Analyzing the Social Benefits and Costs of an Innovative Asset-Building Program for Low-Income Public Housing Residents

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ABSTRACT

We conduct a benefit – cost analysis of an innovative asset-building program: the Denver Housing Authority's Home Ownership Program (HOP). In assessing benefits we rely upon parameter estimates from quasi-experimental methodologies that permit one to draw causal inferences of program impacts with substantial confidence. We deploy a comprehensive accounting framework, distinguishing benefits and costs accruing to program participants, non-participants (other citizens, taxpayers and governments), and their aggregation: society as a whole. We use Monte Carlo simulation techniques to approximate distributions of benefit and cost parameters, thereby ascertaining reliably to what degree did participation in DHA's HOP yield net benefits to participants, non-participants, and society as a whole [compared to if families had continued to receive housing assistance during the same period]. We estimate a net social benefit for HOP of $776,439 per 100 original enrollees. The simulated standard deviation is less than a third of this value, suggesting a high degree of statistical confidence that this program had substantial net benefits to society as a whole. On similar grounds we conclude that the program yielded substantial and roughly equal net benefits to program participants and non-participants alike.

INTRODUCTION

During the past two decades, public and scholarly discourse around antipoverty policy has shifted from an emphasis on providing income subsistence to one of asset development (Sherraden, 1991). Indeed, asset-building strategies have become important components of a comprehensive approach to providing upward mobility for low-income families (Shapiro & Wolff, 2001; Rohe, Gorham & Quercia, 2005, McKernan & Sherraden, 2008).

Subsidized housing policy has long been employed to enhance income- and asset-building among low-income families (Newman and Schnare, 1988; 1992). The Concerted Services Demonstration, the first programmatic experiment attempting to link public housing with services designed to foster economic independence, occurred in the 1960s. This was followed by two similarly oriented, small-scale demonstrations in the 1980s: Project Self Sufficiency and Operation Bootstrap (Bogdon, 1999; Rohe and Kleit,

1999). Since the mid-1980s, multiple generations of U.S. Department of Housing and Urban Development (HUD) programs have tried to blend housing assistance with a variety of supportive services designed to improve the economic wherewithal of recipients (Bogdon, 1999; Riccio, 1999; Bratt, 2008). In this so-called "housing plus" approach, the provision of basic shelter is augmented by services to support both resident families and the larger community development initiatives in which subsidized housing in located.

Arguably the primary programmatic manifestation of this reoriented subsidized housing policy has been the Family Self-Sufficiency (FSS) program. The National Affordable Housing Act of 1990 authorized FSS, administered by HUD. For the first time, all but the smallest local public housing authorities (PHAs) were required to help participants in their public and assisted housing programs reduce their use of various forms of public aid (Sard, 2001). Subsequently, the aims of FSS were bolstered by the Quality Housing and Work Responsibility Act (QHWRA) of 1998, which gave PHAs flexibility to serve more working poor households and tailor their rent policies to encourage work, and authorized smaller PHAs to develop their own FSS programs (Sard and Lubell, 1999; Cramer and Lubell, 2005). Moreover, QHWRA established new HUD rules for PHA accountability (wherein activities promoting resident self-sufficiency were assessed separately) and a HUD grant program (Resident Opportunities for Self-Sufficiency: ROSS) for supporting PHAs' employment-promoting activities by subsidizing resident education and training (Sard and Lubell, 2000).

Each generation of self-sufficiency/asset building programs has been evaluated in some fashion: Project Self-Sufficiency in the late 1980s (HUD, 1987, 1988), Operation Bootstrap in the mid-1990s (Blomquist, et al., 1994; Frees, Ellen, and Holm, 1994; Frees, Ellen, and Locke, 1994), and the Jobs-Plus Demonstration (Riccio, 1999) and FSS Program in the late 1990s and early 2000s (Rohe and Kleit, 1999; Ficke and Piesse, 2004). Other evaluations have focused on local initiatives, such as the Lafayette Courts Family Development, a Baltimore Housing Authority pilot program (Shlay and Holupka, 1992; Shlay, 1993); the Gateway Program operated by the Charlotte Public Housing Authority (Rohe and Stegman, 1991; Rohe, 1995; and Rohe and Kleit, 1997); Housing Authority of Portland (Gibson, 2003) and the Rockford Housing Authority (Anthony, 2005). These evaluations uniformly have claimed that employment and earnings of program participants rose substantially, but low percentages of enrollees completed these programs. However, Riccio (2007) argues that the evidence is weak as to whether FSS actually improved participants' employment, earnings and other self-sufficiency outcomes. He notes that the aforementioned evaluations typically lack control groups or other statistical techniques that would make it possible to produce reliable estimates of causal program effects. Not surprisingly given this uncertainty about causation, no benefit-cost analyses of FSS-related programs have been attempted, despite their centrality in the nation's "housing plus" agenda.

Our research attempts to fill this void by assessing monetized estimates of benefits and costs associated with an enhanced variant of the FSS program: the Denver Housing Authority's (DHA) Home Ownership Program (HOP). In assessing benefits we rely upon parameter estimates from quasi-experimental methodologies that permit one to draw causal inferences with substantial confidence. We deploy a comprehensive accounting framework, distinguishing benefits and costs accruing to program participants, non-participants (other citizens, taxpayers and governments), and their aggregation: society as a whole. We use Monte Carlo simulation techniques to

approximate distributions of benefit and cost parameters, thereby allowing us to assess the precision with which we can answer our research question:

> *To what degree did participation in DHA's HOP yield net benefits to participants, non-participants, and society as a whole [compared to if families had continued to receive housing assistance during the same period]?*

Our paper contributes to policy evaluation scholarship in several ways. First, it is the first comprehensive benefit-cost analysis of a FSS-related program. Second, unlike typical benefit-cost analyses that must draw benefit parameters from other studies conducted for different populations in different geographies and/or periods than those involved in the program being evaluated, our key parameters are estimated for a similar population living in the same city during the same period. Third, it offers reasonable benefit estimates not only to participating adults but also indirect benefits accrued by their children and by their new neighbors if participants bought homes.

Our paper is organized as follows. The first section briefly reviews the rationale and principles of benefit-cost analysis and overviews how we shall conduct our analysis. The second section describes the DHA's HOP initiative being evaluated and program participants. The third section presents our method for assessing program impacts. The fourth section steps through our accounting of each component of program benefits and costs as incurred by various parties in society, building ultimately to our estimates of net benefits. The paper concludes with a discussion of the policy implications derived from our findings.

BASICS OF BENEFIT-COST ANALYSIS

Increasingly across the globe the interest in conducting policymaking guided by rigorous evidence has intensified. Mounting pressures for fiscal austerity at local, state and federal levels has accentuated the urgency of assessing the social value of public interventions. A long-accepted procedure for doing so is benefit-cost analysis, which provides a framework for explicitly and comprehensively taking account of a wide range of potential outcomes produced by a program intervention. Traditionally used to assess infrastructure investments and environmental regulations, benefit cost analysis has more recently been applied in the realm of social policies; for examples, see Vining and Weimer (2009). Perhaps the outstanding illustration is Carlson et al.'s evaluation of the Section 8 (now renamed "housing choice") voucher program (2011), upon which we draw heavily in this paper.

Benefit-cost analysis is based on principles of welfare economics. It aims at estimating the "social efficiency" of a proposed or operating public policy by comparing aggregated estimates of monetized benefits to various segments of society to the costs borne by those segments (Vining and Weimer, 2010). To the extent that benefits and costs accrue over time, the monetary values are appropriately discounted to allow commensurate present value comparisons. Policies registering negative net benefits are clearly socially inefficient in this context; by contrast the most socially efficient are those yielding the greatest positive net benefits. Benefit analysis does not account for how net benefits are distributed. By differentially accounting for benefits and costs to program participants (typically disadvantaged people in the case of social programs) and other citizens (assumed to bear the tax burdens of said programs), benefit-cost analysis can, however, provide raw materials from which an equity evaluation of the program can be deduced.

Of course, benefit-cost analysis faces many empirical challenges when applied to social policies. Foremost among them is that direct causal effects of the policy are difficult to estimate precisely (Shadish, Cook and Campbell, 2002). The direct costs of many social policies may be difficult to quantify (Sussman, 2005). Typically, social policies also create indirect, second-order effects (benefits and costs), both for participants and non-participants, creating still more challenges of estimating causal impacts (Quercia and Wachter, 1996). These challenges are further magnified to the extent that these direct and indirect effects manifest themselves differentially and often over long periods. Both direct and indirect effects need to be monetized (and time discounted) sensibly, imposing still more data requirements. Below we will describe how we have attempted to surmount all these daunting challenges.

