other locating data, 2000 Census-tract-level data.

Sample: Adults from families randomly assigned through to 31 December 1997.

*=$p < 0.05$ on *t*-test. Robust standard errors are shown in parentheses.

Almost half the families assigned to the experimental group leased-up with programme vouchers, as did three-fifths of the families in the Section 8 group. Because many experimental group adults moved to neighbourhoods where poverty was increasing between 1990 and 2000, we estimate that only about half of their destinations had poverty rates below 10 per cent at the time of the move, although virtually all had rates below 20 per cent. Among the Section 8 group, less than 30 per cent of those who moved with programme vouchers moved to census tracts with poverty rates below 20 per cent. While 70 per cent of the control group families had moved away from their baseline locations, half were still living in concentrated poverty areas.

In sum, the period from random assignment to the interim evaluation data collection saw substantial MTO impacts on mobility and on the locations chosen by experimental group members. Four to seven years later, significant neighbourhood differences remained, although they were smaller than the initial differences.

In Shroder (2002b), one of us wrote

> If we apply the fact that only about one-fourth of eligible families applied for MTO, and that only about 3 in 5 with unrestricted vouchers actually moved, we can summarize the results of this test as follows: the offer of assistance tied to a particular unit in a high-poverty area, rather than a unit of the tenant's choice, severely

Table 12. Context of the MTO treatment

Context	Control mean	Experimental vs control		Section 8 vs control	
		ITT	TOT	ITT	TOT
Characteristics of the current neighborhood (2000 Census)					
Share of adults employed ($n = 3669$)	0.810	0.035* (0.004)	0.075* (0.008)	0.032* (0.004)	0.052* (0.006)
Share of two-parent families ($n = 3670$)	0.385	0.067* (0.007)	0.142* (0.014)	0.047* (0.007)	0.076* (0.012)
Share of owner-occupied housing units ($n = 3670$)	0.230	0.095* (0.009)	0.201* (0.019)	0.062 (0.009)	0.101* (0.015)
Share of persons with incomes twice the poverty level ($n = 3670$)	0.374	0.103* (0.008)	0.218* (0.016)	0.061* (0.008)	0.100* (0.013)
Share of persons with education beyond HS ($n = 3670$)	0.307	0.060* (0.007)	0.128* (0.014)	0.039* (0.007)	0.064* (0.011)
Share of persons with college degree ($n = 3670$)	0.151	0.038* (0.005)	0.080* (0.010)	0.020* (0.005)	0.032* (0.008)
Adult friendship [SR]					
Share with 3 + close friends ($n = 3517$)	0.349	0.016 (0.021)	0.034 (0.044)	0.008 (0.023)	0.014 (0.039)
Share with college-educated friends ($n = 3416$)	0.410	0.066* (0.022)	0.140* (0.046)	0.044 (0.024)	0.073 (0.041)
Share with friends earning more than \$30 000 ($n = 3036$)	0.424	0.052* (0.023)	0.112* (0.048)	0.003 (0.026)	0.005 (0.042)

Notes: ITT = intent-to-treat; TOT = treatment-on-treated. Control means and impact estimates are regression-adjusted with robust standard errors. Sub-group impacts were estimated in a single equation using interactions with treatment indicators.
Sources: Adult survey; 2000 Census.
Sample: Adults from families randomly assigned through to 31 December 1997.
*=$p < 0.05$ on *t*-test. Robust standard errors are shown in parentheses.

> distorts the neighborhood choice of at least 15 percent of the families with children who live in public housing projects located in high-poverty census tracts (Shroder, 2002b, p. 407).

The new data show that one out of five Section 8 movers leased-up initially in a high-poverty tract and that figure should be lowered to 12 per cent.

Shroder also wrote

> When we look at the MTO subjects across all groups who have moved out of the origin census tracts, but not as part of the experiment, we see results that closely resemble the unconstrained choices of the Section 8 Group movers—when changes in circumstances led these families to change neighborhood, they moved to areas that on average had about half the poverty of their origin projects. These subsequent movers make up about 37 per cent of the control group. Again using the fact that only about one-fourth of the eligible families applied for MTO, it appears that the offer of assistance tied to a unit in a high-poverty neighborhood distorts neighborhood choice of at least 9 percent of the families with children living in high-poverty public housing projects, relative to no assistance whatever (Shroder, 2002b, p. 407).

