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ABSTRACT

This study investigated the effects of housing assistance received by children between the ages of 10 and 16 at some point during the period 1968-1982 on four outcomes experienced in adulthood: (1) welfare receipt between ages 20-27; (2) earnings above poverty between ages 25-27; (3) total earnings between 25-27; and (4) educational attainment at age 27. The impacts of public housing and privately owned assisted housing built or rehabilitated using federal government subsidies were studied using information from the Panel Study of Assisted Housing Database. The most significant finding is that public housing does not have detrimental effects on the long-term self-sufficiency outcomes of youth. The worse outcomes experienced by children who spend some time in public housing when compared to those who did not have assisted housing experience were a result of differences in family background, not housing assistance. There was some evidence that public housing may have positive effects on a child's long-term self-sufficiency, and there was also some evidence that public housing has a stronger positive effect on the most disadvantaged children. Housing assistance appears to have no effect on high school graduation, but it is associated with a 12 percentage point increase in the probability of a youth having some postsecondary education. Six appendixes discuss methodologies and some aspects of public housing impact. (Contains 40 tables and 39 references.) (SLD)

U.S. Department of Housing and Urban Development
Office of Policy Development and Research

PD&R

The Long Term Effects of Housing Assistance on Self-Sufficiency

Final Report

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The Long-Term Effects of Housing Assistance on Self-Sufficiency

Final Report

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Office of Policy Development and Research

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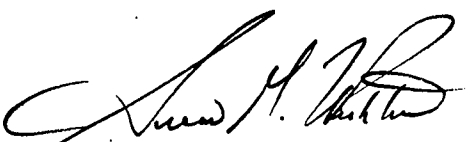
FOREWORD

A variety of Federal programs assist low-income families with children. Americans increasingly expect more from these programs than just helping families to meet their immediate needs. They want to make sure that these programs do not perpetuate poverty by encouraging permanent dependence on public support. President Clinton reflected this desire when he demanded an end to "welfare as a way of life" and when he signed into law the Personal Responsibility and Work Opportunity Reconciliation Act of 1996, which repealed an entitlement system of welfare and replaced it with explicitly temporary assistance to needy families.

Developing the potential of housing programs to support the economic independence of families is one of the primary goals of the Department of Housing and Urban Development (HUD) under Secretary Cuomo. However, very few scholars have seriously examined the effects of housing assistance on the self-sufficiency of low-income families, and the very first paper to study the *long-term* effects of housing assistance is this one.

Using a carefully developed extract of the Panel Survey of Income Dynamics, Sandra Newman and Joseph Harkness look at the outcomes of young adults in the 1980s who lived as teenagers in HUD's public and assisted housing developments during the 1970s. They carefully compare these outcomes to those of lower-income teenagers who did not receive assistance, and they have taken great pains to separate the effects of assistance from the unobserved characteristics of families that might affect both the need for housing assistance and the subsequent careers of their children. Contrary to widespread public perceptions about the pathologies of public housing, the researchers find that these housing programs, as they operated in the 1970s, were not detrimental to these children and may have, in fact, modestly improved their success as adults.

Policy makers will want to know more about what housing assistance does and does not do for young people and their families. This innovative study should make a significant contribution as we try to learn more, and to develop more effective policy responses.



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Executive Summary

Over the last 10 years, there has been an intensification of the debate about the fundamental purpose of housing assistance for the poor. The core question is whether the traditional goal of decent, affordable housing should continue to be viewed as an end in itself, or also--or instead--as a means to economic independence. Proponents of the latter view argue that performance measures emphasizing housing outcomes, such as the number of units meeting HUD's Housing Quality Standards or that are affordable to low- and very-low income households, should be supplemented by such outcomes as educational attainment, labor force participation, cessation of welfare receipt, and moves out of assisted housing. Recent HUD programs such as Project Self-Sufficiency, Operation Bootstrap, and Family Self-Sufficiency are emblematic of this alternative view of housing assistance.

Although a few studies have examined the effects of housing assistance on self-sufficiency outcomes, none has addressed long-term impacts and only one has attempted to deal with the fact that assisted housing residents are not a random sample of the low-income population. Thus, it is difficult to determine whether the results of these studies are due to the effects of housing assistance itself or to the characteristics of families who receive housing assistance. Finally, all but one of the existing studies examine public housing only.

The research reported here begins to address these gaps by examining the effects of housing assistance received by children between the ages of 10 and 16 at some point during the period 1968 - 1982 on four outcomes experienced in adulthood:

(1) welfare receipt between ages 20-27; and

(2) earnings above poverty between ages 25-27;

(3) total earnings between 25-27; and

(4) educational attainment at age 27.

We analyze the impacts of two types of housing assistance: (1) public housing; and (2) privately-owned assisted housing that was built or rehabilitated using federal government subsidies. Combined, these programs comprise about 56 percent of the assisted housing stock.

Two methodological features of this study are noteworthy. First, the study relies on a unique database, the PSID-Assisted Housing Database, which was constructed by matching the addresses of all respondents in the 28-year Panel Study of Income Dynamics to a national census of assisted housing addresses. Thus, it overcomes the serious problems of reporting errors of respondents answering survey questions about whether they live in assisted housing. Second, the study uses statistical techniques to correct for the fact that assisted housing residents are not a random sample of the low-income population. There are seven major findings of this study:

(1) The most significant finding is that, contrary to expectations, public housing does not have detrimental effects on the long-term self-sufficiency outcomes of youth. While, on average, children who spend some time in public housing have worse outcomes than unassisted children who are income-eligible for housing assistance, these worse outcomes are due to differences in family background, not housing assistance. We also find that residence in privately-owned assisted housing has no detrimental impact on self-sufficiency outcomes.

(2) There is some evidence that public housing may in fact have positive effects on a child's long-term self-sufficiency. In models that controlled for both measured and unmeasured characteristics, exposure to public housing exerted positive effects on total earnings, earnings above poverty, and the likelihood of having at least some earnings. Although none of these results was statistically significant at conventional levels, it is likely that these results would probably become stronger in larger samples.

(3) There is some evidence that unobserved differences in family background of children who spent some time in public housing contributes to their poorer outcomes. This conclusion is based on the change in magnitude and statistical significance of the estimated effects for public housing when unobserved characteristics were taken into account. Future research should therefore employ statistical methods that control for both measured and unmeasured family background characteristics.

(4) The sample of children who lived in privately-owned assisted developments is, unfortunately, small. We have some limited evidence that their unobserved family characteristics are more likely to be associated with positive outcomes than those of their counterparts in public housing, or in unassisted housing.

(5) We expected to find that privately-owned assisted housing would have more positive effects on self-sufficiency than public housing. This expectation is not supported. If anything, the evidence suggests the opposite.

(6) The expectation that big city assisted housing would have worse implications for long-term self-sufficiency outcomes of youth is not supported.

(7) There is some evidence that public housing has a stronger positive effect on children from families that are highly dependent on public assistance. This suggests that public housing assistance is most beneficial for the most disadvantaged children.

Introduction

Over the last 10 years, there has been an intensification of the debate about the fundamental purpose of housing assistance for the poor. The core question is whether the traditional goal of decent, affordable housing should continue to be viewed as an end in itself, or also--or instead--as a means to economic independence. Proponents of the latter view argue that performance measures emphasizing housing outcomes, such as the number of units meeting HUD's Housing Quality Standards or that are affordable to low- and very-low income households, should be supplemented by such outcomes as educational attainment, labor force participation, cessation of welfare receipt, and moves out of assisted housing. Recent HUD programs such as Project Self-Sufficiency, Operation Bootstrap, and Family Self-Sufficiency are emblematic of this alternative view of housing assistance.

The reconsideration of the goals of housing assistance has been influenced substantially by the ongoing debate about welfare reform, which produced the Family Support Act of 1988 and, more recently and dramatically, the dismantling of the AFDC program under the Personal Responsibility and Work Opportunity Act of 1996. In both the welfare and housing debates, the question has been whether the primary goal of assistance is to reduce deprivation (whether in income or housing) or to reduce economic dependency. Those who favor the latter view argue that the goal of a reoriented system should be to attack the underlying conditions that produce poverty, primarily low wages and lack of job skills (Ellwood 1988). The question, then, is whether housing assistance plays some role in the ability of the poor to achieve sustained economic self-sufficiency. But there are plausible arguments for expecting either positive or negative effects of assisted housing on recipients, as outlined in detail below.

The research reported here begins to address a series of heretofore unexplored issues related to the impact of different housing assistance programs on economic outcomes of families. Specifically, we examine the effects of living in assisted housing between ages 10-16 on four adult outcomes that pertain to self-sufficiency:

(1) welfare receipt between ages 20-27;

(2) earnings above the federal poverty level between ages 25-27;

(3) total earnings between ages 25-27; and

(4) educational attainment at age 27.

This analysis focuses on these impacts for two types of federally assisted housing: (1) public housing; and (2) privately-owned housing that was built or rehabilitated using government subsidies. We specifically test whether there are different impacts associated with these two forms of assistance. The third major form of housing assistance, certificates and vouchers that tenants use to pay a portion of their rent in the private market, is excluded.

In the next section, we provide an overview of the two types of housing assistance considered in this research, with particular emphasis on the differences between programs that might yield different effects on the adult outcomes of youth. This is followed by a discussion of four hypotheses as to why we would expect housing assistance to affect children's later outcomes. We then describe how the statistical models were specified and highlight several other methodological issues. In the fifth section, we describe the Panel Study of Income Dynamics (PSID)- Assisted Housing Database, the main database used in the analysis. This is followed by a presentation of results in section six. Section seven discusses the key findings. The last section presents our conclusions and suggests directions for future research.

Overview of Housing Programs

In this study, we tested for distinct effects of living in either public housing or privately-owned assisted housing during youth (ages 10-16) on adult outcomes. Although these two program types are similar in that subsidies are tied to the housing unit and not given directly to the recipient to use in a private market housing unit, they differ in their financing, administration and tenant profiles.

The development and operating costs of public housing are funded primarily by HUD and the properties are owned and managed by quasi-governmental entities, local public housing authorities (PHAs). Income eligibility criteria apply to all households who move into public housing, and rents are set at roughly 30 percent of tenant income. Privately-owned assisted housing is a broad category encompassing such HUD programs as Section 8 New Construction and Substantial Rehabilitation, Section 236, and Section 221(d)(3), and programs outside HUD's purview, such as the Low-Income Housing Tax Credit administered by the Internal Revenue Service. The HUD programs are funded in one of three ways: (1) an interest subsidy on the total development cost debt in exchange for rents that meet HUD affordable rent standards; (2) rental subsidies tied to individual housing units; or (3) a combination of an interest subsidy and rental subsidy. In the Low-Income Housing Tax Credit, investment in the property can be claimed as a tax credit against the investor's income. Unlike public housing, in which all tenants who move in meet income eligibility criteria and pay subsidized rents, a portion of units in privately-owned assisted housing developments may be occupied by tenants paying market rents. As result, the profiles of the subsidized and market-rate tenants in privately-owned assisted housing differ substantially. In 1997, the 1.4 million tenants in the HUD Section 8 "project-based" programs (i.e., new construction, substantial rehabilitation), for example, had a median income of $7,500 and the 300,000 non-Section

8 project-based tenants had a median income of $13,300. Public assistance receipt among families with children in the first group was 38 percent; in the latter group, 10 percent (Shroder 1999).