Given these multiple sources of imprecision, it is critical for benefit-cost analysis to acknowledge and estimate explicitly the potential range of net benefit estimates. It is now common practice that when key parameters are taken from econometric studies' estimated coefficients, the associated standard errors are used to create predicted distributions of net benefits by the application of Monte Carlo simulation techniques. Analogously, such simulations are used to create predicted distributions for other parameters whose means and variances are assumed or derived from other evidence (Vining and Weimer, 2010; Carlson et al., 2011). We follow this strategy as well. Specifically, our simulations allow estimated econometric parameters to vary normally using the estimated standard errors, and when a range of alternative parameters are derived from different studies we allow them to vary uniformly over the observed range. Throughout we insure that simulated values do not exceed logical bounds; e.g., neighborhood homeownership rates are constrained between zero and 100 and incremental earnings are non-negative.

THE DENVER HOUSING AUTHORITY'S HOME OWNERSHIP PROGRAM

The low-income family asset-building program we will evaluate with benefit-cost analysis is the Home Ownership Program (HOP) developed by the Denver Housing Authority. In the early 1990s, DHA initiated its basic Family Self Sufficiency (FSS) program focusing on improving the educational and employment opportunities of residents and their families. DHA established the HOP as an elective option for qualified FSS participants in late 1994. DHA was awarded a grant in 2000 under the Resident Opportunities for Self Sufficiency (ROSS) Program, which provided supplementary resources for expanding HOP to an additional 450 non-FSS clients by providing funding for their education and training.[1] This mix of funding streams inevitably introduced some heterogeneity into the HOP pool, with some being subject to the regulations and features of FSS, others to those of ROSS, and still others to both. In this analysis we calculate benefits and costs averaged across the pool of 1,717 enrollees who entered the program during the Jan. 1, 2001 through Dec. 31, 2009 period.[2]

[1] Regrettably, there have been relatively low graduation rates for those who have enrolled in DHA's FSS and HOP programs since 1995: 25 percent and 20 percent, respectively.

[2] We excluded 148 enrollees from the sample used to statistically model program impacts because of inability to ascertain the HOP beginning or end date information needed to estimate intensity of treatment. Further, for enrollees who entered HOP in 2008 and 2009 and who did not have a reported end date or a current participant flag in the administrative data, we assumed that

Program Design

In overview, HOP enrollees develop individual training and services plans outlining their human and financial capital asset development goals in collaboration with HOP case management staff. HOP enrollees are eligible for financial assessments, free credit reports, credit repair and money management counseling, classes on a wide variety of topics (e.g., budgeting, debt reduction, saving, purchasing assets such as cars), and Matched Savings Accounts. In addition to the education, counseling, and supportive services provided by the HOP, Denver's program also includes several financial incentive and assistance programs that enable enrollees to acquire both financial and human capital assets (e.g., grants for tuition and books, child care assistance, transportation costs). FSS-supported HOP enrollees are also eligible for matched escrow accounts. Details follow.

HOP is designed to work in conjunction with its FSS and ROSS programs to overcome four major barriers to asset building among DHA residents: low income, high levels of debt, lack of employment or job instability, and the lack of savings. To address the barrier of low income, the DHA's FSS/ROSS programs have developed an employment component emphasizing education and job training. To address debt issues, the HOP program works with DHA residents to develop specific strategies aimed at debt reduction and credit repair. Both programs work with residents to acquire job skills, encourage work and maintain stability of employment. Finally, to address insufficient savings, HOP utilizes the rent escrow account feature of the FSS program as well as matched savings accounts offered by DHA and other community partners to encourage savings for future asset purchases, such as further education and training, microenterprise and homeownership.

Two stages with different program treatments distinguish HOP. The initial stage is geared towards debt reduction, credit repair, savings accumulation, and employment enhancement. Roughly half of all enrollees have household incomes below $10,000 when they start HOP, and the program tries to build their incomes by 50 to 100 percent during this initial level. Those who are deemed by HOP staff to be within a year of purchasing their own home "graduate" to the advanced stage, the Home Buyers Club, where additional HOP investments are made. Requirements for entry into the Home Buyers Club include being employed with the current employer for at least one year and having personal savings of at least $500. The Home Buyer's Club provides intensive real estate and finance training, presentations by housing industry representatives, peer support, and special benefits such as low mortgage interest rates, mortgage fee discounts, downpayment and closing cost assistance, and second mortgage assistance (if necessary). Integrated into the homeownership counseling sessions are discussions about what constitutes a sound home purchase. At this stage of the HOP program, enrollees are expected to attend 9 of the 12 classes offered during the course of the year, complete an intensive, one-day homeownership seminar offered by the Colorado Housing Finance Authority (CHFA), and pass a homeownership exam administered by CHFA. As enrollees approach the time to purchase a home, they meet regularly (often weekly or biweekly) with their case manager and other HOP program staff members.

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they were still active in the program since in any given year approximately 400 residents are in HOP. Below the figures we report for program outcomes apply for this analysis sample of 1,569; for program costs per 100 enrollees we use the full sample of 1,717.

Rent escrow accounts are used in the HOP program for enrollees who also are involved in the Family Self-Sufficiency Program. These HOP/FSS enrollees are able to accumulate escrow funds that are distributed only if they meet all of the goals of their FSS contracts. Escrow funds reflect the additional rent costs that are associated with their increased earnings. Rents are capped at 30% of income at the time of entry into the FSS program. Additional rents in excess of this income cap are placed into an escrow account. For some HOP enrollees, these escrow payouts have exceeded $40,000 at time of FSS Program completion although the average payout was $7,300. HOP program enrollees entering under the ROSS program are eligible to receive $1,000 toward costs associated with education and training. Matched Savings Accounts (MSAs) are available to all HOP enrollees through DHA and until recently, were matched at a rate of 1:1 up to a maximum participant contribution of $1,500; currently the match rate is 3:1. MSA account funds plus the DHA match are available only for those who successfully complete HOP and go on to purchase a home through the auspices of the DHA. Penalties for program noncompliance are extensive. In addition to loss of escrow funds and program termination, noncompliant HOP enrollees also lose the DHA match from their matched savings accounts.

The only qualification for participation in HOP is that the individual be (and remain) a DHA resident or Housing Choice Voucher (HCV) subsidy recipient for the duration of their involvement with the program. HOP enrollees complete initial as well as ongoing needs assessments and goal setting. Further, the Denver program offers intensive, on-site case management. Unlike generic FSS contracts, the HOP in Denver does not set time limits for homeownership achievement and asset building counseling. The overarching goal of the program is to enhance self-sufficiency and enable enrollees to leave public housing or voucher subsidies, with homeownership as one of the asset building goals of the program.

Enrollees in HOP

We will refer to all who ever qualified and chose to register for HOP as “enrollees.” In 2009, there were approximately 475 DHA public housing and HCV residents enrolled in the initial level of the HOP program and 20 participants in the Home Buyers Club. According to estimates derived from unpublished DHA data sources, HOP enrollees have numerous characteristics that distinguished them from the typical DHA resident, underscoring the self-selection into the program. Significantly higher fractions of HOP participants are heads of mother-only families with children. HOP enrollees are significantly younger: nearly two-thirds are under the age of 40. Further, they are slightly more likely to speak English and be U.S. citizens. Conversely, they are less likely to be disabled. Significantly higher proportions of HOP enrollees have changed units to obtain employment and training; lower proportions have been evicted for whatever reason. Although during the 2001 through 2009 period there was some overrepresentation of enrollees from two DHA developments---the North Lincoln Campus of Learners and the Curtis Park HOPE VI project---HOP enrollees come in nearly equal numbers from the conventional developments, scattered-site housing units and from HCV residents. As a result, the HOP enrollee pool is drawn from a much broader set of neighborhoods than noted in previous evaluations of programs in Charlotte, Rockford or Seattle.

Given the strong and understandable distinctions between the pool of HOP enrollees and the generic DHA clientele, it would be inappropriate to employ the latter as

a control group in measuring program impacts on the former. Instead we employ as controls those enrollees who only participated minimally before dropping out of HOP, as we amplify below.

MEASURING IMPACTS FROM HOP PARTICIPATION

For purposes of this benefit-cost analysis we have simplified the operationalization of "treatment" under the HOP because: (1) the treatments as described above were often bundled and administered in idiosyncratic ways in different temporal patterns and (2) we have no means of estimating costs for separate components of HOP. Here we define those who have been "treated" by HOP as *"participants."* These are enrollees who have remained in the program at least 12 months since enrollment and participated in an appropriate number of HOP activities; within the participants we distinguish those who received Home Buyers Club training. Participants have received somewhat varied types and intensities of treatments, experienced different tenures within HOP, and differed on whether they ultimately bought a home through the auspices of HOP. Thus, we will focus on estimating "average treatment effects on the treated" across this treatment bundle, distinguishing only two varieties of treatment: *"moderate intensity"* (greater than or equal to 12 months in HOP; did not enter HBC: 59.2 percent of enrollees) and *"high intensity"* (participated in HBC regardless of length of duration or completion: 18.4 percent of enrollees). The breakdown of the participant group by broad categories of intensity of treatment and home tenure outcome is presented in Table 1.