This estimate also needs updating. Of 1136 control households in the follow-up survey, 793 (70 per cent) had moved. Some 64 per cent of movers lived in tracts with less than 40 per cent poverty, while only 21 per cent of those who did not move lived in such tracts. About 12 per cent of the control group obtained vouchers outside MTO. The estimate of distortion in neighbourhood choice relative to no assistance is lower than the previous estimate: at least 6 per cent of families with children in very-high-poverty public housing would live in lower-poverty neighbourhoods if they received no assistance.[33] This decidedly non-experimental estimate might be further reduced if we took into account any improvements in income among mover households since random assignment.

Impacts on Neighbourhood Conditions and Safety

We found substantial programme effects on a variety of measures related to neighbourhood conditions and safety. These effects were significant for the experimental group and the Section 8 group, each taken as a whole (intent-to-treat effects). Estimated effects for programme movers (TOT) were often much larger for the experimental group than for the Section 8 group. On specific measures of neighbourhood quality (litter and trash in the area, public drinking) and neighbourhood safety (residents witnessing drug transactions, feelings of safety at night), the positive effects for experimental group programme movers were particularly large relative to the control mean. On one measure—the percentage of survey respondents reporting problems with the police not responding to calls in the area—the estimated effect for experimental group families that leased-up reduced the control mean nearly to zero. Taken together, MTO's effects in this domain showed clear neighbourhood and safety improvements relative to controls and they were of great importance to the many participants whose primary motivation for joining MTO was improved safety.

Baseline Conditions for the MTO Sample

At baseline, the families who joined MTO considered the dangers of their housing developments as a primary motivation for moving. More than 80 per cent put getting away from drugs and gangs as key reasons for wanting to move. Fewer than 10 per cent wanted to move within the same neighbourhood. A high proportion of the respondents reported the following as 'big' problems: presence of abandoned buildings (38 per cent), presence of litter or trash in the streets (53 per cent), presence of *graffiti* (63 per cent), and presence of drug dealers (87 per cent). Only one-third felt safe or very safe on the street during the day and just 12 per cent felt safe or very safe on the street at night. Most striking, only 4 per cent felt very safe when home alone at night.

About 90 per cent of the interim evaluation sample lived in public housing at baseline,[34] and nearly all these families came from distressed public housing, much of which would meet the formal definition of substandard housing (Fitzpatrick and LaGory, 2000). Conditions in high-rise developments were particularly bad; in some developments, young children played in front of unprotected windows and asthmatic mothers and children had to climb many flights of stairs every day. Many MTO applicants came from multigenerational families living together in public housing. For the younger generations of these families—daughters raising their own children while living with their mothers (and sometimes their sisters and sisters' children, too)—MTO offered the chance to obtain their own apartments and their own housing subsidies.

Current Neighbourhood Conditions for the Control Group

We begin with an important caveat. During the same time-period as MTO, major efforts were made to improve or demolish the most distressed public housing developments. The HOPE VI programme, vacancy consolidation and comprehensive modernisation affected developments from which MTO families were recruited in four of the five MTO sites

(all sites but New York). As noted above, roughly one-fifth of the interim evaluation sample lived at baseline in public housing developments affected by early HOPE VI and related programmes.[35] The proportion of MTO sample members in developments affected by these initiatives varied from 16 per cent of the Los Angeles families in this study to 44 per cent of the Baltimore families in this study.

Although a substantial proportion had moved from their baseline locations, many adults in the control group still reported dissatisfaction with their current (2002) neighbourhoods. While 75 per cent said they felt safe during the day, only 55 per cent reported feeling safe at night. Two-thirds of the control group respondents indicated there were problems with trash or litter in their neighbourhoods and over half said there were problems with public drinking. Two-thirds reported a problem with people 'hanging out' in the area and about one-third said police did not come when called. Twenty-one per cent reported that they or someone else in their household had been victimised in the past 6 months.[36] Overall, one-third said they were very or somewhat dissatisfied with the area where they currently lived. Still, this proportion was considerably reduced from baseline.