We distinguish between public housing and privately-owned assisted housing for two reasons. First, tenants gain access to the two types of assisted housing in different ways. To gain access to public housing, a household must apply to the PHA, while the prospective tenant for privately-owned assisted housing applies directly to the landlord or manager. It is plausible to expect these different approaches to applying for housing assistance might attract different types of households to each of the programs, and some recent research supports this contention. Newman and Schnare (1993) found that different types of households with children appear to be channeled into different housing programs with the least disadvantaged households located in privately-owned assisted housing. Among households obtaining assistance through PHAs, the most disadvantaged end up in public housing. Finally, Hungerford's research (1996), which found that spells of residence in public housing are distinct from spells associated with other types of housing assistance, also suggest differences in the tenant populations of different types of assisted housing programs. To gain an accurate view of the effects of housing assistance, these variations in the sorting of different types of households into different programs needs to be taken into account.

The second reason for distinguishing between public housing and privately-owned assisted housing in this analysis are differences between the two programs in the types of neighborhoods surrounding the housing developments, as well as modest differences in the physical adequacy of housing units. Each of these attributes could affect adult outcomes of individuals who lived in assisted housing when they were between 10 and 16 years of age.[1]

[1]We did not include tenant-based housing assistance for two reasons. First, we could not obtain historical data on the addresses of certificates or voucher recipients. Second, tenant-based assistance was only introduced toward the very end of the period in which we observed youth residence in assisted housing

Hypothesized Effects of Housing Assistance on Children

The question whether assisted housing affects the children who live there has received virtually no attention.[1] In the absence of either theory or empirical results, we suggest four general hypotheses:

(1) Children are positively affected by the superior physical quality and/or residential stability associated with housing assistance;

(2) Children are positively affected by the increased disposable income available to families with housing assistance;

(3) Children are negatively affected by the degree of concentrated poverty within assisted housing developments and/or the neighborhood surrounding the developments; and

(4) Children are indirectly affected by housing assistance via its effect on their parents or guardians.

Hypothesis 1: Children are positively affected by the superior physical quality and/or residential stability associated with housing assistance.

Because assisted housing regulations require that all dwelling units meet housing quality standards, the overall physical adequacy of these units should be higher than for the dwellings of households with comparable incomes who do not receive housing assistance. This expectation is borne out by recent empirical evidence (Currie and Yelowitz 2000; Newman and Schnare 1993). However, there is limited research linking housing quality to child outcomes. Recent work by Mayer (1997) and Klebanov et al. (1997) suggests that there is some effect. Other studies indicate that overcrowding, one measure of dwelling adequacy, is related to poor health in children (Coggon et al. 1993; Galpin et al. 1992; Mann et al. 1992). Assisted housing may thus be more physically adequate than other low-income rental properties, but the extent to which this difference matters for

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(1968-1982) and only later become a sizeable program.

[2]The sole exceptions are Currie and Yelowitz (2000) and Meyers et al. (1995).

child outcomes is not well- understood. At a minimum, we might expect that because public housing units are somewhat more physically deficient than those in privately-owned assisted housing (Newman and Schnare 1993), any positive effects would be less strong for public housing.

Housing assistance might also result in more stable housing either because the subsidy might make it easier for the family to pay its rent, or because provisions in administrative law make it more difficult to evict families living in assisted housing. Children who move often are also likely to change schools more frequently, putting them at greater risk of grade repetition and poor academic performance (U. S. General Accounting Office 1994). In addition, Haveman et al. (1991) found that the number of residential moves adversely affects the likelihood of a child graduating from high school. Unfortunately, there is no empirical work on the residential stability of children in assisted housing.[3] Therefore, while we expect positive effects due to hypothesized greater housing stability, it is impossible to predict how large such effects might be.

Hypothesis 2: Children are positively affected by the increased disposable income available to families with housing assistance.

The second hypothesis is that by reducing rent burdens, housing assistance may increase the amount of income a family can spend for items that benefit a child's development, such as nutritious food, books, games, or educational aids.[4] Families without housing assistance often devote a significant proportion of their household income to rent. In 1995, more than a third of very low-

[3]Appendix D presents estimates of the impact of housing assistance on residential mobility for the analysis sample in this study. Unfortunately, resources did not permit a full investigation of this issue, and therefore the methods used were admittedly crude. With this strong caveat in mind, the results in Appendix D suggest that public housing was linked with reduced mobility, but privately-owned assisted housing appeared to be associated with more moves.

[4]Of course, there is no guarantee that increased income will actually be spent on goods that enhance child development. If additional income is used to sustain a parent's addiction to drugs or alcohol, for example, children could be adversely affected.

income households spent more than 50 percent of their incomes for rent (HUD 1998). Families with housing assistance, on the other hand, pay roughly 30 percent of their incomes for rent, with government subsidies making up the balance.[5] However, there is only minimal evidence that more generous cash or in-kind benefits contribute to better outcomes for children. While Meyers et al. (1995) found residence in public housing was associated with greater nutritional adequacy in young children, the literature on the effects of AFDC and non-cash benefit programs on children is inconclusive (Currie 1995). Mayer (1997) argues that it is not income, but the parental characteristics associated with stable employment, that lead to better outcomes for children. Finally, enhanced income is likely to be most effective during early childhood because these are the critical developmental years (Duncan and Brooks-Gunn 1977). Therefore, we may not observe income effects in this study, which focuses on older children 10-16.

Hypothesis 3: Children are negatively affected by the degree of concentrated poverty within the assisted housing development and/or the neighborhood surrounding the development.

A growing body of research is attempting to identify the effects of concentrated poverty, crime, joblessness and other indicators of neighborhood distress on children. If such "neighborhood effects" exists, then to the extent that housing assistance increases a youth's contact with highly disadvantaged neighborhoods (or reduces contact with better-off ones), his or her prospects will be diminished. Because much public housing and privately-owned assisted housing is located in large developments, neighborhood effects could occur at two levels: the housing development, or its surrounding neighborhood. The sparse research that exists in this area indicates that it is the former that matters most for children's outcomes. Shlay and Holupka (1991) report that for children living

[5]Before 1982, which covers the period of youth observation in this study, assisted renters paid 25 percent of their incomes for rent.

in large public housing developments, the orbit of activity is confined to the development itself and venturing out into the neighborhood is rare. Newman and Harkness (1998) find that for children living in public housing, the development itself--not the surrounding neighborhood--matters more for educational attainment.

But for much assisted housing, the characteristics of the development and its neighborhood are closely correlated, with public housing ranking worst on both counts. Newman and Schnare (1997) find that 43 percent of units in family public housing developments, compared to 12 percent of welfare households, are located in census tracts with a poverty rate of 40 percent or more.[6] Public housing developments also exhibit severe concentrations of households with low incomes, high welfare dependency rates and low educational achievements (Newman and Schnare 1993).[7] If the concentration of disadvantaged neighbors hurts life chances, as posited by collective socialization and epidemic models of neighborhood effects (Jencks and Mayer 1990), both neighborhood aspects of public housing suggest worse outcomes for children who grow up there.[8]

For privately-owned assisted housing, the expected consequences are less certain. While the census tracts of privately-owned assisted units are significantly less distressed than those of public housing, they are no better than the neighborhoods of welfare recipients (Newman and Schnare 1997). Likewise, compared to families in public housing or with certificates or vouchers, tenants

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[6]These data are drawn from a period significantly later than the period of youth observation in the present study. But the contemporaneous evidence strongly suggests that assisted housing developments, and public housing in particular, also tended to be located in the worse neighborhoods when they were built.

[7]As with tract characteristics, these data are drawn from a period later than the period of youth observation in the present study. The profile of assisted housing residents was significantly less disadvantaged during the time of this study than it later became.

[8]An obvious problem here is that there is no evidence that housing assistance actually worsens a youth's neighborhood context over what it would have been in the absence of subsidized housing. Appendix E profiles the results of multivariate analyses showing that public housing leads to worse neighborhood conditions, while the opposite is true for privately-owned assisted housing.

in privately-owned assisted housing exhibit the highest incomes, lowest welfare dependency rates, highest educational achievement, fewest children, and smallest concentration of female heads (Newman and Schnare 1993). How this compares to the tenant profile in unsubsidized developments of similar size and location is unknown. The difference in neighborhood context between public housing and privately-owned assisted housing underscores the importance of disaggregating by type of program in analyzing the long-term impacts of exposure to assisted housing.

Hypothesis 4: Children are indirectly affected by housing assistance via its effect on their parents or guardians.

There are three major pathways through which the impact of housing assistance could be transmitted to children through altering the behavior of their parents or guardians. First, there is the possibility that housing assistance discourages employment, and that non-working parents serve as poor role models for children. Because families in assisted housing generally pay 30 percent of their income in rent, they retain only 70 cents out of each additional dollar of increased earnings. This "implicit tax" on earnings may dampen a parent's enthusiasm for work. However, like empirical studies on the labor market effects of other transfer programs, such as AFDC, Medicaid and Food Stamps (Moffitt 1992, Moffitt and Wolfe 1992, Fraker and Moffitt 1988), the few studies of the impacts of housing assistance on adult work behavior indicate only modest or nonexistent effects. Murray (1980) estimated that living in public housing reduced labor supply by just four percent, Reingold (1997) found no effect, and Houser and Dickert-Conklin (1998) reported that a 10 percent increase in expected housing assistance benefits reduced labor force participation by one percent for single parents and had no effect on primary earners. If these estimates are correct, it is unclear how children 10-16 years old would be affected by such small changes in parental work behavior.

A second possibility is that housing assistance relieves financial pressure on parents, thereby reducing stress, depression, and other symptoms of psychological distress, with potentially beneficial effects on their children.

A third possible pathway is through a "neighborhood effect" of assisted housing on parents who, in turn, transmit this effect to their children. For example, a "spatial mismatch" between the locations of assisted housing developments and job opportunities could play a role in reducing work behavior among adults living in assisted housing. In this case, it is the disadvantageous location of assisted housing developments, not the subsidy per se, which accounts for the dampening effect of housing assistance on work engagement. The work of Ong (1998), who found that welfare recipients using certificates and vouchers worked more than either public housing residents or those who rented in the private market, lends support to this view, as does analysis of the Gautreaux housing desegregation program (Rosenbaum 1991). Another possibility is that distressed neighborhoods could impose psychological burdens on adults, resulting in behaviors that could, in turn, adversely affect children. To the extent that the environmental context of assisted housing stresses parental coping mechanisms, we would expect negative impacts on children.