[Table 1 about here]

Our *"control"* group receiving only a low-intensity treatment consists of enrollees who initially qualified for and voluntarily enrolled in HOP but either never attended HOP activities or dropped out of the program within a year; this group constitutes 22.5 percent of our 2001-2009 HOP cohort. Face validity suggests this is a sensible control group, as they met the same eligibility criteria and self-selected to enroll like the treatment group. For our impact analysis we will create synthetically even closer comparability through propensity score matching, as explained below.

For this paper we conducted four quasi-experimental impact evaluations of HOP for the outcomes of: earnings growth during HOP, earnings growth after HOP, self-sufficiency and homeownership.[3] The impact was estimated by assessing differences across propensity score-matched samples. This approach has been shown to yield a plausible estimate of causal impact (Heckman, Ichimura and Todd 1997, 1998; Heckman and Navarro-Lozano, 2004; Shadish, Clark and Steiner, 2008, Cook and Steiner, 2010) and represent the standard for benefit-cost analysis when experimental estimates are not available (Carlson et al. 2011). For our earnings impact estimates we employed a difference-in-differences regression approach on the matched samples to gain an even more robust impact estimate. Details are found in Appendix B.

[3] By "after HOP" we mean the period between HOP exit and time of personal survey conducted as part of our study, results are annualized to make estimates comparable. By "self-sufficiency" we mean that the participant either: (1) moved out of DHA to accept employment in another locale; (2) evinced income gains so substantial that they disqualified the family from housing assistance and/or (3) chose to move into private rental or owner-occupied accommodation because of their improved economic circumstances.

We found that the HOP moderate-intensity treatment group did not evince any statistically significant differences in outcomes compared to the matched low-intensity treatment group. HOP participants who were intensely treated (i.e., participated in Home Buyers Club activities) gained considerably, however, in all four realms compared to both matched low-intensity and moderate-intensity groups. The impact parameter estimates and their standard errors are presented in Table 2.[4] The HOP high-intensity treatment increased annual earnings during HOP by $3,213, increased annual earnings after HOP by $4,523, increased the probability of becoming self-sufficient by 0.42, and increased the probability of becoming a homeowner within five years of program enrollment by 0.29. All these impact parameters proved statistically greater than zero at the .01 significance level. As we amplify below, all these outcomes generate a variety of benefits for not only the participants but also for their children and the communities in which they purchased homes.

[Table 2 about here]

[4] For simplicity we present the impact estimates derived from the test of the high-intensity group compared to a matched sample of the combined low- and moderate-intensity group.

BENEFIT-COST ANALYSIS OF HOP

Table 3 presents our estimates of the present-discounted (constant 2012 dollar, 4 percent discount rate) value of social benefits and costs attributable to the DHA's HOP operating during 2001-2009, expressed in per 100 enrollees in HOP.[5] These estimates are founded upon our estimated program impacts above, as well as estimates from other scholarship as detailed in each particular case. We provide both mean estimates and their standard deviations (shown parenthetically) produced by our Monte Carlo simulations, which explicitly account for the uncertainty associated with parameters of each benefit and cost component.[6] For a category when the HOP arguably makes a discrete and relatively permanent change in the stock of adult or child human capital (education, health, etc.), we estimate a discounted present value (4 percent discount rate); the number of future years for which this calculation is undertaken varies by category of benefit, as explained below.[7] Our evidence, assumptions and calculation procedures associated with each category shown in Table 3 are explained below. These categories are extensive though probably not exhaustive; potential omitted categories are discussed at the end under caveats. We are confident that the omissions result in an understatement of HOP benefits.

We disaggregate benefits and costs by participants and non-participants (which includes taxpayers, neighbors of homebuying participants, and various levels of government). The mean estimates shown for society as a whole are the sums of the respective means for participants and non-participants; standard deviations are estimated via simulation based on the aggregated categories. Note that the figures in Table 3 are our best estimates of the per-100 enrollees net social benefits, an "intent-to-treat" estimate. We conservatively assume that the 23 enrollees receiving only a low-intensity HOP treatment (i.e., our control group) gained no benefits to themselves or society. Given our aforementioned impact analysis results, we assume the same for the 59 receiving moderate-intensity treatments. Only the 18 who persist long enough to receive high-intensity treatments accrue benefits to themselves and others through their program-enhanced earnings, self-sufficiency, and/or homebuying, as measured above. We estimate that for every 100 enrollees originally entering HOP, the net aggregate benefits accruing to high-intensity treated participants amounted to $350,360 ($19,041 average per such participant) and the corresponding aggregate figure for non-participants was $426,079. These figures indicate that the net benefit to society as a whole per 100 HOP enrollees was $776,439. This figure is considerably greater than zero (by 3.51 standard deviations), thus we have confidence that the results of net positive social benefits is robust to a plausible range of parameters employed.

[Table 3 about here]

[5] Dollar estimates in all original scholarly studies employed were inflated appropriately into 2012 dollars so that all monetary figures cited here are comparable.

[6] As is standard practice in benefit-cost analyses, Monte Carlo simulation involves conducting a large number of trials (we undertook 10,000) performing a specified calculation wherein uncertain parameter values are randomly drawn from predefined probability distributions that seem reasonable *a priori*.

[7] Following Carlson et al. (2011) we conduct simulations with alternative discount rate alternatives to test the robustness of our conclusions. Figures reported in tables use 4%.

Program Benefits to Participants and their Families

Increased Participant Earnings. Participants benefit if their earnings increase as a result of the human and social capital they gain as a result of HOP treatment. As noted above, we found a program impact of $3,213 higher mean annual earnings ($770 standard error) for high-intensity treated individuals during the time they were participating in HOP; the corresponding figures for the period after leaving HOP were $4,523 ($1,697). In supplemental analysis [citation redacted], we show that this gain was produced by a combination of higher hourly wages and more hours worked annually that, in turn, were likely related to the enhanced educational credentials and training that intensely treated HOP participants acquired. For this reason we do not "double count" the value of these program-generated educational credentials, instead allowing their impact to manifest themselves in the observed earnings differentials. For the purposes of this analysis we conservatively assume that this earnings benefit: (1) only occurs during the last year of HOP participation; (2) persists for only five years past the point of HOP exit[8] and (3) the real (i.e., constant 2012 dollar) value of this benefit is unchanged over these five years.[9] This translates into a per high-intensity HOP participant benefit of $20,953 ($7,814 standard deviation), discounted over 5 years at 4 percent, or a total program earnings benefit of $444,617 ($144,491) per 100 HOP enrollees.[10]

Increased Participant Wealth via Initial Home Equity. Many HOP participants benefit by the increased wealth associated with purchasing a home; see Table 1. Those who completed the HOP Home Buyers Club and purchased through the program received an immediate, one-time average $9,354 (standard deviation $4,066) increase in wealth at the point of purchase through a combination of: (1) closing cost assistance from DHA; (2) downpayment assistance grants from local non-profits; and/or (3) accumulated DHA-contributed funds in their FSS escrow accounts or matched-savings accounts. This represents a $65,627 ($28,199 standard deviation) increment in HOP homebuyer wealth per 100 enrollees, given that only seven (7) percent of enrollees ended up buying a home via HOP completion and program auspices that qualified them for the aforementioned home purchase assistance.[11] None of these one-time, wealth-enhancing benefits were available to those who participated in HOP but did not complete the Home Buyers Club.

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[8] We project only five years into the future for two reasons. First, our longitudinal study of HOP participants covers this span of post-graduation experience, and we are reluctant to extrapolate beyond our data. Second, the mean length of tenure in homeownership of HOP participants who buy a home 5.5 years (standard deviation 2.5). We recognize that arbitrarily limiting the period over which benefits may accrue understates them and thus provides a more conservative benefit-cost estimate.

[9] This is equivalent to assuming that participants' future earnings rise only at the rate of inflation.

[10] For every 100 enrollees, 18.4 will receive the high-intensity treatment that will produce an expected increment in earnings of (18.4)($3213) within HOP gain plus (18.4)($4523) summed over five years discounted after HOP gain= $20,953 total gain for high-intensity treatment participants, on average.

[11] These figures are produced by Monte Carlo Simulations. Note that to derive this benefit we do not need to use propensity score-matched samples because there is no doubt that this home purchase assistance benefit is only due to a certain type of participation in HOP.