Observational data from the field staff conducting the surveys corroborated the mixed conditions of the control group's neighbourhoods in 2002. Twenty-nine per cent of the control group families' buildings had metal bars on windows above the basement level. The majority of the buildings in which the control group members were living were observed to be in fair condition (52 per cent), but 16 per cent were rated as in poor condition or badly deteriorated. Other residential structures on the same block received the same mix of ratings. One-third of the streets had major or minor accumulations of trash.

Impacts on Neighbourhood Quality, Satisfaction and Safety

Table 13 shows the impact estimates for neighbourhood quality and satisfaction, using self-reports from the adult survey data. There were significant, positive effects for both the experimental and Section 8 groups on all neighbourhood safety measures and on every outcome related to neighbourhood conditions and quality, but the effects were often substantially greater for the experimental group.

The first panel of Table 13 shows that impacts on measures of neighbourhood quality and satisfaction were significant for both treatment groups, but the impact estimates are about twice as large for the experimental group programme movers as the Section 8 group programme movers. About half the control group said they were very or somewhat satisfied with their neighbourhoods, while roughly 60 per cent of each treatment group did. The TOT estimate in the experimental group is 29 percentage points.

The next panel shows that 21 per cent of control group adults reported that they or their family members had been crime victims in the past 6 months. Significantly smaller proportions of the experimental and Section 8 groups reported crime victimisation (4 percentage points less in the experimental group, 5 points less in the Section 8 group). Three-fourths of the control group adults reported feeling safe in their current neighbourhoods during the day, 55 per cent at night. The estimated effect of Section 8 group and experimental group programme moves was to raise the sense of night-time safety by 16 percentage points and 30 percentage points, respectively. While 45 per cent of adults in the control group reported seeing drug transactions in the neighbourhood in the previous month, just one-third of the experimental and Section 8 group members did. For those in the experimental group who leased-up, the estimated effect is -20 percentage points.

In the qualitative MTO study (Popkin *et al.*, 2001), experimental group movers described their new neighbourhoods as quiet and peaceful. Section 8 movers did not speak as much about quiet but acknowledged the reduced visibility of drugs and violence. Some respondents, who had moved from their initial low-poverty areas to higher-poverty

Table 13. MTO neighbourhood quality and safety outcomes

Outcome	Control mean	Experimental vs control		Section 8 vs control	
		ITT	TOT	ITT	TOT
Measures of current neighbourhood quality					
Share reporting litter/trash/ *graffiti*/abandoned buildings ($n = 3502$)	0.704	−11.1* (2.1)	−23.6* (4.6)	−7.6* (2.4)	−12.7* (4.0)
Share reporting public drinking/groups of people 'hanging out' ($n = 3489$)	0.695	−17.0* (2.2)	−36.0* (4.6)	−9.9* (2.4)	−16.6* (4.0)
Share reporting police not responding ($n = 3286$)	0.337	−12.8* (2.0)	−26.6* (4.2)	−9.2* (2.2)	−15.7* (3.8)
Share very satisfied or satisfied with current neighbourhood ($n = 3524$)	0.475	13.8* (2.2)	29.3* (4.7)	10.8* (2.4)	18.0* (4.0)
Measures of current neighbourhood safety					
Share feeling safe during the day ($n = 3514$)	0.750	9.3* (1.8)	19.8* (3.9)	9.6* (1.9)	16.1* (3.2)
Share feeling safe at night ($n = 3482$)	0.549	14.2* (2.2)	30.3* (4.6)	9.3* (2.4)	15.6* (4.0)
Share saw drugs in past 30 days ($n = 3480$)	0.445	−11.7* (2.2)	−24.8* (4.6)	−10.3* (2.4)	−17.1* (3.9)
Share any household member crime victim in past 6 months ($n = 3499$)	0.209	−4.0* (1.7)	−8.5* (3.6)	−5.3* (1.8)	−8.9* (3.0)

Notes: ITT = intent-to-treat; TOT = treatment-on-treated. Control means and impact estimates are regression-adjusted with robust standard errors. Sub-group impacts were estimated in a single equation using interactions with treatment indicators.
Source: Adult survey.
Sample: Adults from families randomly assigned through to 31 December 1997.
*=$p < 0.05$ on *t*-test. Robust standard errors are shown in parentheses.

neighbourhoods, described feeling vividly the loss of their sense of safety.