Synopsis

One clear implication of this review is that the impact of public housing on outcomes should be no better and may be worse, than the impact of privately-owned assisted housing. But it is difficult to make a compelling case for either positive or negative impacts. However, because this analysis focuses based on the assisted housing experience of youth between the ages of 10 and 16, neighborhood effects should be apparent. Children in this age group begin to venture out of the home and into the surrounding neighborhood, becoming increasingly independent of parental supervision and more susceptible to influence by peers (Chase-Lansdale et al. 1997). As a result,

the home environment may be less important and the neighborhood more important. Since the disadvantaged neighborhood context of much public housing, both the development itself as well as the surrounding neighborhood, is consistent with negative effects, we would expect to find that exposure to public housing harms a youth's life chances. For privately-owned assisted housing, where the environmental context is less dire, we would tentatively expect a neutral or possibly somewhat positive effect on outcomes.

Methods

To study the long-term effects of housing assistance on children who spent some time in these environments, we compare the self-sufficiency outcomes in early adulthood (the 20s) of children who spent some time living in assisted housing between the ages of 10-16 and those who did not. That is, the outcome, or dependent, variables are drawn from the later, adult period, while the explanatory, or independent, variables pertain to the childhood years.[9]

Of major methodological concern in this study is that families who live in assisted housing may be different from those who do not, and these differences in family background could affect children's outcomes. If the dataset contains measures of these differences, we can statistically control for them and obtain "unbiased" estimates of the effect of housing assistance. But if some measures that affect adult outcomes of children 10-16 years old are missing from the data, the impact of these unmeasured, or "unobserved," differences, could lead to inaccurate, or biased, estimates of the effect of housing assistance. For example, parents in assisted housing may have different aspirations or expectations for their children than parents with similar incomes who do not live in assisted housing. If aspirations and expectations affect how children fare later in life, but we do not

[9]We were required to restrict our observations of children to ages 10 to 16 because the PSID has not been following individuals long enough to observe both early childhood and adult outcomes.

have measures for characteristics, we may misattribute the effects we derive in the analysis to assisted housing and not to parental differences. Unfortunately, it is virtually impossible to be certain that all potentially relevant measures have been taken into account in analyses of complex behavioral questions, in part because our understanding of such complex phenomena is imperfect, and in part because datasets rarely include every conceivably important measure. Instead, we address this problem statistically, as described below.

Another potential problem is associated with the longitudnal nature of the data. This analysis requires that we observe children over 17 years. But it is unlikely that all of these children or their families remained in the study over this entire period, and if those who drop out of the study are different from those who don't, particularly in ways that are likely to affect the outcomes studied here, the analysis could produce skewed or biased results. As discussed later, we conducted statistical tests to determine whether the results from our models are affected by attrition. These tests revealed no such bias.

Model Specification

Dependent Variables and Estimation Techniques

Figure 1 summarizes the impacts studied, how each was measured with the data, and the statistical approach used to analyze each. The policy question is whether these outcomes were significantly affected by either residence in public housing or privately-owned housing between the ages of 10 and 16.[10]

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[10]In addition to whether an individual ever lived in assisted housing as a youth, another potential policy variable of interest is the number of years a youth lived in assisted housing. For methodological reasons, however, we could not test this latter variable. A key feature of this analysis were the controls for both the measured and unmeasured characteristics of families in assisted housing. This required a statistical technique that relies on the identification of special variables known as instruments. However, just as assisted households are likely to differ from unassisted households in unmeasured ways, unmeasured characteristics could also plausibly affect the duration of time spent in assisted housing. To account for these

Figure 1
Impacts, Measures and Statistical Estimation Techniques

Impact	Measures	Age when observed	Statistical technique
Welfare receipt	Years off welfare (continuous)	20-27	OLS
	Years off welfare (0-1, 2-5, 6-7, 8 yrs)		Ordered Logit
Earnings above poverty	Number of years earnings exceeded federal poverty line (continuous)	25-27	OLS
	Number of years earnings exceeded federal poverty line (0, 1-2, 3 yrs.)		Ordered Logit
Total earnings	Average annual earnings of self and spouse	25-27	OLS
	Average annual earnings of self and spouse		Tobit
	Whether self and spouse had any earnings		Probit
Educational attainment	Whether graduated from high school	27	Probit
	Whether acquired any post-secondary education		Probit

In the analysis of welfare receipt, the dependent variable was the number of years an individual lived in a household that received *no* welfare from age 20 to age 27. For example, if the individual's household received welfare every year from 20 to 27, the dependent variable would have a value of zero. Conversely, if the individual's household never received welfare from 20 to 27, the dependent variable would be eight. "Welfare" here includes as AFDC, Food Stamps, or "other" welfare (e.g., General Assistance).[11] We relied on household welfare receipt rather than individual welfare receipt because the dataset reported on individual welfare receipt for household heads only,

unmeasured characteristics, we would require an additional set of instruments that enabled us to distinguish between long- and short-term residents, and we could not identify such instruments.

[11]The results are not sensitive to the inclusion of Food Stamps in this definition. The correlation between years off welfare with and without counting Food Stamps as welfare was nearly 0.9.

and only some of the sample members were always household heads from ages 20-27, while others never were. We tested this model using two different techniques: ordinary least squares (OLS), and ordered logit.[12]

OLS assumes that the transition from less to more dependence on welfare is essentially smooth. However, this assumption may not be realistic in the case of welfare dependence where there is likely to be a greater qualitative difference in going from no receipt to one year on welfare than in going from one to two. Likewise, households that are continuously on welfare are likely to exhibit characteristics that differ not only in degree, but also in kind, from those who are on welfare only one or two years. Therefore, in addition to OLS, we specified another model with a categorical dependent variable indicating whether the individual's household was off welfare for 0-1 years, 2-5 years, 6-7 years, or all eight years from ages 20 to 27. We estimated this second model using ordered logit, a technique appropriate for models with dependent variables that are a set of categories that can be ranked in a logical order, as in the present case.

The second outcome is whether earnings allow an individual or couple to be self-sufficient. This outcome is measured by the number of years between ages 25-27 that earnings exceeded the federal poverty level. We count earnings of the individual plus, if married, his or her spouse. We included spouse earnings because success in the "marriage market" could reasonably be viewed as a positive adult outcome (Wilson 1987). Failure to include spouse earnings could unfairly bias results against child-bearing women whose partners earn sufficient income to permit them to stay out of the labor market. The poverty level depends on family size. To compute family size, we included an individual's children, but not other relatives or unrelated persons living in the same

[12]For this and other statistical estimation techniques used in this analysis, the interested reader may consult Greene (1993). For probit and ordered logit, also see Maddala (1983).

household. Here, again, we used both OLS and ordered logit to estimate effects. In the ordered logit model, the categories of dependent variable were: zero, one or two, and three years with earnings above poverty from age 25 to 27.[13]

In the third model, which focuses on the impact of housing assistance on total earnings, the dependent variable was the combined average annual earnings of the individual and, if married, his or her spouse from age 25 to 27. In this case, we used OLS and tobit. OLS is not the best technique for analyzing data with a substantial number of observations with zero. In the case of earnings, 12 percent of the sample had zero earnings. Tobit is the most appropriate technique for dealing with such a distribution.[14]

In order to further investigate the factors driving labor force participation, we also tested whether housing assistance exposure between ages 10 and 16 affected whether the child had *any* earnings when they reached age 25 to 27. In this analysis, we used probit. This technique is appropriate when the dependent variable is binary (e.g., yes/no, worked/did not work).

In the fourth model, we tested two measures of educational attainment: whether an individual graduated from high school, and whether he or she acquired one or more years of post-secondary education. We used probit to estimate these models.

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[13]For this outcome, 32 percent of sample members never had earnings above poverty, while 41 percent always did.

[14]The usual technique for coping with a skewed distribution of the dependent variable is to transform it by taking the log or performing a Box-Cox transform. Neither of these techniques can cope with zeros in the dependent variable, however. The tobit model assumes a continuous underlying or latent dependent variable that measures the ability to earn. This "ability to earn" is observed for those with earnings; for those with zero earnings, it is unobserved and may be negative.

Interaction Models

Earlier, we described separate hypotheses pertaining to the effects of the physical quality of assisted housing and the effects of the neighborhood surrounding assisted housing. But the effects of housing assistance may also be associated with the combined (or "interaction") effects of the physical quality of the housing units and the attributes of the surrounding neighborhood. For example, under-maintained public housing located in a high-poverty neighborhood might plausibly have worse effects than well-maintained public housing located in an affluent neighborhood. Because administrative data on physically distressed public housing were not available to allow a direct test of this sort of effect, we relied on a crude approximation. Since it is likely that the most physically distressed assisted housing developments and those in the most physically distressed neighborhoods were predominantly located in large cities during the study period, we used residence in assisted housing in a big city (population 500,000 or more) as a proxy for physically inadequate units and/or distressed neighborhoods. Statistically, we created a variable measuring the number of years a child lived in a big city, and interacted it with housing assistance receipt.

We also examined the interrelated effects of family background and housing assistance by testing for an interaction effect between receipt of housing assistance and the family's dependence on welfare (measured by the average cash value of transfer income). Our reasoning here is that housing subsidies may have a stronger impact on children from poorer families because the subsidy provides a greater relative improvement in housing quality and a greater relative decrease in the proportion of income that is absorbed by rent.

Independent Variables

The policy variables in each model measure whether an individual ever lived in either public housing or privately-owned assisted housing when that individual was between the ages of 10 and

16. Control, or independent, variables also measured at ages 10-16 are: (1) demographics (whether black, female, year born, family size, and mother's age at birth); (2) welfare dependence (whether ever relied on welfare, average cash value of transfer income); (3) earnings and employment of household head (average annual labor income, specified to allow different effects above and below $10,000),[15] whether very low work hours (less than 200 hours annually); (4) other characteristics of the household head (educational attainment, number of years disabled); (5) family structure (number of years with single parent, whether a marital change occurred); (6) housing tenure (number of years as homeowner); (7) geography (indicators for number of years in a big city (population more than 500,000) and in a small city (population 100,000-500,000), indicators of the primary state of residence). Variable definitions, means, and standard deviations are shown in Table 1.

For the most part, these variables were selected as general measures of characteristics of the individual or family disadvantage.[16] By contrast with other studies of similar outcomes, we also control for housing tenure and geographical characteristics (e.g., city size). We included housing tenure both as an indicator of household disadvantage and because limited evidence indicates that homeownership may exert a positive effect on child development (Green and White 1997).

Finally, we included indicators of the child's primary state of residence to control for state-level variations in welfare, education, and employment programs that could potentially affect

[15] In particular, we specified a piecewise linear spline function with a knot at $10,000. Extensive testing with various specifications of this variable showed this formulation to have the best fit.

[16] We did not include measures of events that occurred after ages 10-16 (e.g., whether the individual was married or was a household head) because they may also be affected by assisted housing residence (in statistical terms, they may be endogenous).

outcomes.[17] But we did not include indicators of neighborhood quality, such as the tract poverty rate or the number of times that a child moved, because these variables are likely to be influenced by whether a child lived in assisted housing (that is, they are endogenous). Therefore, the housing assistance variables can be interpreted as capturing "the whole package" of living in assisted housing: the housing assistance subsidy, the assisted housing unit, its surrounding neighborhood, and possible impacts on residential mobility.