Increased Participant Wealth via Home Equity Appreciation. Past the point of purchase, however, wealth may increase further if the purchased home appreciates in value, regardless of whether the HOP participant received purchase assistance. In fact, HOP high-intensity participant homebuyers experienced over their first five years of home owning during the period 2001-2011 an average annual home *depreciation* of $2,210.[12] This is not surprising inasmuch as some bought at what subsequently proved to be the peak of the housing price bubble and prices in Denver fell precipitously beginning in 2007. However, there is an asymmetry in risk to homebuyers' wealth: an unlimited upside potential home equity gain but a limit on the downside potential loss constrained by the equity (i.e., downpayment) they had in the home at time of purchase. If value were to drop more than initial equity, that would not generate a further loss of wealth to them, only to the lender, whether they defaulted or not. In the case of our 2001-2009 cohort of HOP high-intensity participant homebuyers, 70 percent suffered such losses of some or all of their initial equity (which they either personally financed and/or received as downpayment assistance), averaging $6,272 ($6,623 standard deviation). The rest evinced a five-year annualized average home appreciation of $7,084 ($7,069 standard deviation), or summed and discounted over five years yields a present value gain of $39,100 ($39,017). Again assuming that this appreciation accrues only for five years, only 18 of every 100 enrollees are treated at high-intensity, and that treatment increases the number of homebuyers after five years by five (5.34), the foregoing translates into a mean expected value of home appreciation wealth benefit of $39,124 (with a substantial standard deviation of $67,470 reflecting depreciation risk) per 100 HOP enrollees.[13]

Improved Child Health Outcomes through Higher Parental Income. Here we follow the precedent established by Carlson et al. (2011) and use the well-recognized estimates derived by Condliffe and Link (2008) of the relationship between the log of parental income and an ordinal scale of child health, controlling for prior chronic conditions and other parent and child characteristics. This relationship shows that a one unit increase in the log of parental income reduces the probability of being in the Good/Fair/Poor health reported category (instead of the Excellent/Very Good category) by 0.055.[14] Our earnings analysis above showed that the mean parental earnings

[12] The period over which these annualized figures were estimated varied depending on when the participant bought a home after exiting HOP. Home price appreciation was based on official tax assessor's office records of: (1) sales price if participant sold original home before five years after HOP exit; or (2) assessed value as of if participant still living in original home five years after HOP exit. Appreciation was set to zero if participant defaulted on original mortgage. We use our empirically observed standard deviations for annualized home equity gains and losses and assume both are normally distributed for the purposes of our simulation, which estimates the expected values of gains. Annual gains are discounted, but losses are not.

[13] For every 100 enrollees, 18.4 will receive the high-intensity treatment that will produce an expected increment in buying a home of (18.4)(.29)= 5.34 more homes purchased. Given that 70 percent of our sample witnessed losses, the expected value of appreciation weights the $6,272 loss by .7 and the $39,100 gain by .3 and returns in our simulations a mean expected value of home equity gain for each buyer of $7,339 ($12,576). Multiplying this value by 5.34 yields the program effect per 100 enrollees.

[14] We employ the Condliffe and Link (2008) standard error of 0.019 in our Monte Carlo simulations. For further details of the strategy we replicate, see Carlson et al. (2011: Appendix A).

increase attributable to high-intensity HOP participation was $4,523, which when compared to the mean of participants at time of program entry ($12,459), represents an increase in the log of parental income of .31 and a corresponding mean reduction in probability of the child being in the inferior health category of .017. We assume this child health gain persists for five years after parents' completion of HOP.

To monetize this probabilistic improvement in children's health, we again follow the strategy of Carlson et al. (2011), who combine estimates of Nyman et al. (2007), Dow and Schoeni (2008) and Schoeni et al. (2011) regarding the monetized utility of a year of life spent in optimal health, aggregating the values of the child, parent and society as a whole. Using their valuation algorithm we find that the aforementioned probability of being in better health is worth on average $12,708 ($2,012 standard deviation) per child per year. Since we assume this benefit persists (discounted) as long as the improvement in HOP participant income and that we have, on average, 2.16 children (standard deviation 1.2) per HOP high-intensity treatment family, our estimated mean benefit here for each such average family is $2,100. The benefit per 100 HOP enrollees is $38,645 ($35,828 standard deviation).

Program Benefits to Non-Participants

Reductions in DHA/Taxpayer Costs of Rent Subsidies and Public Housing Operations and Administration. Recall that HOP participants come from both the DHA Housing Choice Voucher (Section 8) and public housing programs. Thus, when these families become self-sufficient (both homebuyers and those renting in the private sector) at the end of HOP and relinquish their DHA subsidy, taxpayers benefit from the savings. These benefits take two forms. The first, larger, and most obvious are saving the erstwhile costs that DHA incurred for the: (1) rental housing assistance paid to HCV landlords for the benefit of former HOP graduates; or (2) the operating and amortized capital costs of the public housing units formerly occupied by HOP graduates (less their rent revenues); and (3) the associated costs of administration. Since the share of HOP graduates coming from the HCV and public housing programs varies yearly and we see no analytical benefit from trying to distinguish their costs and benefits, we estimate these program costs for a "generic" DHA household.

Specifically, from DHA budget reports (DHA, various years) we tabulated the total annual expenditures made by DHA while operating and administering its two housing assistance programs for the 2001-2009 period, with all figures inflation-adjusted to constant 2012 dollars. From these figures we subtracted rental payments made by public housing residents, which served to defray costs partially, to compute a net annual expenditure. We also subtracted the annual costs associated with running HOP, which we detail later, because these are not associated with the generic assisted household. We then calculated for each year a per-recipient net expenditure (i.e., an average net cost across all HCV and public housing recipients combined). This produced a mean of $11,513 (standard deviation of $1,990) over the 2001-2009 period.

Recall from Table 2 we estimated that HOP high-intensity participation increased the probability of becoming economically self-sufficient (i.e., ceasing the need to be subsidized by DHA) by .42 (.04 standard error). This means that for every 100 HOP enrollees the marginal expected number of roughly eight (7.73) who are made self-

sufficient by HOP[15] each saved DHA $11,513 annually, on average ($1,990 standard deviation), during each of the five years after graduating compared to if they had remained on DHA assistance during this period. Summing these discounted values over five years and adjusting for the 18.4 percent high-intensity participation rate, this translates into a mean taxpayer benefit of $412,235 (simulated standard deviation of $81,647) per 100 HOP enrollees.

The second benefit is a reduction in the distortions associated with the federal income tax used to raise revenue for the aforementioned program costs, the so-called "excess welfare burden of taxation." Following the procedure employed by Carlson et al. (2011) based on their review of the empirical literature, in our Monte Carlo simulations we permit a normally distributed range of parameter estimates for this marginal excess tax burden with a mean of 0.20 per dollar of tax paid and a standard error of .05. Applying these parameters to the $412,235 figure estimated above for present discounted value of taxpayer savings over five years, this translates into a benefit of $82,537 ($26,718 standard deviation) per 100 HOP enrollees.

Combining these two types of benefits, we estimate a mean taxpayer benefit (discounted present values over five years) of $494,772 ($100,293 simulated standard deviation) per 100 HOP enrollees, given that HOP renders through its high-intensity treatment approximately eight enrollees self-sufficient who otherwise would have remained dependent on public subsidies.

More Homeowner-Generated Positive Externalities for Neighbors. HOP participants who buy homes add to the stock of homeowners to the extent that the program improves their chances of buying compared to the counterfactual. As reported in Table 2 we estimated that HOP high-intensity participation increased the probability of buying a home within five years of start of program participation by 0.29. This translates into an increase of five homeowners per 100 original enrollees in HOP compared to the counterfactual.

There are many reasons why non-participants who are neighbors to these additional homeowners will reap benefits. Compared to absentee owners, owner-occupiers will have more financial and social stake in their property and thus vested interest in the quality of their neighborhoods. This means that they will maintain their property at superior levels, participate more actively in local social institutions, and be more apt to engage in activities enhancing collective efficacy (Galster, 1987; DiPasquale and Glaeser, 1999; McCarthy, van Zandt and Rohe, 2001).

Not surprisingly, the housing market positively capitalizes neighboring homeowners compared to absentee owners, and this gives us a way to monetize the aforementioned benefit. Fu (2005) estimated that the value of a dwelling (renter or owner-occupied) would increase 0.194 percent (standard error of 0.061) for each one percentage-point increase in the encompassing census tract's homeownership rate, controlling for a wide array of other neighborhood housing, demographic and socioeconomic characteristics.

[15] For every 100 enrollees, 18.4 will participate in the high-intensity treatment that will produce an expected increment in self-sufficiency of (18.4)(.42)= 7.73 people becoming self-sufficient.