Interpretation of Results

We found substantial, positive programme effects on a wide variety of measures related to mobility, neighbourhood and safety. ITT effects were significant for both the experimental and the Section 8 treatment groups, while TOT effects for programme movers were often much larger for the experimental group than for the Section 8 group. Overall, experimental group and Section 8 group adults rate their current neighbourhoods far more highly than controls. Four to seven years after a one-time intervention, the MTO programme had produced notable neighbourhood improvements for the participants, compared with conditions faced by members of the control group. Despite substantial control group mobility and some convergence of neighbourhood characteristics for the experimental and Section 8 groups, estimated effects for experimental group programme movers were consistently larger (even twice as large) as the effects for the Section 8 group movers.

Conclusions

Moving to Opportunity is a carefully designed, large demonstration to measure the impact of neighbourhood on the lives of very low-income families with children who initially lived in subsidised housing developments in the concentrated-poverty areas in very large cities. The two treatment groups were offered vouchers to move—the Section 8 group could move to any neighbourhood of their choosing, while the experimental

group could only move to low-poverty neighbourhoods. Controls were not offered vouchers.

Although assignment to treatment was random, take-up (success in leasing-up) was not random and the traits we have shown to be associated with take-up are often correlated with outcomes in other domains. This confirms the caution that analysts have frequently expressed: that observed 'neighborhood effects' may result from self-selection.

The neighbourhood constraint in the experimental group significantly lowered overall lease-up but also significantly altered neighbourhood outcomes for the group as a whole. Programme moves by the Section 8 group lowered the neighbourhood poverty rate for mover families, but not nearly as much as programme moves by the experimental group. Neither group, however, moved to predominantly White neighbourhoods. The effects on the real poverty rates of the sample's residential locations were somewhat less than planned for the demonstration, because experimental group movers often located in declining neighbourhoods (areas with poverty rates that were rising in the 1990s), but these effects were nonetheless quite substantial.

All groups, including the control group, experienced high levels of mobility after random assignment. Non-programme mobility tended to reduce the average differences in poverty rates experienced by the three groups, yet large differences remained at follow-up (4–7 years after random assignment). In 2002, the TOT reduction was 17 points in the poverty rates of current residential locations for those who leased-up in the experimental group. The TOT estimate was a 10-point reduction for those who leased-up from the Section 8 group. Provision of housing assistance in project-based, rather than tenant-based, form is thus shown to have distorted the neighbourhood choices of a significant fraction of families with children in those projects.

Programme lease-up exposed participants to greater numbers of neighbours in two-parent families, who had a high-school education and who had jobs. It did not reduce the number of close friends. Families assigned to the experimental and Section 8 groups were more likely to be receiving housing assistance 4–7 years after random assignment than members of the control group, presumably because the voucher was more valuable than a subsidised unit tied to a high-poverty housing project.

On specific measures of neighbourhood quality (litter and trash in the area, public drinking) and neighbourhood safety (residents witnessing drug transactions, feelings of safety at night), the positive effects for experimental group programme movers were particularly large relative to the control mean. Despite the high mobility of the control group, neighbourhood satisfaction and sense of safety for those families remained low and victimisation remained high. By contrast, on one measure—the percentage of survey respondents reporting problems with the police not responding to calls in the area—the estimated effect for experimental group families that leased-up reduced the control mean nearly to zero. Taken together, MTO's effects in this domain showed clear neighbourhood and safety improvements relative to controls. These were of great importance to participants whose primary motivation for joining MTO was usually improved safety.