Addressing Unobserved Differences Between Assisted and Unassisted Families

A major difficulty in using nonexperimental data to gauge the effects of housing assistance on early adult outcomes is that assisted households may be systematically different from unassisted households, and it is unlikely that measures of all of these differences will be available. To the extent that unmeasured characteristics affect the self-sufficiency outcomes being examined here, the failure to control for them could bias results.

There is nothing unique about assisted housing in this respect. The participants in any social program always represent a self-selected sample.[18] The process through which families get into assisted housing is probably among the more complicated entry procedures for social programs. A family must first apply, and then, typically there is a lengthy waiting period before a housing unit becomes available and they move in. Both steps involve selection. In the first step, for example, families that apply for housing assistance may be less, or more, resourceful than those who do not.

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[17] If the observations were concentrated in a limited number of small areas, a similar argument could be made for including indicators of the primary county or MSA of residence. With an average of only 21 observations per state, however, finer levels of geographic disaggregation were not feasible.

[18] Social experiments overcome this self-selection by using randomization to assign people to programs, which is why experiments are widely regarded as the "gold standard" in measuring program impacts.

They may tend to have less extended kin or friendship networks to draw upon, or they may have more serious problems with drugs or alcohol dependency. They may be less likely to be recent immigrants. They may have different attitudes, values, and aspirations for their children. The second step also involves a selection. For example, the temporarily needy might become ineligible after a short wait and drop off the list, the more resourceful may find ways to move up on the waiting list, those with other options may move to a different city, and so on. In short, assisted families could differ from unassisted families in many different ways. Because we do not understand, even imprecisely, what factors determine who gets into assisted housing, it is impossible to know what factors to include in the models to control for selection.

We address this selectivity problem by using a two-stage instrumental variable approach. (The outline of this approach follows; greater detail can be found in Appendix A.) This statistical method requires one or more "instruments;" that is, a variable that is correlated with whether an individual received housing assistance as a youth but is unrelated to self-sufficiency outcomes except indirectly through assisted housing participation. These instruments are included in a first-stage model predicting housing assistance receipt. The predicted probabilities (or instrumental variables) from this first-stage model are then substituted for the actual indicators of housing assistance receipt in the main, second-stage model, which estimates the effects of assisted housing on outcomes.

This analysis uses two different instruments. The first capitalizes on the marked spatial variation in the supply of housing assistance per income eligible household (Kingsley and Tatian 1999). The second is based on the changes in income eligibility rules of housing programs that occurred during the study period, which allow us to define two distinct housing policy "regimes": one for 1968-1974, and the second for 1975-1984. As a first approximation, housing programs were governed by two different sets of rules concerning such key features as the definition of income and

income eligibility in each of these time periods (24CFR860; 24CFR1272.102; Leonard 1999). Finally, because the effect of housing supply on whether a family achieves housing assistance could depend on the policy regime, we included the interactions between the supply instrument and the policy regime instrument. Again, the first-stage models were estimated separately for public housing and privately-owned assisted housing.

The supply of assisted housing, the first instrument, is measured as the number of assisted housing units per income eligible family in each county. This instrument is appealing because households are more likely to be assisted if they live in places where housing assistance is more readily available. But its weakness is that locations in which assisted housing tends to be concentrated are likely to be areas in some distress and, therefore, areas associated with lower overall attainment of the sorts of self-sufficiency outcomes we are studying. This means that the second criterion for an instrument--no association with outcomes, holding constant assisted housing participation and other explanatory variables--is not met. To purge this measure of its association with population characteristics that might affect outcomes, we regressed it on a vector of county characteristics, and used the purged measures (the residuals) as instruments in the first-stage models.[19] For each sample member, there were seven such instruments (one for each year between ages 10-16) for each type of housing assistance. We reduced this to two by using the mean and the maximum in the first-stage models. The housing policy regime instrument was measured as a simple count of the number of years an individual lived under the first regime ("regime 1").[20] Tests demonstrated that these instruments

[19]The characteristics in this regression were: the population (logged), percent of families with incomes below poverty, percent white population, percent of population age 65 or older, percent of adults with a college degree, the ratio of median rent to median income, and the percent of households with a female head. We also included dummy variables for the state of residence.

[20]The number of years an individual spent under the two policy regimes summed to seven. Because the independent variables in regression models cannot add up to a constant, only the years under one of the

were correlated with whether an individual received housing assistance as a youth, a partial test of their usefulness. (The instruments for public housing were very strong, as shown in Appendix A.)

Attrition Bias

Any survey that follows individuals over time faces problems of sample attrition. For example, some sample members may refuse to participate at some point, others may move and be impossible to locate. From a research perspective, the most worrisome aspect of attrition is that those who drop out of the sample may be systematically different from those who remain, potentially biasing the estimated impacts. For example, if the more disadvantaged recipients of housing assistance were more likely to drop out, we would overstate the positive effect of living in assisted housing. However, just as selection bias constitutes a significant problem only if the factors associated with who gets into assisted housing are not measured in the dataset and thus cannot be controlled for in the analysis, so too is attrition bias only a serious problem if the factors contributing to it are unmeasured. If all the relevant factors are available in the data, then they can be statistically taken into account, thereby neutralizing their effect.

Tests of attrition bias in the PSID have recently been conducted and demonstrate that while attrition is substantial, it does not bias model estimates (Fitzgerald et al. 1998a and 1998b; Zabel 1998). We conducted similar tests of attrition bias for the present study and also found no evidence of attrition bias.

The logic of these tests is as follows. We cannot compare the effect of housing assistance on outcomes at age 25-27 for sample dropouts and stayers because these data are missing for the dropouts. However, data are available for both groups at earlier ages, and there is a strong correlation between

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regimes could be included in the models.

outcomes at ages 20-21 and ages 25-27. Since only a small proportion of individuals dropped out of the sample at ages 16-20 or 16-21, we can compare the effect of housing assistance on outcomes at ages 20-21 between those who subsequently dropped out and those who did not.[21] If there is no significant difference, then because of the strong correlation between outcomes at ages 20-21 and ages 25-27, we can be fairly certain that the estimated impacts at ages 25-27 are unbiased.

The dependent variables in these tests were: (1) welfare receipt at ages 20 and 21; (2) earnings at ages 20 and 21; and (3) educational attainment at age 20. The results, shown in Table 2, indicate that none of the differences in impact estimates between dropouts and stayers are statistically significant. Further, while stayers always fared worse than dropouts among those who lived in privately-owned assisted housing, for those who lived in public housing, the pattern of results was inconsistent. Stayers were more likely to graduate from high school and had higher earnings, but they were also more likely to receive welfare. This inconsistency in the results, coupled with their statistical insignificance, suggests that there is no attrition bias in the estimated impact of housing assistance on young adult outcomes.

Data

PSID-Assisted Housing Database

This research relies on a unique database, the PSID-Assisted Housing Database, which we have developed by matching all sample addresses in the 28-year Panel Study of Income Dynamics (PSID) to the addresses of assisted housing units across the nation.[22] The PSID is an ongoing longitudinal survey of U.S. households begun in 1968 by the Survey Research Center of the University of

[21]More precisely, we compare the coefficients obtained from estimating the same model on: (1) the sample of stayers; and (2) the pooled sample of dropouts and stayers.

[22]Appendix F provides a detailed description of the data base and its construction.

Michigan. Low-income families were initially oversampled, but statistical weights have been developed to adjust for both the differential initial sampling probabilities and the differential nonresponse that has arisen since the beginning of the study. By following all members of its sample over time including children as they leave their parents' homes, the PSID maintains a representative sample of the nonimmigrant U.S. population and of major subgroups in the population.

The database of assisted housing addresses constitutes the closest approximation to a national census of assisted housing that we are aware of (Newman and Schnare 1997). It is based on eight sources including several of HUD's administrative and program databases, and surveys we have conducted with all housing agencies across the nation including departments of housing and community development, Housing Finance Agencies, and Farmer's Home offices. Programs covered by the database include public housing, HUD privately-owned developments, Farmer's Home Section 515, the Low-Income Housing Tax Credit, certificates and vouchers, and state rental assistance programs. (As noted, certificates and vouchers are excluded from the present analysis).

Because the PSID-Assisted Housing Database identifies whether the sample member receives housing assistance through address matches of properties known to receive housing assistance and not respondent self-reports, it overcomes the serious problem of reporting errors of respondents answering survey questions about whether they live in assisted housing. Recent evidence suggests that such self-reports are highly inaccurate (Shroder and Martin 1996).

Analysis Sample Definition

The analysis sample is drawn from nine PSID cohorts born between 1957 and 1967. The observations on the effects of exposure to assisted housing for these cohorts cover the 14-year period from 1968 through 1982 when these individuals were 10-16 years old. Adult outcomes from ages 20 to 27 were measured beginning in 1978 and extending through 1993.

The analysis sample includes two groups: (1) those who lived in assisted housing at some point between the ages of 10 and 16; and (2) a comparison group of those who were "eligible" for federally assisted housing but who were unassisted. Our goal was to compare the self-sufficiency outcomes of youth exposed to assisted housing with the same outcomes of similar youth who were unassisted.

Eligibility for HUD programs is generally based on having family income below some specified proportion of the median income in the geographic area. Unfortunately, two major data limitations made it impossible to define eligibility using HUD's exact criteria.[23] First, income eligibility standards were not consistently defined for all programs and for the 14 years that are the focus of this research. Second, HUD's definition is based on the "income limit area," a geographic unit that roughly corresponds to the metropolitan statistical area (MSA). However, historical data are not available on either the boundaries of these income limit areas or their corresponding median incomes.

Our best approximation of HUD's income eligibility threshold for this period relies on counties as a proxy for income limit areas, and family income below 80 percent of the county median income for the varied income thresholds over this 14-year period. County median incomes come from the decennial census, and were interpolated linearly for intercensal years. We chose counties over MSAs for two reasons: counties cover the entire U.S. while MSAs do not, and MSA boundaries shift over time. We selected the 80 percent of county median cutoff because it was the legal eligibility threshold for more of the 14 years than any other definition. To be part of the analysis sample, individuals had to have a family income below 80 percent of the county median for at least two of the seven years when the child was between 10-16 years old, and we applied HUD's income adjustments for family

[23] According to econometric theory, however, these problems are irrelevant. If the statistical models are specified correctly, different samples should produce roughly similar estimates. However, because smaller samples will have less statistical power than larger ones, they produce less precise estimates. This is what we found in our tests of alternative sample definitions for this analysis, as shown in Appendix D.

size.[24] We also included siblings of those who fell into either the assisted or unassisted samples because the families in which these children grew up were members of the target population for HUD programs for at least a portion of their childhood. Therefore, it seems plausible that these individuals were candidates for federal housing assistance even though they did not meet the 80 percent income eligibility threshold when they were between 10 and 16 years old.[25]

Sample Profile

It is important to keep in mind that the analysis pertains to the effects of housing programs that existed--and the rules under which they operated--between 1968 and 1982. During this period, income eligibility rules were more liberal than they became in the 1980s. The very poor were also not given priority for assisted housing as they ultimately were with the institution of preference rules in 1988. As a result, the profile of assisted housing residents included a mix of working poor, the lower-middle class as well as the more disadvantaged, in sharp contrast to the largely disadvantaged tenant profile today.