Our 2001-2009 HOP participant homebuyers purchased in 132 Denver-area census tracts having, on average, 1892 dwellings (874 standard deviation), 66.9 percent homeownership rates (59.5 standard deviation) and median home sales prices of $140,766 ($52,679 standard deviation).[16] The HOP participant homebuyers constituted an estimated increment of five more owner-occupied dwellings in this mean tract, per 100 enrollees, thereby raising the mean homeownership rate by 0.39 percentage points. This translates, via the Fu (2005) estimates, into an one-time, aggregate externality value increment summed for all dwellings in the mean tract by $101,692 ($88,888 standard deviation).[17]

It is worth noting that there is no reason to believe that HOP participants hurt the neighborhoods into which they moved by rendering them more vulnerable to the myriad negative externalities associated with home foreclosures. On the contrary, when HOP participant homebuyers were compared to their counterpart enrollees who dropped out of the program but eventually purchased homes, the former experienced significantly fewer foreclosures (self-citation redacted). Indeed, HOP participant homebuyers performed about as well as the generic homebuyer (regardless of income) during this challenging period in Denver.

Reductions in Labor Disincentive Effects. It is well-known theoretically and empirically that receiving income transfers (including housing subsidies) that are reduced proportionately when recipient income rises creates a work disincentive (Olsen, 2002). These proportionate subsidy reductions effectively constitute a high marginal tax rate on recipient earnings, thus encouraging them to substitute leisure for work hours and creating a "deadweight" loss for society thereby. A social benefit of HOP-generated self-sufficiency is that such distorting subsidies are discontinued.

Carlson et al. (2009) have estimated the work disincentive effects of the voucher program, and when combined with various estimates of labor supply and demand elasticities, have concluded the deadweight loss per housing subsidy recipient ranged between 0.7 to 4.0 percent of recipient earnings annually (also see Olsen, 2002). In our simulations we employ a uniformly distributed set of estimates within the foregoing range (following Carlson et al. 2011) applied to the $12,459 mean earnings of HOP participants at time of program entry. This procedure yields a mean annual social benefit of $293 ($135 standard deviation) per HOP-generated self-sufficient participant annually, or $10,495 ($4,943 standard deviation) total discounted over five years per 100 HOP enrollees in deadweight losses avoided for the estimated 42 enrollees who are boosted into self-sufficiency via high-intensity HOP treatments.

[16] Given the atypical boom-bust housing bubble that ensued during the decade, we believe that the 2000 median home value figures provide a more conservative and stable parameter upon which to base our analysis.

[17] Although this calculation is conducted as if all HOP homebuyers purchased in the same, average tract, the aggregate benefits are the same as if they were even spread across tracts because the Fu (2005) estimates are linear.

Program Costs to Participants

Loss of Rental Housing Subsidy. HOP high-intensity participants who become self-sufficient no longer receive housing assistance in the form of a private rental voucher or subsidized public housing, and this represents a cost to them. The monetary value of a voucher subsidy is the difference between fair market rent for an apartment and the tenant contribution to that rent, i.e., the DHA payment to the landlord. From DHA budget reports for the 2001-2009 period (DHA, various years) we calculated the mean annual average DHA payments to HCV landlords per HCV recipient as $10,312 ($868 standard deviation) in 2012 dollars.[18] Estimating the monetary value of the subsidy implicit in a DHA public housing unit is more difficult because these units do not command market rents. Nevertheless, Murray (1975) and Clemmer (1984) have derived such estimates, which range from $5,172 to $9,422 (in 2012 dollars).[19]

The monetary value of the subsidy is larger than the value to the recipient, however, because recipients of public housing or vouchers will have their consumption bundle distorted toward more housing than they would otherwise choose. Reeder (1985) finds that tenant benefits are 83 percent of the value of the federal subsidy for a voucher. Estimates of the equivalent figure for public housing in studies summarized in Olsen (2002), with a median of 76 percent.[20] We use these estimates of distortions and the above estimates of subsidies to conduct separate Monte Carlo simulations for former voucher holders and public housing residents who become self-sufficient. This yielded simulated mean annual costs of lost subsidies of $10,287 and $5,690 per self-sufficient high-intensity participant previously using vouchers and public housing, respectively. Taking present discounted values over five years and adjusting for participation and HOP-generated self-sufficiency impacts, and weighting this group by their share in DHA vouchers (.181) and public housing (.819), yields a mean cost of lost housing subsidies (to self-sufficient high-intensity participants) of $233,428 per 100 enrollees ($40,392 standard deviation).

Loss of Housing Stability Provided by DHA's Adjustable Rents. HOP high-intensity participants who become self-sufficient are no longer partially insulated from interruptions in their household income as they were when receiving DHA assistance, inasmuch as their rent contributions to DHA would decline 30 percent of any income decline they experienced. Such income interruptions might lead to eviction or foreclosure in the private market, but by comparison should not affect a household's security of tenure when receiving a voucher or public housing lease. Similarly, unsubsidized households are more vulnerable to affordability shocks caused by landlords raising rents or adjustable rate mortgages being reset upwards. Following the procedure employed by Carlson et al. (2011), we monetize this loss of stability as the

[18] In our simulations we allowed this value to vary normally with its observed standard deviation of $868. Our mean estimate here is an overstatement of losses to HOP graduates inasmuch as they began the program with an above-average income and thus the value of the voucher was less to them than the generic DHA voucher recipient.

[19] We allow estimates used in our simulations to vary uniformly within the observed inter-study range.

[20] In our simulations we allowed the estimates summarized in Olsen to vary uniformly within the observed inter-study range from 64 to 92 percent. Reeder did not provide a standard error associated with his estimate, so we allow it to vary uniformly within the range 75 to 90 percent.

cost of a minimum-value ($25,000) term "mortgage protection" insurance policy, which they estimated having mean annual premium of $118 and normally distributed standard error of $27 (2012 dollars). Taking present discounted values over five years and adjusting for high-intensity participation and HOP-generated impacts on self-sufficiency yields a cost of lost security of housing tenure to self-sufficient tenants of $4,225 ($1,053 standard deviation) per 100 enrollees.

Program Costs to Non-Participants: HOP Operation Costs

DHA costs in operating HOP involved DHA staff wages and benefits, office and classroom space, materials and supplies, marketing, matches for tenant contributions to FSS savings accounts, and closing cost assistance.[21] DHA records indicate that these costs summed for the 2001-2009 period amounted to $3,034,562 ($2012). Additional operating costs were borne by other segments of society in the form of volunteer time devoted to teaching HOP classes (estimated at over $60,000 equivalent value) and non-profit organizations' downpayment assistance to HOP homebuyers (amounting to over $100,000). Combined, HOP cost society $3,104,488 ($2012) to operate during this nine-year period, or $180,809 per 100 enrollees. Unfortunately, data did not permit us to allocate these costs annually on a per enrollee basis, so we have no empirical evidence on how average annual program costs varies across the period. In our Monte Carlo simulations were therefore assume a modest, normally distributed standard deviation ($20,000) to account for possible inter-temporal variations in the costs per enrollee and DHA administrative reporting errors.[22]

DISCUSSION AND SENSITIVITY ANALYSES

Examination of Table 3 holistically reveals several important features of our estimated benefits and costs. First, the largest category of benefits accrues not to HOP participants but to non-participants: reduced needs for housing assistance provided by DHA ($494,772). These benefits are of the same order of magnitude as those accrued by participants via enhanced earnings ($444,617). There are also sizable benefits to other non-participants: positive externalities accrued by homeowners in neighborhoods receiving more homeowners from HOP ($101,692). This result has powerful political implications: HOP not only delivers far more benefits to *recipients* than it costs to operate, it delivers *even more to the rest of society* than it costs to operate. Thus, HOP could be justified not only on equity grounds (i.e., improving the well-being of participants) but on social efficiency grounds (producing more benefits to non-participants than they pay to operate the program plus any other costs).

Second, it is clear that participants who receive the high-intensity HOP treatment (Home Buyers Club) gain large net economic benefits ($19,041 average accumulated during the last year of HOP and the five years after HOP exit), even though they lose their rental subsidy and the insulation from potential rent increases that this implies. Of

[21] Note that it is not appropriate to include as a program cost to DHA foregone tenant rents that HOP participants paid into rent escrow accounts. The counterfactual is the generic DHA family who stays at same income in DHA, so there is nothing foregone by comparison.

[22] We assume all costs are incurred before any benefits accrue, thus we do not time discount costs in our calculations. This is a conservative assumption because this reduces calculated net benefits.

course, it is unfortunate that only 18.4 percent of original enrollees persist successfully to receive such intense treatment, for otherwise the net benefits for HOP would have appeared even more remarkable.

Third, the primary economic benefit from HOP to participants came through enhanced earnings capacity, not through wealth gains associated with owning a home. Of course, there were particular exceptions of notable home equity gains among participants, and 30 percent overall experienced appreciation within five years of purchase. However, there was clear risk associated with buying a home, as 70 percent of HOP high-intensity participants lost some or all of their original home equity. We would emphasize that this result may not be general insofar as our analysis period for home value appreciation spanned one of the worst housing collapses in U.S. history. It is encouraging, nevertheless, that a program ostensibly designed to build assets via homeownership proved to be net beneficial for participants despite such an abysmal housing market context.