As implemented, therefore, MTO serves as a platform for unbiased measurement of the ways that improvements in neighbourhood can change the lives of very-low-income families with children. Further, after 4–7 years, the experiment continues to affect the lives of participating families in positive and important ways, giving them access to better-quality and safer living environments.

Notes

1. In total, there were 7.8 million persons—including 3.5 million poor persons—living in high-poverty census tracts in 2000 (see Jargowsky, 2003). These figures represent a reduction in poverty concentration, in contrast to the increases from 1970 to 1990 (see Jargowsky, 1997). Poverty has increased since 2000 (see Procter and Dalaker, 2003).

2. See, for example, Wilson (1987, 1996); Jencks and Mayer (1990); and Brooks-Gunn *et al.* (1993). Chapter 1 of Orr *et al.* (2003) contains a fairly extensive literature review. The review by Ellen and Turner (1997) cites various theories about the mechanisms by which middle-class (often predominantly White) neighbourhoods shape or reshape the lives of their residents.
3. Feins was the primary author of these chapters.
4. See the remaining chapters in Orr *et al.* (2003). The report is available at http://www.huduser.org/publications/fairhsg/mtoFinal.html. Links to other MTO publications and working papers may be found at http://www.mtoresearch.org.
5. The national poverty rate in 1990 was 13.5 per cent. A neighbourhood with less than 10 per cent poverty would generally be an ordinary middle-class community.
6. At the time of MTO demonstration operations, the Section 8 programme was still issuing both certificates and vouchers. Subsequently, HUD converted all certificates to vouchers. Here, the term 'voucher' will be used for all the tenant-based resources issued through MTO and we will refer to the non-experimental treatment group as 'Section 8', because the rules of the demonstration were set under the tenant-based version of that programme.
7. See Appendix B of Orr *et al.* (2003) for a detailed description of how these estimates were generated.
8. See Appendix B of Orr *et al.* (2003) for further information on the 'Bloom adjustment'.
9. Differences in residential environment may include differences in the dwelling unit as well as differences in the neighbourhood. For example, dwelling units in lower-poverty areas may have fewer health hazards. We use 'neighbourhood' as a shorthand term for the entire set of environmental factors.
10. Chapter 9 of Orr *et al.* (2003) addresses implications of this fact for interpreting programme impacts.
11. This is not the entire MTO population. Intake continued in Los Angeles until July 1998 and lease-ups occurred there until March 1999. The sample for the present study was restricted to ensure that at least 4 years had passed since random assignment for all its members. The full MTO population consists of 4608 families, of whom the 4248 families in the interim evaluation sample represent 92.2 per cent, including all families in 4 of the 5 sites (Baltimore, Boston, Chicago and New York).
12. More families were assigned to the experimental group than to the Section 8 group to achieve efficient sample sizes despite the expected lower lease-up rate among experimentals. Assignment rates within sites were further adjusted over time to reflect actual lease-up rates. Sample weights used in the quantitative analyses adjust for differences among sites and over time in the rate of random assignment.
13. The victimisation rates reported in the participant baseline survey were about four times higher than those reported in a 1994 national survey of residents of public housing family developments.
14. The sample included not only adults (the source of the data analysed for this paper) but also children aged 5–19. For a full description of the sample and data collection, see Orr *et al.* 2003, Appendix A.
15. See Feins (2003) and Katz *et al.* (1999), both analysing MTO data from 1997.
16. As noted in chapter 1 of Orr *et al.* (2003), the estimates presented in this report represent the incremental effects of MTO demonstration vouchers relative to what happened to the controls. Chapter 9 provides some additional information on this issue.
17. These included HUD administrative data systems (The Multifamily Tenant Characteristics System for public housing and Section 8 and the Tenant Rental Assistance Certification System for private, assisted developments), the National Change of Address system operated by the US Postal Service and credit bureau data.
18. Not all voucher holders lease-up in the Housing Choice Voucher programme generally. The most recent national study found that 69 per cent of families and individuals receiving vouchers in 2000 from large metropolitan housing authorities leased-up (Finkel and Buron, 2001, p. i). The national rate was 81 per cent in 1993, just prior to the start of MTO.
19. These lease-up rates mirror closely the lease-up rates for the MTO population overall (47 per cent for the experimental group and 60 per cent for the Section 8 group). That population includes additional families enrolled in 1998 in Los Angeles.
20. The MTO demonstration design allowed for a considerable range of counselling practices (see Feins *et al.*, 1997). All such services were short-term.
21. Leasing-up means that the family finds a housing unit that passes the programme's quality standards, has a willing landlord