The dramatic changes in the tenant profile of assisted housing between 1970 and subsequent decades are shown in Table 3. During the 1970s, there were sharp declines in the fraction of married household heads and in earnings, and a sharp increase in dependence on public assistance. These patterns hold for both public housing and privately-owned assisted housing. Thus, for the bulk of the

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[24]The base income (80 percent of median, in this case) is the income limit for a family of four. Ten percent is subtracted from this base for each person fewer than four, while eight percent is added to the base for each additional person.

[25]These siblings also had to be part of the PSID-Assisted Housing Database between ages 10-16 and ages 20-27, as was the case for others in the sample. There were 152 individuals in this sibling group, or about 12 percent of the sample. These siblings were not unique in their failure to meet the 80 percent income eligibility cutoff. More than 10 percent of public housing residents and 30 percent of families in privately-owned assisted housing were also "ineligible" under our definition. The regression models account for the non-independence of these, and other, sibling observations by using Huber-White standard errors.

period during which we observe children ages 10-16 living in assisted housing, the profile of tenants was dramatically different than it is today.

Another difference between assisted housing programs in the 1970s and those in the 1990s was the 1969 Brooke amendment to the U.S. Housing Act that limited the rent payable by public housing tenants to 25 percent of their income. This ratio wasn't raised to 30 percent until 1981, nearly the end of our observation period. It is possible that lower rent burdens may have an effect on outcomes.

Table 4 illustrates several key characteristics of the sample. There are 178 cases of public housing exposure and 52 cases of exposure to privately-owned assisted housing. A cautionary note is appropriate for the small count for private developments, which will likely yield imprecise estimates. Residents of public housing have the most disadvantaged backgrounds and the worst outcomes on virtually all measures. More than half lived in assisted housing over the entire seven-year period between ages 10 and 16. Virtually all of their families received some welfare, and most received welfare for six of the seven years. Families in public housing had the lowest earnings of the three groups and lived in neighborhoods with the highest poverty and high school dropout rates. The adult outcomes of children exposed to public housing between ages 10 and 16 were also poor. More than 80 percent spent some time on welfare when they were between ages 20 and 27, and more than half spent at least four of these seven years on welfare as young adults. Their adult earnings were about 30 percent below those in the eligible but unassisted group.

The picture is more mixed for those who were exposed to privately-owned assisted housing between ages 10 and 16. These children lived in assisted housing for a much shorter period than those who lived in public housing, suggesting that reliance on housing assistance was more temporary for them. While they spent much more time in a single-parent household and were more likely to rely on public assistance than their unassisted peers, the earnings of the household head were considerably

higher among those exposed to this type of assisted housing. But their young adult outcomes were worse than those of the unassisted comparison group. The assisted group had both lower earnings and greater reliance on welfare, probably because its members were predominantly female (69 percent).

Results

Unadjusted Differences in Means

Table 5 compares the differences in means in adult outcomes between those who lived in assisted housing at some point between the ages 10 and 16, and those who were eligible but unassisted. These are raw differences without any statistical controls to account for differences in the characteristics of individuals who live in assisted housing. The figures in the table are consistent with the more disadvantaged background of public housing residents.

Compared to the unassisted group, public housing residents average one more year on welfare between ages 20 and 27, earn 20 percent less, and spend an additional one-fourth of a year with below poverty earnings between ages 25 and 27 ($p<0.01$ for all three outcomes). However, their educational outcomes are statistically indistinguishable from those in the unassisted group.

The less stark disparities in the degree of disadvantage between children 10-16 in privately-owned assisted housing and the unassisted group are also borne out in Table 5. There are few statistically significant differences in adult outcomes for the two groups. However, the adult earnings of those who spent some time in privately-owned assisted developments as youth are 14 percent lower than those of their unassisted counterparts ($p=0.09$), and they rely on welfare half a year more ($p=0.14$).

Regression Results: Direct Effects

The regression results are presented in Tables 6-9.[26] Table 6 summarizes the regression model results for all four of the impacts analyzed.[27] Because it is difficult to make sense of the raw coefficients from ordered logit models, Table 7 transforms these coefficients into an interpretable form. Tables 8 and 9 summarize the results for the models interacting housing assistance receipt with years in a big city and level of transfer income, respectively.

The regression models include statistical controls for individual characteristics, so the estimated effects of housing assistance are independent of the characteristics of assisted housing residents. We present results from both the uninstrumented and instrumented models. The uninstrumented models results take into account only those characteristics that are measured in the PSID-Assisted Housing Database, while the instrumented models also control for unmeasured differences between assisted and unassisted children ages 10-16. Because the instrumented models control for both measured and unmeasured characteristics, they should provide a more accurate estimate of the effect of housing assistance itself, independent of the traits of families who live there. We present both sets of results in order to demonstrate the impact of unmeasured characteristics on the estimated effects. To gauge whether such impacts are negative or positive, it is helpful to bear the following simple rule in mind: If the estimated effect in the instrumented results is more positive than in the uninstrumented results, the effect of unmeasured characteristics is negative. Conversely, more negative estimates in the instrumented results mean that the effect of unmeasured characteristics is positive. A synopsis of the results for each of the four outcomes (welfare dependence, sufficiency of

[26]Only the coefficients on the key policy variables are presented in these tables. The full model output is shown in Appendix C.

[27]For comparative purposes, the results corresponding to those shown in Table 6, obtained by estimating the models on other samples, are shown in Appendix D.

earnings, earnings, and educational attainment) follows.

Effects of Housing Assistance on Welfare Duration

The unadjusted differences in welfare dependence shown in Table 5 indicate that youth who lived in public housing average a year more on welfare between ages 20-27 compared to those who were eligible but unassisted. When statistical controls are added in an OLS model (Table 6), these differences disappear. Further controlling for unmeasured characteristics using instrumental variables yields somewhat more positive estimates of the effect of public housing, suggesting that families who live in public housing are more disadvantaged than their measured characteristics indicate. These positive estimates are not statistically significant, however.

The opposite occurs for youth who lived in privately-owned assisted housing. That is, the estimated impact of exposure to privately-owned assisted housing on welfare dependence is more negative in the instrumented than in the uninstrumented results. However, these estimates are likely to be imprecise because the sample size for this type of housing is very small.

As in the OLS, the transformed ordered logit results in Table 7 show that statistical controls for individual characteristics attenuate differences in welfare receipt between those who obtain housing assistance and those who do not. For example, without controls, 41 percent of the unassisted group never rely on welfare compared to 20 percent for those who lived in public housing and 28 percent for those who lived in privately-owned assisted housing. With controls, the predicted percentages of those who never rely on welfare are nearly equal for the three housing groups (42, 36, and 38 percent, respectively).

Unlike the OLS results, however, the statistically significant association of public housing with more years on welfare persists in the uninstrumented ordered logit results (Table 6). Table 7 shows the implication of this result: 35 percent of youth exposed to public housing are predicted to receive

welfare for more than two years from ages 20 to 27 compared to 28 percent for unassisted youth, a seven percentage point difference. However, when unmeasured characteristics are also controlled for using instrumental variables, this effect is no longer statistically significant, indicating that the negative effect on welfare dependence is the product of the unmeasured characteristics of families that lived in public housing, not public housing per se.

In both the instrumented and uninstrumented ordered logit results, privately-owned assisted housing is estimated to increase dependence on welfare. In the instrumented results, this negative impact is quite large, but it is statistically significant only at a fairly modest level (p=0.17) and, therefore, potentially unreliable.

Effects of Housing Assistance on Earnings Above Poverty

The pattern of results for achieving employment with earnings above poverty from ages 25-27 are nearly the same as for welfare duration. When controls for observed family characteristics are added, the statistically significant difference between outcomes for public housing residents and unassisted youth disappears. For privately-owned assisted housing residents, the difference in outcomes compared to their unassisted peers is not statistically significant either with or without controls, but with controls for measured characteristics, outcomes become slightly more favorable compared to the unassisted group.

Further controls for unobserved characteristics produce large and positive estimated impacts of exposure to public housing. For example, the OLS models predict that public housing residence reduces the number of years with below poverty earnings by two-thirds of a year, while the ordered logit results suggest that exposure to public housing raises the proportion of sample members who never have below poverty earnings from 45 to 75 percent. Although large in magnitude, these estimated positive impacts of public housing are statistical significant at only a modest level of (p=0.13

for both specifications). However, it seems safe to conclude that public housing itself does not have a negative on effect on future earnings above poverty. The large shift in the magnitude and statistical significance of the coefficients that occurs between the uninstrumented and instrumented results suggests that it is the unobserved characteristics of the families themselves who live in public housing that probably reduce the future ability of their children to stay out of poverty.

For privately-owned assisted housing, the instrumented models again produce more negative impact estimates than the uninstrumented models. In the ordered logit results, these negative impacts are fairly large, with exposure to privately-owned assisted housing predicted to reduce the proportion of sample members who never experience below poverty earnings from 45 to 18 percent. Again, however, this result is not statistically significant (p=0.24).

Effects of Housing Assistance on Earnings

The unadjusted differences (Table 5) show that youth who lived in public housing had adult earnings that were 20 percent lower than unassisted youth, while those who lived in privately-owned assisted housing had earnings that were 14 percent lower than their eligible but unassisted peers. Once measured family background characteristics are taken into account, these differences in earnings between those with and without exposure to assisted housing vanish. After controlling for unmeasured characteristics with instrumental variables, the estimated impact of public housing residence on annual earnings becomes more positive and quite large ($6,474 in the OLS model and $9,245 in the tobit model), but remains fairly imprecise. For example, the tobit model produces the sharpest estimate, but the 90 percent confidence interval ranges from minus $363 to plus $18,851. Thus, while we can claim with some confidence that the effect of exposure to public housing on earnings is not negative, we do not find strong evidence of a positive impact. For youth exposed to privately-owned assisted housing, the estimated impact on earnings becomes negative in the instrumented models, but is highly

imprecise (p>0.75).

In the unadjusted outcomes, neither type of housing assistance had any effect on labor force participation. This absence of effect is sustained in the regression results. The exception is with the instrumental variable approach, where public housing residence is estimated to raise the average sample member's probability of working by 23 percentage points, which is a very large increase. While the statistical significance is fairly modest (p=.06), it seems likely that public housing may have a positive effect on employment.

Educational Attainment

In the unadjusted outcomes (Table 5), 66 percent of youth who lived in public housing graduated from high school compared to 70 percent of unassisted youth, a four percentage point difference of marginal statistical significance (p=0.16). In the regression model results, neither public nor privately-owned assisted housing has a statistically significant effect on high school graduation.

But housing assistance has a positive effect on the acquisition of post-secondary education. The uninstrumented model results indicate that public housing residence is associated with a 12 percentage point increase in the probability of a youth acquiring some post-secondary education, while the instrumented models suggest that living in privately-owned assisted housing as a youth has an even more dramatic positive impact on acquisition of post-secondary education.