How confident are we in these conclusions? We have high confidence in our conclusion of large, positive net social benefits for five reasons. First, we were unable to quantify several categories of likely benefits accruing to participants and their children. As illustration, we did not count any value of HOP participants' improved educational credentials in terms of future improvements in their earnings prospects, reduced rates of unemployment, etc. past the first five years after HOP. We could not estimate any health benefits accruing to HOP participants as a result of their improved education, income, and perhaps neighborhood conditions. We also could not measure any potential benefits to participants' children's health or educational performance associated with families moving to better neighborhoods as they bought homes.

Second, throughout we have made conservative assumptions in our simulations that tended to minimize benefits and maximize costs. For example, there were no calculated social benefits of any kind (only social costs) for "partial participants" who did not receive the Home Buyers Club treatment of HOP but nevertheless may have gained some benefits while participating. By assuming negligible distortion of consumption from the rental housing subsidy we eliminated this potential benefit to HOP participants while simultaneously raising their costs in terms of valuing their foregone rental subsidy. We assumed that health benefits from higher parental income accrued only to HOP participant children, not to the larger society, i.e., there were no social benefits from reductions in communicable diseases or needs for medical services partially subsidized by the public. Finally, we assumed that income gains for HOP high-intensity participants persisted only five years and did not grow in inflation-adjusted terms.

Third, our conclusion does not hinge on one category of benefits or program effects. No single category of benefits is so substantial that it drives the results. Indeed we could alternatively assume that there were *no* HOP impacts on either participants' earnings, or self-sufficiency, or homeownership rates, and we would calculate positive net social benefits nevertheless.

Fourth, because our analysis period encompassed a major housing price collapse, there were unusually small estimated benefits from buying a home as a consequence of HOP. This not only meant that HOP homebuyers undoubtedly suffered from a higher rate of default (and, ultimately, foreclosure) than would be normal, they more often as not lost home equity even if they remained a homeowner. Had we been

able to calculate appreciation using more recent data from a recovering Denver regional housing market we would have expected to see larger homebuyer wealth benefits.

Fifth, many benefit calculations (and none of the cost calculations) involved time discounting, and all figures reported above used a standard four (4) percent discount rate. When we replicated the analysis using a ten (10) percent rate, we still estimated net social benefits of $700,928. We are thus confident in the robustness of our results.

CONCLUSION

The last two decades have witnessed an unmistakable evolution of assisted housing policy in the United States. As epitomized by the Family Self-Sufficiency Program, decent, affordable housing increasingly has been viewed not merely as an end in itself but as a means for family asset-building and reductions in their long-term needs for public assistance. We have conducted a comprehensive benefit-cost analysis of an enhanced FSS program implemented by the Denver Housing Authority, relying on parameter estimates from quasi-experimental statistical studies from which plausible causal inferences can be drawn. We estimate $0.42 million social costs and $1.19 million social benefits per 100 enrollees who entered HOP, on average, with the latter accruing over five years after program exit. This yields a net social benefit estimate for HOP of $0.78 million. The simulated standard deviations associated with these means suggest a high degree of statistical confidence in concluding that this program had substantial net benefits to society as a whole. On similar grounds we conclude that the program yielded substantial and roughly equal net benefits to program participants and non-participants alike.

The foremost policy implication from our analysis is clear. A well-conceived and executed public housing authority program aimed at building the financial, human and social assets of low-income households receiving housing assistance can yield substantial net benefits to participants, non-participants and society as a whole. We thus should not overreact to the disastrous experiences of generic low-income homebuyers during the housing-mortgage market meltdown of the last decade by concluding that all efforts to expand home ownership opportunities in this realm should be abandoned.

Of course, we acknowledge that the experience with HOP cannot necessarily be generalized to similar self-sufficiency programs run by other housing authorities. Indeed, we recognize that DHA is a well-run and innovative authority with exceptional staff, having been awarded HUD's "high performer" designation for many consecutive years. For a wider-ranging, more general investigation of the impacts of FSS, analysts must wait for the currently ongoing evaluation being conducted for HUD by MDRC (Verma et al., 2012).

REFERENCES

Angrist, J., & Pischke, J. (2009). *Mostly harmless econometrics: An empiricist's companion*. Princeton, NJ: Princeton University Press.

Anthony, J. (2005). Family self-sufficiency programs: An evaluation of program benefits and factors affecting participants' success. *Urban Affairs Review, 41*(1), 65-92.

Bloomquist, J. D., Ellen, I. G., & Bell, S. H. (1994). *Documentation of Operation Bootstrap, Volume II: Report on project outcomes* (HUD-1483-PDR): U.S. Department of Housing and Urban Development.

Bogdon, A. S. (1999). What can we learn from previous housing-based self-sufficiency programs? In S. J. Newman (Ed.), *The home front: Implications of welfare reform for housing policy* (pp. 149-174). Washington, D.C.: The Urban Institute Press.

Bratt, R. G. (2008). Viewing housing holistically: The resident-focused component of the Housing-Plus agenda. *Journal of the American Planning Association*, *74*(1), 100-110.

Card, D. (2001). Estimating the returns to schooling: Progress on some persistent econometric problems. *Econometrica, 69,* 1127-1160.

Carlson, D., Haveman, R., Kaplan, T., & Wolfe, B. (2009). Long-term effects of public low-income housing vouchers on labor market outcomes. Institute for Research on Poverty Discussion Paper. Madison, WI: University of Wisconsin-Madison.

_____(2011). The benefits and costs of the Section 8 Housing Subsidy Program: A framework and estimates of first-year effects, *Journal of Policy Analysis and Management, 30*(2), 233-255.

Clemmer, R. (1984) “Measuring welfare effects of in-kind transfers,” *Journal of Urban Economics, 15*, 46-65.

Condiffe, S., & Link, C. (2008). The relationship between the economic status and child health: Evidence from the United States. *American Economic Review, 98*, 1605-1618.

Cook, T., & Steiner, P.M. (2010). Case matching and the reduction of selection bias in quasi-experiments: The relative importance of pretest measures of outcomes, of unreliable measurement, and of mode of data analysis. *Psychological Methods, 15*(1), 56–68.

Cramer, R., & Lubell, J. (2005). *The Family Self-Sufficiency Program: A promising, low-cost vehicle to promote savings and asset building for recipients of federal housing assistance. Issue Brief #9*, Washington, DC: New America Foundation.

Crump, R.V., Hotz, J., Imbens, G., & Mitnik, O. (2009). Dealing with limited overlap in estimation of average treatment effects. *Biometrika, 96*(1), 187–199.

Denver Housing Authority. (various years). *Comprehensive Budget*. Denver, CO: Housing Authority of the City and County of Denver, years 2001-2010 inclusive.

DiPasquale, D., & Glaeser, E. (1999). Incentives and social capital: Are home-owners better citizens? *Journal of Urban Economics, 45*, 354-384.

Dow, W., & Schoeni, R. (2008). *Economic value of improving the health of disadvantaged Americans*. Technical Report for Overcoming Obstacles to Health: Report from the Robert Wood Johnson Foundation to the Commission to

Build a Healthier America. Retrieved Jan. 21, 2013 from: http://www.commissiononhealth.org/PDF/7626470d-e944-4dfe-9f8c-3fd2dad98472.

Ficke, R. C., & Piesse, A. (2004). *Evaluation of the Family Self-Sufficiency Program: Retrospective analysis 1996-2000:* U.S. Department of Housing and Urban Development Office of Poverty Development and Research.

Frees, J. W., Ellen, I. G., & Holm, C. (1994). *Operation Bootstrap, Volume III: Case studies* (HUD-1485-PDR). Washington, D. C.: U.S. Department of Housing and Urban Development.

Frees, J. W., Ellen, I. G., & Locke, G. (1994). *Operation Bootstrap, Volume I: Program administration* (HUD-1483-PDR). Washington D.C.: U.S. Department of Housing and Urban Development.

Fu, S. (2005). *What has been capitalized into property values?* Washington, DC: U.S. Bureau of the Census, Working Paper CES-05-25.

Galster, G. (1987). *Homeowners and neighborhood reinvestment*. Durham, NC: Duke University Press.

Gibson, K. J. (2003). Raising assets, earnings, and esteem: The Housing Authority of Portland's Family Self-Sufficiency Program. Paper presented at the 2003 IAFFE Conference on Feminist Economics.

Heckman, J., Ichimura, H., & Todd, P.E. (1997). Matching as an econometric evaluation estimator: Evidence from evaluating a job training programme. *Review of Economic Studies, 64*, 605–654.