and has rents affordable to the family under programme rules. A lease is then signed that obligates the administering agency to pay the voucher amount towards the rent and obligates the tenant to pay the remainder. Someone who rents a housing unit with the help of the voucher assistance is said to lease-up. If these conditions are not met, the voucher expires and the family has failed to lease-up.

22. See Shroder (2002a) for variable definition and construction.
23. MTO participants were living in 34 states in 2002. See exhibit C2.1 in Orr *et al.* (2003) for a map of the sample adults' locations across the US at the time of the interim evaluation.
24. Another 3 per cent of the experimental group members lived in the same block group in 2002 as at random assignment, as did another 2 per cent of the Section 8 group. These adults could be considered to have stayed in place.
25. A considerable number of lease-ups occurred in census tracts with poverty rates of up to 10.9 per cent. HUD also granted a small number of waivers in special circumstances for lease-ups in higher-poverty locations.
26. The arrival of experimental group families alone (or of the few Section 8 group families making low-poverty programme moves) did not play a role in the decline of these areas, because the numbers of MTO families moving to any single neighbourhood were too small to be influencing tract-level changes. *At the most*, experimental group families accounted for 2.3 per 1000 households in the low-poverty destination tracts (Goering *et al.*, 1999, p. 42).
27. Los Angeles was the only MTO site where the MSA-wide poverty concentration increased, contrary to the national pattern (Jargowsky, 2003, pp. 11, 14–17).
28. Most of the remainder (58 per cent) were in areas with poverty rates of 10–19 per cent.
29. There was an exception made to this 40 per cent requirement in Boston. HUD agreed to include in MTO three public housing developments in areas below the 40 per cent threshold because of high local crime rates and other conditions consistent with MTO targeting.
30. Shroder (2002b) has argued that the mobility pattern of the non-programme movers is a measure of the degree to which the public housing programme distorts choice of neighbourhood for a significant fraction of assisted tenants, relative to no assistance at all. Non-programme movers in all groups, most of whom are not assisted, were less likely to reside in a high-poverty census tract in 2002.
31. Experimental group members cited safety much less frequently but leasing problems more frequently. Some of these problems may have forced the families to move. For example, some respondents indicated that landlords would not renew leases or that the unit had failed minimum housing quality standards on reinspection.
32. All sub-groups in the impact analyses are defined by baseline characteristics, so that they are exogenous to the treatment and can be tested within the experimental design.
33. The computation was as follows: 0.25 (proportion of families volunteering for the experiment) times 0.58 (proportion of families moving without HUD assistance: 0.7-0.12) times 0.43 (reduction among movers in exposure to high-poverty relative to non-movers).
34. The remaining 10 per cent (some 444 of these 4248 families) came from project-based, assisted developments with private owners. Private developers built rental housing under a number of different federal programmes from the 1960s to the 1980s. The developers received subsidies in various forms (such as below-market interest rates on mortgages), in exchange for providing some units affordable to low-income renters. Such developments were built under a number of programmes (rent supplement, 221(d)(3), BMIR, Section 202, Section 236, Section 8 new construction, or substantial or moderate rehabilitation.) Here and elsewhere they are called private, *assisted* housing.
35. By early HOPE VI sites we mean sites designated for HOPE VI implementation during MTO operations, which ended intake in mid 1998. HOPE VI implementation grants have continued to be made by HUD through federal fiscal year 2002.
36. Specific questions were asked about: having a purse, wallet, or jewellery stolen; being threatened with a knife or gun; being beaten or assaulted; being shot or stabbed; or having an attempted or actual housebreaking. Their joint occurrence for the control group was 21 per cent.

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