It is curious that the effect of public housing residence is positive and significant in the uninstrumented model, but when unobserved characteristics are controlled for in the instrumented version, these estimated effects are still positive but no longer statistically significant. This indicates that the unobserved family background characteristics of youth who lived in public housing prompt them to acquire post-secondary education. The opposite occurs for youth who lived in privately-owned assisted developments: unobserved family background characteristics appear to hinder them

from obtaining post-secondary education.

These effects are notable for two reasons. First, they do not exhibit the same pattern as other outcomes, where we found that the instrumented models produced more positive effects of public housing than the uninstrumented models and the reverse, more negative impact estimates in the instrumented models, for privately-owned assisted housing. Second, these are the only results that confirm the expectation that youth exposed to privately-owned assisted housing will have better outcomes than those exposed to public housing.

One possible explanation of these disparate results is that both post-secondary education and exposure to assisted housing represent small proportions of the sample (20 percent and 18 percent, respectively). Therefore, observations of children with some assisted housing exposure who obtained post-secondary education constitute only four percent of the sample. With dummy variables for each state included in the models, there is not much variation left for reliable estimation. These results may, therefore, be unreliable.

Regression Results: Interaction Effects

Interaction of Housing Assistance with Years in a Big City

The results from the models interacting housing assistance receipt with years in a big city (population of 500,000 or more) are shown in Table 8. This interaction tests whether the effects of housing assistance are different when the development is located in a big city, where the assisted housing developments and their surrounding neighborhoods are more likely to be distressed.

As shown in the table, once unmeasured characteristics of public housing families are taken into account, exposure to public housing increases the likelihood of acquiring post-secondary education. But every year of residence in big city public housing reduces this advantage; public housing residents who lived in a big city for the entire period from age 10 to 16 (76 percent of youth

who ever lived in a big city) lost the advantage entirely. Exposure to big city public housing also reduced the probability of graduating from high school.

It is difficult to explain this result. It could arise because public housing in big cities is often located in the worst neighborhoods where public educational institutions are weak (Schill and Wachter 1995), not necessarily because the environment of big city public housing itself hinders educational achievement. While these results do not suggest that poor quality assisted housing has strong negative impacts on self-sufficiency outcomes, we cannot dismiss the possibility that city size is an inadequate proxy for physical condition and neighborhood quality, nor that the general findings on post-secondary education are imprecise.

Interaction of Housing Assistance with Average Cash Value of Welfare Receipt

The relative benefit of housing assistance may be greater for youth from poorer families. This could occur because housing assistance makes a relatively greater contribution to the living conditions of a poor family, or because housing assistance boosts the fraction of income that may be spent on non-housing items more for a poor family. To test this hypothesis, we interacted residence in assisted housing with the average annual cash value of welfare income a family received, using welfare income as a proxy for economic need.[28]

The results, shown in Table 9, lend some support this hypothesis. Average family welfare receipt has an independent negative affect on outcomes. But for youth who lived in public housing, the effect of family welfare income in the instrumented model results is neutral or even positive on two adult outcomes: acquisition of post-secondary education, and years on welfare between ages 20-27. For example, in the instrumented OLS model for the number of years off welfare from age 20 to 27,

[28] State fixed effects control for variations in AFDC benefit levels across states.

every additional $1,000 in annual welfare income is associated with a 0.15 decrease in the dependent variable. But for those who lived in public housing, this coefficient is offset by 0.22 of a year, for a net effect of 0.07 additional years off welfare between ages 20-27 for every $1,000 in annual welfare receipt over ages 10-16.

These results suggest that the additional support provided by housing subsidies offsets some of the negative consequences of growing up in a very poor, welfare-dependent family. For less-poor families, the effects of housing assistance are more neutral. It is important to bear in mind, however, that such effects are found for only two out of five measures, and for the post-secondary education outcome, the estimates should be treated with caution.

Differences in the Effects of Public and Privately-Owned Assisted Housing

Differences in Impact Estimates

Empirical observations lead us to expect the self-sufficiency outcomes of youth who lived in public housing to be worse than those who lived in privately-owned assisted housing. Youth in public housing face a social environment that is significantly more disadvantaged than those in privately-owned assisted housing. To the extent that neighborhood effects exist for assisted housing recipients, these effects should be more negative for youth in public housing.

The evidence does not support this expectation. In the uninstrumented models, the estimated effects of the two types of housing assistance were very similar. In the instrumented results, public housing is almost always associated with more positive effects, the direct opposite of our expectation. However, none of the differences in the estimated effects of living public versus privately-owned assisted housing were statistically significant.

Effects of Unobserved Characteristics

The effects of controlling for unobserved characteristics by using instrumental variables were somewhat different for the two types of assisted housing. Moving from the uninstrumented to the instrumented models in the public housing analysis dramatically increased both the magnitude and statistical significance of the estimated effects on several outcomes. For example, the OLS estimate of the impact of exposure to public housing on years with earnings above poverty between ages 25-27 increased from 0.03 (p=0.83) in the uninstrumented results to 0.67 (p=0.13) in the instrumented results. This disparity in results highlights the importance of controlling for the unobserved characteristics of families who live in public housing because these unobservables contribute to worse self-sufficiency outcomes for their children.[29] We speculate that with a larger sample, controls for unobserved characteristics could easily make the difference between finding an insignificant effect and a positive, significant one.

Nearly the opposite was the case for privately-owned assisted developments. The estimated impacts of this form of assisted housing were more negative in the instrumented than uninstrumented models. Thus, unobserved characteristics of families in privately-owned assisted housing probably lead to better outcomes for their children. However, the instrumented model results for privately-owned assisted housing are quite imprecise largely because of small sample sizes.

Discussion

This analysis yields seven primary results:

(1) *After controlling for differences in demographics and family background, living in assisted housing, whether public housing or privately-owned, between ages 10-16 does not contribute to worse impacts on the four self-sufficiency outcomes examined here.*

[29]Educational attainment is the notable exception.

Only one of our regression models--the ordered logits on welfare dependence--produced a statistically significant negative estimates for the effect of housing assistance on outcomes. While some of the other models produced estimates of negative effects, none was statistically significant in the instrumented models that account for unmeasured characteristics of families.

(2) *In models that controlled for both measured and unmeasured characteristics, exposure to public housing exerted positive effects on total earnings, earnings above poverty, and the likelihood of having at least some earnings. Although none of these results was statistically significant at conventional levels, it is likely that these results would probably become stronger in larger samples.*

The instrumented results for the effect of public housing on earnings-related outcomes were consistently positive at modest, though not negligible, levels of statistical significance. The consistency of these results suggests that the impact of living in public housing as a youth on adult earnings is probably positive and would be statistically significant with a larger sample. Positive impacts are consistent with the hypotheses that assisted housing increases disposable income, housing quality and residential stability.

(3) *There is some evidence that unobserved differences in family background of children 10-16 years of age who spent some time in public housing contributes to their poorer outcomes. This conclusion is based on the change in magnitude and statistical significance of the estimated effects for public housing when unobserved characteristics were taken into account.*

Comparisons of results from the uninstrumented and instrumented models for public housing produce a generally consistent picture: the instrumented results are substantially more positive and statistically significant. Thus, family traits unmeasured in the PSID-Assisted Housing Database appear to depress the self-sufficiency adult outcomes of youth who lived in public housing. Future research should control for these unmeasured characteristics to produce unbiased results, and effort should be directed at identifying a more comprehensive set of these attributes and understanding their effects.

(4) *For privately-owned assisted developments, the evidence that unobserved family characteristics affect outcomes is weak, but it tends to suggest that the unmeasured characteristics of families in this type of assisted housing lead to more positive outcomes.*

For privately-owned assisted housing, comparisons of the results from the instrumented and the uninstrumented models yields a conclusion that is opposite that for public housing. In privately-owned assisted developments, the unmeasured family characteristics of youth appear to contribute to better self-sufficiency outcomes in adulthood. This interpretation is consistent with the channeling of different types of families into different types of housing assistance (Newman and Schnare 1993) and a creaming effect in private developments (i.e., selection of only the "best" tenants from among those who apply for residence). It would be worthwhile to determine whether this finding is sustained with a larger sample and other sample groups (e.g., younger children, adults).

(5) *The expectation that public housing, compared to privately-owned assisted housing, would have more detrimental impacts on the long-term self-sufficiency outcomes of youth is not supported. If anything, the evidence suggests the opposite.*

There were no statistically significant differences in the estimated effects of public versus privately-owned assisted housing. Therefore, our expectation that the worse social and/or physical environments of public housing developments and their surrounding neighborhoods would lead to worse outcomes than the relatively better conditions of privately-owned developments is not confirmed. On the contrary, in the instrumented model results, which should provide the most accurate impact estimates, privately-owned assisted housing was consistently associated with worse outcomes than public housing. Because the estimates for privately-owned assisted housing are imprecise, the strongest conclusion warranted from these results is that contextual conditions of the two types of housing assistance do not appear to affect outcomes.

(6) *The expectation that big city assisted housing would have worse implications for long-term self-sufficiency outcomes of youth is not supported.*

This finding dovetails with the preceding one. If contextual conditions have little effect on long-term self-sufficiency in general, then we would not expect the contrasting conditions of big cities versus other locations to affect outcomes. We find no such differences.

(7) *There is limited evidence that public housing has a stronger positive effect on children from families that are highly dependent on public assistance.*

Because housing assistance should make a relatively greater contribution to the well-being of the poorest families, we hypothesized that the effect of housing assistance could depend on the extent of a family's disadvantage. Two of the models support this expectation. This finding may have implications for the allocation of the limited stock of public housing, and is worthy of further study.

Conclusions

These results suggest that exposure to housing assistance as a child during the period from 1968 to 1982 did not play a significant role in determining adult outcomes. While adults who lived in assisted housing at some point between the ages of 10 and 16 spent more time on welfare, had lower earnings and were more likely to be in poverty, these outcomes result from their more disadvantaged backgrounds, not from housing assistance per se. There is also no evidence that self-sufficiency outcomes in young adulthood are adversely affected by the neighborhood conditions of assisted housing developments, at least among the assisted housing settings and among the age groups in this sample. In fact, in the case of public housing, there is at least suggestive evidence of positive effects that exposure has a positive effect on a child's future earnings. This impact may arise either because housing assistance enhances disposable income, because it provides a more stable, higher quality living environment, or some combination of these factors. This finding is not statistically significant at conventional levels, however, and warrants further study with larger and different samples.

One interpretation of the neutral or modestly positive findings is that the 1968-1982 period

predates implementation of preference rules, which gave priority for housing assistance to the most disadvantaged households among those in the eligible population. Therefore, the income mix of tenants was more diverse prior to the 1980s. Other research (Jargowsky 1997) indicates that neighborhood poverty has become increasingly concentrated over the last three decades.

This research represents only a first step in developing an understanding of the long-term effects of housing assistance on a range of life outcomes. To increase confidence in these findings, and their generalizability it is important to examine whether younger children are affected in the same way by exposure to assisted housing as the older children studied in this research. The child development literature clearly indicates that early childhood is the critical formative period in a child's life. Addressing this question would require analyses of samples that include children younger than 10 years of age.