——. (1998). Matching as an economic evaluation estimator. *Review of Economic Studies, 65*, 261–294.

Heckman, J., & Navarro-Lozano, S. (2004). Using matching, instrumental variables, and control functions to estimate economic choice models. *The Review of Economics and Statistics, 86*(1), 30–57.

Ho, D., Imai, K., King, G., & Stuart, E. (2007). Matching as nonparametric preprocessing for reducing model dependence in parametric causal inference. *Political Analysis, 15,* 199–236.

Lubell,J. (2004a). *A diamond in the rough–the remarkable success of the FSS Program,* FSS partnerships (http://www.fsspartnerships.org/includes/fssresults.pdf*).*

Lubell, J. (2004b). *Expanding asset-building opportunities for low-income families through FSS*, FSS Partnerships (http://www.fsspartnerships.org/includes/expandingfss.pdf).

McCarthy, G., van Zandt, S., & Rohe, W. (2001). *The Economic benefits and costs of homeownership.* Washington, DC: Research Institute for Housing America, Working Paper No. 01-02.

McKernan, S., & Sherraden, M. (2008). *Asset building and low-income families.* Washington, D. C.: Urban Institute Press.

Murray, M. (1975). The distribution of tenant benefits in public housing. *Econometrica, 43* (4), 771-788.

Newman, S.J., & Schnare, A.B. (1988). *Beyond bricks and mortar: Re-examining the purpose and effects of housing assistance.* Washington, D.C.: Urban Institute Press.

Newman, S.J., & Schnare, A.B. (1992). *Integrating housing and welfare assistance.* Working paper, MIT Center for Real Estate Development.

Nyman, J., Barleen, N., Dowd, B., Russell, D., Coons, S., & Sullivan, P. (2007). Quality-of-life weights for the U.S. population. *Medical Care, 45*, 618-628.

Olsen, E. (2002). Housing programs for low-income households. In R. Moffitt (Ed.), *Means-tested transfer programs in the U.S*. (pp. 365-441). Chicago, IL: University of Chicago Press.

Quercia, R., & Wachter, S. (1996) Homeownership counseling performance: How can it be measured? *Housing Policy Debate, 7*(1), 175-200.

Reeder, W. J. (1985). The benefits and costs of the Section 8 Existing housing program. *Journal of Public Economics, 26*, 349-77.

Riccio, J. A. (2007). *Subsidized housing and employment: Building evidence about what works to improve self-sufficiency.* MDRC Working Paper.

____ (1999). *Mobilizing public housing communities for work: Origins and early accomplishments of the Jobs-Plus Demonstration*. New York: MDRC.

Rohe, W. (1995). Assisting residents of public-housing achieve self-sufficiency - An evaluation of Charlotte's Gateway Families Program. *Journal of Architectural and Planning Research, 12*(3), 259-277.

Rohe, W., Gorham, L., & Quercia, R. (2005). Individual Development Accounts: Participants' Characteristics and Success. *Journal of Urban Affairs, 27*(5), 503.

Rohe, W., & Kleit, R. (1997). From dependency to self-sufficiency: An appraisal of the Gateway Transitional Families Program. *Housing Policy Debate, 8*(1), 75-108.

Rohe, W., & Kleit, R. (1999). Housing, welfare reform, and self-sufficiency: An assessment of the family self-sufficiency program. *Housing Policy Debate, 10*(2), 333-369.

Rohe, W., & Stegman, M. (1991). Coordinating housing and social services: The new imperative. *Carolina Planning, 17*(2), 46-50.

Santiago, A. M., Galster, G.C., Kaiser, A.A., Santiago-San Roman, A.H., Grace, R.A., & Linn, A.T.H. (2010a). Low-income homeownership: Does it necessarily mean sacrificing neighborhood quality to buy a home?" *Journal of Urban Affairs* 32:171-198.

Santiago, A. M., Galster, G.C., Santiago-San Roman, A.H., Tucker, C. M., Kaiser, A.A., Grace, R. A., & Linn, A.T.H. (2010b). Foreclosing on the American Dream?: The financial consequences of low-income homeownership. *Housing Policy Debate,* 20, 707-742.

Sard, B. (2001). *The Family Self-Sufficiency Program: HUD's best kept secret for promoting employment and asset growth*. Washington DC: Center for Budget and Policy Priorities.

Sard, B., & Lubell, J. (1999). How the statutory changes made by the Quality Housing and Work Responsibility Act of 1998 may affect welfare reform efforts. Washington, DC: Center for Budget and Policy Priorities.

Sard, B., & Lubell, J. (2000). The increasing Use of TANF and state matching funds to provide housing assistance to families moving from welfare to work. Washington, DC: Center for Budget and Policy Priorities.

Schoeni, R., Dow, W., Miller, W., & Pamuk, E. (2011). The e*conomic value of improving the health of disadvantaged Americans*. *American Journal of Preventative Medicine* 40 (1 Suppl 1):S67-72.

Shadish, W., Clark, M. H., &, Steiner, P. M. (2008). Can nonrandomized experiments yield accurate answers?: A randomized experiment comparing random and nonrandom assignments. *Journal of the American Statistical Association, 103*(484),1334–1356.

Shadish, W.R., Cook, T.D., & Campbell, D.T. (2002). *Experimental and quasi-experimental designs.* New York: Houghton Mifflin.

Sussman, C. (2005). Resident services for families in affordable housing: A background paper. Paper presented at the Resident Services Symposium, Washington, DC, March.

Shapiro, T. M., & Wolff, E.N. (2001). *Assets for the poor: Benefits and mechanisms of spreading asset ownership*. New York, NY: Russell Sage.

Sherraden, M. (1991). *Assets and the poor: A new American welfare policy*. Armonk NY and London: Sharpe.

Shlay, A. B. (1993). Family self-sufficiency and housing. *Housing Policy Debate, 4*(3), 457-495.

Shlay, A. B., & Holupka, C. S. (1992). Steps toward independence - Evaluating an integrated service program for public-housing residents. *Evaluation Review, 16*(5), 508-533.

U.S. Department of Housing and Urban Development. (1987). *Project Self-Sufficiency: An interim report on progress and performance*. Washington, D.C.: U.S. Government Printing Office.

U.S. Department of Housing and Urban Development. (1988). *Project Self-Sufficiency: A summary*. Washington, D.C.: U.S. Government Printing Office.

Verma, N., Tessler, B., Miller, C., Riccio, J., Rucks, Z., & Yang, E. (2012). *Working toward self-sufficiency: Early findings from a program for housing voucher recipients in New York City.* New York: MDRC, December.

Vining, A.R. & Weimer, D.L. (2010). The application of cost-benefit analysis to social policy, *LaFollette Policy Report, 19*(2),1-4.

_____.eds. (2009). *Investing in the disadvantaged: Assessing the benefits and costs of social policies.* Washington, DC: Georgetown University Press.

Table 1. Distribution of HOP Enrollees by Intensity of Treatment and Mean Outcomes (2001-2009 cohort)

Outcome	Intensity of HOP Treatment		
	Low Intensity	Moderate Intensity	High Intensity
Share of Enrollees	22.5%	59.2%	18.4%
Mean Annual Earnings Change during HOP	2554	1353	4411
Mean Annual Earnings Change after HOP**	468	468	4992
Self-Sufficiency Exit*	14.0%	12.6%	54.8%
Purchased Home Within 5 Years	4.5%	13.5%	52.5%

* Moved into private rental voluntarily or income-ineligible for DHA; purchased home; moved for higher education
** Low- and Moderate-Intensity groups combined due to small N
Note: mean values for outcomes are not adjusted

Table 2. Estimated Impacts of High-Intensity HOP Treatment

Outcome	HOP Treatment Group					
	Low/Moderate Intensity	High Intensity	Difference	Standard Error	t-statistic	N for Matching
Mean Annual Earnings Change during HOP	1212	4425	3213	770	4.17	1437
Mean Annual Earnings Change after HOP	468	4992	4523	1697	2.67	72
Self-Sufficiency Exit*	.13	.55	.42	.04	9.65	1437
Purchased Home Within 5 Years of HOP Start	.01	.30	.29	.03	9.27	1437

Note: all differences significant at $p < .01$; impacts based on propensity-matched sample comparisons (see text for details)

* Moved into private rental voluntarily or income-ineligible for DHA; purchased home; moved for higher education

Table 3. Estimated Mean Benefits and Costs of DHA's HOP per 100 Enrollees, by Type and Component of Society (Standard Deviations in Parentheses)