The present research also makes clear that the raw differences in outcomes between the assisted housing and unassisted groups disappear when controls for background characteristics, most prominently parental attributes, are included. This finding suggests that we need to look more closely at these background variables to determine whether assisted housing may be related to them. Put another way, while assisted housing may have no direct effects on children's outcomes, it may affect them indirectly through its impacts on parents' work hours, earnings, and welfare dependence. In the present analysis, for example, we find that increases in parents' earnings have a positive influence on their children up to a threshold of $10,000. If housing assistance receipt were associated with a reduction in parental earnings or their slower rate of growth, this could have negative repercussions on the life outcomes of their children. In this paper, we treated parental earnings as exogenous and were unable to distinguish such indirect effects. Doing so requires an analysis of whether adults are affected by housing assistance receipt and then estimating how these effects convey to their children.

Examining adult exposure to assisted housing and outcomes is also a worthy topic for research itself.

A final avenue worth pursuing in future work is the effect of income mixing in the tenant population of assisted housing on individual outcomes. Recent federal legislation increased income mixing in an effort to count the perceived deleterious effects of the concentration of poor families in assisted housing. The economic profile of assisted families during the period covered in this study was substantially less disadvantaged than it became in the 1980s and the 1990s, with the advent of tighter income targeting and preference rules. In the 1970s, for example, assisted housing residents were a mix of the working poor and the lower-middle class along with the very disadvantaged. In this study, which covered exposure to assisted housing during the period 1968-1982, the incomes of 23 percent of the public housing families were never below 50 percent of the county median. Comparing the same self-sufficiency outcomes studied here for those exposed to assisted housing in the late 1980s and 1990s when poverty concentrations were much higher could shed light on the effects of income mixing.

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Table 1
Univariate Statistics of Variables Used in Models

	Mean	Median	Std. Dev.
Dependent Variables			
# years off welfare 20-27	5.37	7	2.87
# years earnings above poverty 25-27	1.75	2	1.29
Mean earnings of self and spouse 25-27	16,007	12,819	15,011
Completed high school (0, 1)	0.69		
Acquired post-secondary education (0, 1)	0.20		
Policy Variables			
Ever in public housing ages 10-16 (0, 1)	0.14		
Ever in private assisted housing ages 10-16 (0, 1)	0.04		
Predicted probability: public housing	0.15	0.07	0.19
Predicted probability: private assisted housing	0.04	0.01	0.08
Demographics			
Cohort (year born+10)	1972	1972	2.49
Black (0, 1)	0.66		
Female (0,1)	0.55		
Mother's age when born	27.99	28	6.17
Family background			
Head a high-school graduate (0, 1)	0.32		
Years in one-parent family ages 10-16	3.41	3	3.14
Parents changed marital status ages 10-16 (0, 1)	0.30		
Years with disabled family head ages 10-16	2.11	1	2.54
Number of children in family	3.89	4	2.01
Family economic characteristics			
Whether any time on welfare ages 10-16 (0, 1)	0.73		
Mean annual cash value of welfare ages 10-16 ($1,000s)	3.49	1.20	4.58
Mean annual labor income ages 10-16 ($1,000s)	13.47	11.62	11.45
Mean annual work hours of head<200 ages 10-16(0, 1)	0.16		
Geographic and housing characteristics			
Years in a big city (>500,000) ages 10-16	2.18	0	3.12
Years in a small city (100,000-500,000) ages 10-16	1.29	0	2.58
Years as homeowner ages 10-16	3.3	3	3.09

Source: PSID - Assisted Housing Database
Notes:
a. 1990 dollars used for monetary values.
b. Welfare includes AFDC, Food Stamps and "other welfare." SSI is excluded.

Table 2
Attrition Test Results

	Pooled (A)	Non-attriters (B)	Difference (A)-(B)	P(|Difference|=0)
N	1939	1230	709	
Probit: graduated high school				
Public housing	0.01	0.04	-0.04	0.161
	(.04)	(.04)	(.08)	
Private assisted housing	0.09	0.05	0.04	0.252
	(.06)	(.07)	(.11)	
Probit: whether received welfare at age 20				
Public housing	0.02	0.04	-0.03	0.518
	(.04)	(.05)	(.16)	
Private assisted housing	0.08	0.12	-0.04	0.835
	(.07)	(.08)	(.16)	
Probit: whether received welfare at age 21				
Public housing	0.03	0.04	-0.01	0.345
	(.04)	(.05)	(.12)	
Private assisted housing	-0.03	0.00	-0.03	0.985
	(.07)	(.08)	(.14)	
Tobit: Earnings at age 20				
Public housing	-910	-688	-223	0.667
	(645)	(770)	(420)	
Private assisted housing	-2,493	-3,226	734	0.161
	(1075)	(1215)	(555)	
Tobit: Earnings at age 21				
Public housing	-200	22	-222	0.641
	(731)	(830)	(389)	
Private assisted housing	-1,296	-1,633	337	0.666
	(1212)	(1301)	(476)	

Source: PSID - Assisted Housing Database
Notes:
a. Standard errors in parenthesis.
b. 1990 dollars used for monetary values.
c. Welfare includes AFDC, Food Stamps and "other welfare". SSI is excluded.
d. The standard errors of the differences shown in this table are computed based on the fact that the variance of the difference in the estimated coefficients is equal to the difference in the variances. A proof of this is supplied in Appendix E.

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d. The standard errors of the differences shown in this table are computed based on the fact that the variance of the difference in the estimated coefficients is equal to the difference in the variances. A proof of this is supplied in Appendix E.

Table 3
The Changing Profile of Assisted Housing

	1970	1980	1990
I. Public Housing			
% black	61.9	80.8	80.5
% high school graduates	28.0	33.5	44.2
% married	50.4	24.4	30.3
% receiving welfare	46.5	67.1	72.3
labor earnings			
mean	$10,087	$4,471	$5,921
s.d.	$9,771	$6,735	$8,184
II. Privately-owned Assisted Housing			
% black	67.8	54.7	66.5
% high school graduates	69.7	52.2	73.5
% married	56.7	28.7	23.3
receiving welfare	21.6	54.9	51.3
labor earnings			
mean	$17,937	$10,230	$9,940
s.d.	$10,664	$9,997	$10,541

Source: PSID - Assisted Housing Database
Notes:
a. Sample limited to families with children.
b. 1990 dollars used for monetary values.
c. PSID weights used to correct for oversampling the poor and for attrition.
d. Welfare includes AFDC, Food Stamps and "other welfare." SSI is excluded.

Table 4
Illustrative Characteristics of Analysis Sample (weighted)

	Public housing (N=178)	Privately-owned assisted housing (N=52)	Unassisted (N=1005)
Characteristics of children ages 10-16			
# yrs. in assisted housing			
mean	5.3	3.0	0.0
median	7	2	0
% black	72	48	27
% female	52	69	53
Annual earnings of head			
mean	$12,119	$18,042	$17,397
median	$11,635	$22,612	$15,670
Years in single-parent family			
mean	3.5	4.6	2.8
median	4	5	2
% high school graduates (head)	42	40	45
% receiving any welfare (household)	89	65	54
# yrs. receiving welfare			
mean	4.6	2.7	2.1
median	6	2	1
Neighborhood poverty (tract)			
mean	28	22	18
s.d.	14	15	12
% high school drop outs (tract)			
mean	22	18	17
s.d.	7	9	11
Characteristics of adults 20-27			
Average earnings 25-27 (self and spouse)			
mean	$15,950	$14,617	$21,900
median	$12,250	$16,156	$18,630
% receiving any welfare 20-27	82	63	45
# yrs. receiving welfare 20-27			
mean	3.6	3.3	1.7
median	4	1	0
% high school graduates	66	72	73
Mean tract poverty rate 25-27			
mean	26	22	17
s.d.	13	14	12

Source: PSID - Assisted Housing Database
Notes:
a. 1990 dollars used for monetary values.
b. "Unassisted" defined as eligible using 80 percent of county median family income adjusted for family size.
c. PSID weights used to correct for oversampling the poor and for attrition.
d. Welfare includes AFDC, Food Stamps and "other welfare". SSI is excluded.

TABLE 5
Comparison of Unadjusted Outcomes

	Means				
	Unassisted (A)	Assisted (B)	Difference (A)-(B)	Std. Error of Difference	P (Difference<0)
# Years off welfare					
Public housing	5.54	4.52	1.019	0.237	0.00
Private assisted	5.54	5.07	0.470	0.427	0.14
Household income					
Public housing	16,586	13,193	3,394	1,081	0.00
Private assisted	16,586	14,355	2,232	1,634	0.09
Had earnings					
Public housing	0.89	0.86	0.030	0.028	0.14
Private assisted	0.89	0.92	-0.034	0.039	0.81
# years income> poverty					
Public housing	1.79	1.53	0.263	0.105	0.01
Private assisted	1.79	1.75	0.041	0.198	0.42
Completed high school					
Public housing	0.70	0.66	0.038	0.039	0.16
Private assisted	0.70	0.72	-0.021	0.066	0.62
Postsecondary education					
Public housing	0.20	0.22	-0.024	0.034	0.76
Private assisted	0.20	0.23	-0.036	0.060	0.72

Source: PSID - Assisted Housing Database

Notes:

a. 1990 dollars used for monetary values.

b. "Unassisted" defined as eligible using 80 percent of county median family income adjusted for family size.

c. Welfare includes AFDC, Food Stamps and "other welfare". SSI is excluded.

d. T-tests assume variances are not equal for assisted and unassisted groups.

Table 6
Regression Results

	Uninstrumented		Instrumented	
	Coef.	P	Coef.	P
OLS: # years off welfare 20-27				
Public housing	-0.19	0.53	1.26	0.27
Privately-owned assisted housing	-0.08	0.87	-0.74	0.63
Ordered logit: Years off welfare[1]				
Public housing	-0.29	0.01	-0.15	0.86
Privately-owned assisted housing	-0.19	0.33	-1.41	0.17
OLS: # years income above poverty 25-27				
Public housing	0.03	0.83	0.67	0.13
Privately-owned assisted housing	0.11	0.63	-0.54	0.45
Ordered logit: years with income above poverty[2]				
Public housing	0.08	0.65	1.29	0.13
Privately-owned assisted housing	0.19	0.54	-1.28	0.24
OLS: Earnings				
Public housing	630	0.62	6,474	0.25
Privately-owned assisted housing	529	0.79	-2,064	0.79
Tobit: Earnings				
Public housing	674	0.62	9,245	0.11
Privately-owned assisted housing	1,105	0.61	-1,470	0.85
Probit: Had earnings[3]				
Public housing	0.01	0.60	0.23	0.06
Privately-owned assisted housing	0.05	0.20	0.03	0.83
Probit: Graduated from high school[3]				
Public housing	0.04	0.39	-0.10	0.65
Privately-owned assisted housing	0.05	0.60	-0.20	0.41
Probit: Any postsecondary education[3]				
Public housing	0.12	0.01	0.20	0.22
Privately-owned assisted housing	0.08	0.24	0.52	0.01

Source: PSID - Assisted Housing Database

[1]Categorical dependent variable: 0-1, 2-5, 6-7, or 8 years off welfare.