	Component of Society		
	Participant	Non-Participant	Society
Benefit Categories			
Increased Earnings	$ 444,617	N / A	$ 444,617
	$ (144,491)		$ (144,491)
Increased Wealth via Downpayment Aid	$ 65,627	N / A	$ 65,627
	$ (28,199)		$ (28,199)
Increased Wealth via Home Appreciation	$ 39,124	N / A	$ 39,124
	$ (67,470)		$ (67,470)
Less-Distorted Housing Consumption	$ -	N / A	$ -
	(0)		(0)
Improved Child Health via Income	$ 38,645	N / A	$ 38,645
	$ (35,828)		$ (35,828)
Reduced Public Housing Subsidies	N / A	$ 494,772	$ 494,772
		$ (100,293)	$ (100,293)
Increased Homeowner Externalities	N / A	$ 101,692	$ 101,692
		$ (88,888)	$ (88,888)
Reduced Labor Market Disincentives	N / A	$ 10,495	$ 10,495
		$ (4,943)	$ (4,943)
Total Benefits	*$ 588,014*	*$ 606,959*	*$ 1,194,973*
	$ (176,359)	*$ (134,432)*	*$ (221,289)*
Cost Categories			
Reduced Rental Housing Subsidy	$ 233,428	N / A	$ 233,428
	$ (40,392)		$ (40,392)
Reduced Housing Stability	$ 4,225	N / A	$ 4,225
	$ (1,053)		$ (1,053)
Program Operating Costs	N / A	$ 180,880	$ 180,880
		$ (20,042)	$ (20,042)
Total Costs	*$ 237,654*	*$ 180,880*	*$ 418,534*
	$ (40,624)	*$ (20,042)*	*$ (45,240)*
Net Benefits	*$ 350,360*	*$ 426,079*	*$ 776,439*
	$ (181,079)	*$ (136,028)*	*$ (221,121)*

Note: All parameter estimates reported in each cell are based on independent Monte Carlo simulations and thus columns will not precisely sum to totals presented (see text for details); figures are expressed in 2012 dollars (discounted from the future where appropriate using a four percent rate).

APPENDIX A. A BRIEF REVIEW OF THE FSS EVALUATION LITERATURE

All FSS programs share several elements in common (Sard, 2001; Rohe and Kleit, 1999; Bratt, 2008). PHA staff and representatives from key local service providers form a Program Coordinating Committee that devises an action plan tailored to local realities, which must be approved by HUD. PHA resident households choose voluntarily to participate, and can be screened from participation only on a circumscribed set of characteristics related to motivation (Rohe and Kleit, 1999). Participants sign a five-year contract that delineates their interim and final goals (which must include independence from public assistance) and work or educational responsibilities, and supportive services that will be provided to them. Intensive case management is provided to assist in goal development and achievement, through counseling, information, referral, and advocacy. Finally, FSS provides for an escrow savings account, into which any marginal formulaic increases in rent associated with improvements in participants' income are deposited. With approval of the PHA, participants can withdraw funds from their escrow account as part of fulfilling terms of their contracts, such as paying tuition for college. Upon successful completing of their contracts and exit from welfare assistance for at least 12 months, FSS participants receive a lump sum payment from their escrow accounts. Conversely, the failure to complete all program and contract requirements results in forfeiture of any funds held in escrow.

A number of PHAs have augmented their FSS Programs by adding elements designed to assist public housing families build financial assets through homeownership and individual development accounts. A 1996 survey of FSS programs by Rohe and Kleit (1999) revealed that 77 percent provided counseling about private rental and home ownership opportunities, 12 percent used homeownership as a benchmark for measuring participant success, and ten percent thought that homeownership assistance was the most important program element in attracting participants to FSS. The Charlotte, NC Housing Authority pioneered the homeownership-focused self-sufficiency strategy through its Gateway Program, which began in 1987 (Rohe, 1995; Rohe and Kleit, 1997). In addition to the FSS escrow accounts, some PHA-sponsored homeownership programs (see Santiago et al. 2010a,b) offer matched savings accounts (IDAs) as part of the PHA bundle of asset building initiatives or in partnership with local organizations. Moreover, ROSS funds provide financial support to public housing residents to build human capital assets through additional schooling and job training.

Lubell (2004a, b) and Sard (2001) underscore the potential of the FSS Program for helping low-income families build assets. Nearly half of FSS participants who had been enrolled in the program for at least 12 months held positive escrow balances averaging $2,400 and with average monthly deposits of $300 (Sard, 2001). Ficke and Piesse (2004) report that the median FSS escrow disbursement was $3,351. Individual programs report greater asset accumulation and escrow payouts: $3,297 in 22 programs located Oregon and Washington (FSS Annual Report Summary, 2003); $7,000 in Portland (Cramer and Lubell, 2005); and $8,000 in Montgomery County, MD (Cramer and Lubbell, 2005). Moreover, FSS participation has been linked to increases in participant earnings, economic self-sufficiency and homeownership (see Ficke and Piesse, 2004, Gibson, 2003. Unfortunately, attrition from FSS programs is quite high: Rohe and Kleit (1999) found that more individuals dropped out of FSS than completed; completion rates were less than 10 percent of all participants.

The previous statistics are difficult to interpret, however, because they may be substantially biased by unobserved characteristics of FSS s that affect who enrolls in and completes the program, as well as their financial outcomes. As noted above, the lack of quasi-experimental techniques represents the central shortcoming of the FSS

evaluation literature that limits our ability to draw conclusions regarding program impacts, particularly as they pertain to asset accumulation.

APPENDIX B: QUASI-EXPERIMENTAL METHODS OF MEASURING PROGRAM IMPACT EMPLOYED

Suppose that for each individual observation i during time t (before the program treatment is applied) the outcome (O) under investigation is a linear function of a set of measured personal characteristics ([M]) and unmeasured, fixed (i.e., time invariant) personal characteristics ([U]), plus an error term:

$$O_{it} = \alpha_t + [M_{it}]\,[\beta] + [U_i]\,[\delta] + \varepsilon \qquad [1]$$

Similarly, in a later period t+1 after the treatment T has been applied (to some i) the outcome can be described as a function of the current set of measured characteristics and the same set of unmeasured characteristics:

$$O_{it+1} = \alpha_{t+1} + [M_{it+1}]\,[\beta] + \sigma T_{it+1} + [U_i]\,[\delta] + \gamma \qquad [2]$$

where T=1 if individual treated; zero otherwise.

The main challenge in accurately assessing σ is that $[U_i]$ may be correlated both with γ and T due to selection into the treatment group. To address this challenge here we employ propensity score matching and, in the case of earnings outcome, a difference-in-differences analysis, as explained below.

Propensity Score Matching

Statistical matching of samples based on observed characteristics of treatment and control groups as a way of reducing bias from selection has been employed frequently in impact analyses (Heckman, Ichimura and Todd 1997, 1998; Heckman and Navarro-Lozano, 2004). Although such matching procedures assume that unobservables are highly correlated with observed characteristics, recent work suggests that this may not be implausible given that matching methods have been shown to approximate experimental results when a wide array of covariates is included (Shadish, Clark and Steiner, 2008, Cook and Steiner, 2010). As suggested by Ho *et al*. (2007), Angrist and Pischke (2009) and Crump *et al*. (2009) we use matching before estimating our regression model [1]. This provides an added advantage: no additional adjustments are required to the standard errors (Angrist and Pischke, 2009).

Our matching employs propensity scores generated by matching on age, gender, ethnicity, in FSS, in ROSS, and DHA housing type (conventional public housing or HCV). Finally, we would note that all in our sample reside in the same metropolitan area, thereby implicitly controlling for one element that has previously been identified as a crucial source of bias (Heckman, Ichimura and Todd, 1997).

Difference-in-Differences model

Under the similar set up we could also specify a model that combines observations at t and t+1 for both treatment and non-treatment (control) groups and distinguishes pre- and post-treatment periods of observation (P=1 if post-treatment period t+1, 0 otherwise):

$$O_i = \alpha_t + [M_i]\,[\beta] + \psi T_i + \lambda P_i + \sigma T_i P_i + [U_i]\,[\delta] + \varepsilon \qquad [3]$$

The parameter ψ gives us the initial, pre-treatment "difference" between treatment and control groups' O; λ gives the difference in outcomes for both groups that may be only due to temporal shifts in unmeasured factors affecting O between t and t+1; again σ is the measure of the treatment effect, the "differences in differences" (D-in-D) post-treatment. This model assumes that T controls for [U], insofar as any systematic differences across the groups in [U] should be measured by the pre-treatment "difference" between treatment and control groups' O. Note that the basic D-in-D models omit the [M] term, assuming that any differences will be picked up in the initial, pre-treatment "difference" between treatment and control groups. This is not as strong as trying to control for them explicitly, making it more plausible that T controls for [U], not the combination of [M] and [U]. Thus we employ propensity score matching to control for [M] before applying [3], thus providing a more robust estimate of σ. Of course, both propensity score matching and D-in-D models can fall prey to time-varying unobservables differentially and systematically impinging on treatment and control groups that might be strongly correlated with O (as do all experimental designs).