[2]Categorical dependent variable: 0, 1-2, or 3 years with earnings above poverty.

[3]The probit coefficients have been transformed to show the change in probability with respect to a unit change in the policy variable with the other variables in the models set to their means.

Notes:

a. Welfare includes AFDC, Food Stamps and "other welfare". SSI is excluded.

b. 1990 dollars used for monetary values.

Table 7
Transformed Ordered Logit Results

		Unadjusted Distribution			Based on Uninstrumented Model Results[1]			Based on Instrumented Results[1]		
		Unassisted	Public housing	Privately-owned assisted housing	Unassisted	Public housing	Privately- owned assisted housing	Unassisted	Public housing	Privately-owned assisted housing
Years off welfare										
	8	0.41	0.20	0.28	0.42	0.35	0.37	0.41	0.42	0.13
	6-7	0.21	0.27	0.23	0.29	0.30	0.30	0.30	0.30	0.21
	2-5	0.24	0.30	0.30	0.22	0.26	0.25	0.22	0.22	0.39
	0-1	0.14	0.24	0.19	0.07	0.09	0.08	0.07	0.07	0.27
Years with income above poverty										
	3	0.46	0.35	0.51	0.47	0.49	0.52	0.45	0.70	0.22
	1-2	0.26	0.30	0.15	0.30	0.29	0.28	0.31	0.20	0.29
	None	0.28	0.35	0.34	0.23	0.22	0.20	0.24	0.10	0.49

Source: PSID - Assisted Housing Database

[1]Regression adjusted distributions were calculated with all variables set to their means.

Notes:

a. Welfare includes AFDC, Food Stamps and "other welfare". SSI is excluded.

Table 8

Results of Interaction of Housing Assistance Receipt with Average Annual Welfare Income

	Uninstrumented		Instrumented	
	Coef.	P	Coef.	P
OLS: # years off welfare 20-27				
Public housing	-0.64	0.10	1.05	0.39
Private assisted housing	-0.07	0.90	0.57	0.73
Public x years in a big city	0.15	0.09	0.08	0.71
Private x years in a big city	0.02	0.91	-0.38	0.27
Years in a big city	-0.04	0.47	0.00	0.99
OLS: # years income above poverty 25-27				
Public housing	-0.10	0.52	0.72	0.15
Private assisted housing	-0.08	0.78	-0.63	0.49
Public x years in a big city	0.04	0.21	-0.02	0.85
Private x years in a big city	0.06	0.31	0.02	0.89
Years in a big city	-0.04	0.11	-0.02	0.42
OLS: Earnings				
Public housing	-573	0.73	6,329	0.31
Private assisted housing	-900	0.69	-8,927	0.36
Public x years in a big city	411	0.29	-33	0.97
Private x years in a big city	490	0.39	2,041	0.31
Years in a big city	-339	0.13	-290	0.29
Tobit: Earnings				
Public housing	-431	0.81	8,730	0.19
Private assisted housing	-998	0.74	-8,952	0.36
Public x years in a big city	389	0.33	72	0.95
Private x years in a big city	692	0.28	2,248	0.21
Years in a big city	-371	0.11	-330	0.24
Probit: Had earnings[1]				
Public housing	0.016	0.63	0.171	0.16
Private assisted housing	-0.012	0.84	0.018	0.93
Public x years in a big city	0.000	1.00	0.018	0.39
Private x years in a big city	0.027	0.09	0.008	0.82
Years in a big city	-0.001	0.89	-0.002	0.75
Probit: Graduated from high school[1]				
Public housing	0.037	0.61	0.177	0.48
Private assisted housing	-0.009	0.93	-0.186	0.55
Public x years in a big city	0.003	0.85	-0.090	0.02
Private x years in a big city	0.020	0.55	-0.016	0.81
Years in a big city	-0.005	0.59	0.010	0.35
Probit: Post-secondary education[1]				
Public housing	0.107	0.09	0.459	0.02
Private assisted housing	0.048	0.60	0.351	0.19
Public x years in a big city	0.005	0.65	-0.077	0.01
Private x years in a big city	0.010	0.58	0.043	0.40
Years in a big city	0.003	0.70	0.014	0.13

Source: PSID - Assisted Housing Database

[1]The probit coefficients have been transformed to show the change in probability with respect to a unit change in the policy variable with the other variables in the models set to their means.

Notes:

a. 1990 dollars used for monetary values.

b. Welfare includes AFDC, Food Stamps and "other welfare". SSI is excluded.

Table 9

Results of Interaction of Housing Assistance Receipt with Average Annual Welfare Income

	Uninstrumented		Instrumented	
	Coef.	P	Coef.	P
OLS: # years off welfare 20-27				
Public housing	-0.70	0.07	-0.96	0.50
Private assisted housing	-0.58	0.34	-0.01	1.00
Public x welfare income	0.09	0.07	0.22	0.03
Private x welfare income	0.16	0.18	-0.22	0.48
Welfare income	-0.11	0.00	-0.15	0.00
OLS: # years income above poverty 25-27				
Public housing	0.08	0.61	0.70	0.25
Private assisted housing	-0.15	0.58	-0.76	0.31
Public x welfare income	-0.01	0.62	-0.01	0.88
Private x welfare income	0.08	0.11	0.12	0.49
Welfare income	-0.02	0.13	-0.03	0.09
OLS: Earnings				
Public housing	-501	0.76	6,912	0.36
Private assisted housing	-2,302	0.26	-6,056	0.49
Public x welfare income	217	0.32	-102	0.80
Private x welfare income	895	0.08	2,058	0.26
Welfare income	-298	0.05	-290	0.11
Tobit: Earnings				
Public housing	-436	0.82	9,671	0.21
Private assisted housing	-2,527	0.36	-5,745	0.49
Public x welfare income	219	0.37	-107	0.84
Private x welfare income	1,143	0.04	2,206	0.17
Welfare income	-414	0.02	-421	0.06
Probit: Had earnings[1]				
Public housing	0.02	0.49	0.32	0.06
Private assisted housing	-0.03	0.63	-0.02	0.91
Public x welfare income	0.00	0.77	-0.01	0.43
Private x welfare income	0.03	0.00	0.02	0.50
Welfare income	-0.01	0.05	-0.01	0.09
Probit: Graduated from high school[1]				
Public housing	0.02	0.80	-0.33	0.23
Private assisted housing	-0.17	0.17	-0.18	0.51
Public x welfare income	0.01	0.57	0.02	0.25
Private x welfare income	0.07	0.00	0.00	0.95
Welfare income	-0.01	0.08	-0.01	0.11
Probit: Post-secondary education[1]				
Public housing	0.13	0.03	-0.11	0.59
Private assisted housing	0.03	0.71	0.42	0.04
Public x welfare income	0.00	0.98	0.03	0.05
Private x welfare income	0.02	0.31	0.07	0.10
Welfare income	0.00	0.47	-0.01	0.05

Source: PSID - Assisted Housing Database

[1]The probit coefficients have been transformed to show the change in probability with respect to a unit change in the policy variable with the other variables in the models set to their means.

Notes:

a. 1990 dollars used for monetary values.

b. Welfare includes AFDC, Food Stamps and "other welfare". SSI is excluded.

Appendix A

Instruments and First-Stage Models for Housing Assistance Receipt

Background

Assisted families may differ from families that are eligible but unassisted in ways not captured in our data. Estimates of the long-term effect of housing assistance may be biased if these unmeasured differences are associated with outcomes. We addressed this potential bias using a two-stage approach where housing assistance receipt is predicted in the first stage using instruments for housing assistance, that is, variables that are associated with a family's receiving housing assistance but not with outcomes. The second stage then uses the predicted value for housing assistance receipt in place of the actual value to estimate the effects of housing assistance on outcomes. This appendix details our derivation of instruments and describes the models used in the first-stage prediction of housing assistance receipt.

Construction of Instrumental Variables

An effective instrument for housing assistance would be one that is associated with housing assistance receipt but not otherwise related to outcomes. That is, an instrument should be able to predict whether a family lives in assisted housing but should not be associated with any other characteristics that might contribute to a youth's becoming self-sufficient in adulthood. We use two types of instruments in this analysis. The first is based on the housing assistance supply ratio (HASR), which we define as the supply of assisted housing units per eligible family in each county. Such an instrument is feasible because there is substantial geographical variation in the proportion of low-income renters who receive housing assistance (Kingsley and Tatian 1997). However, the supply of housing assistance is likely to be at least partly endogenous because it may depend on demand factors, such as income, that could potentially affect outcomes. We therefore purged the HASR of demand factors in order to derive instruments that represent the portion of the supply of housing assistance determined purely by administrative or political decisions rather than need. More formally, we regressed the HASR on a vector of county-level census characteristics and used the residual from this regression to form our instruments.

As a second type of instrument, we use rule changes in eligibility standards for housing assistance. This gave us two housing policy regimes, one extending from 1968 to 1974 and the other from 1975 to 1982. Because the effect of housing assistance availability could depend on the regime, we interact the two sets of instruments.

To form the HASR, we relied on our previously-compiled national database of assisted housing projects (Newman and Schnare 1997). Because the tenant characteristics, entry mechanisms, and likely effects on outcomes are so different for public and other HUD-assisted projects, we developed different instruments for the two types of housing assistance.[1] For public housing, we used the distribution of public housing units by county in 1995. We believe this represents an accurate measure of the supply of units for the period 1968-1982 (the years during which our analysis sample members were between ages 10-16) because by 1973, 1.26 million public housing units were in operation -- 93 percent of the current total (HUD, 1974) and few units had been demolished or otherwise removed from the public housing inventory. On the other hand, the supply of units in privately-owned HUD-assisted developments was rapidly expanding during this period. Consequently, both the geographical and temporal distribution of units in private assisted projects were needed to construct the instrument. We used the date of final endorsement to proxy the date when the units became available for occupancy.

Because our sample consists of children in families, developments housing primarily the elderly and handicapped should be excluded from the unit counts. This was feasible for public housing where we could determine whether the project was for the elderly or handicapped for 94 percent of public housing projects comprising 97 percent of units. For private assisted developments, we excluded all Section 202 projects, which are predominantly non-family. For the remainder, we used 1998 data from "A Picture of Subsidized Households" (APSH) to estimate the number of family units in each development. We matched these APSH data to our assisted housing database using the FHA number. About 45 percent of the units were identified as elderly or handicapped units. The units were excluded from the calculation.

In the HASR denominator, we used Census data to estimate the number of families in the county with incomes below 50 percent of the county median. To calculate this figure, we used historical microdata to determine the proportion of families below 50 percent of median family income in each state, and then multiplied the number of families in the county by this fraction.[2]

Over the period of our youth observations, the average HASR for public housing declined from 5.5 percent in 1968 to 4.5 percent in 1982, while the average private assisted HASR climbed from 0.04 percent to 2.1 percent over the same period.[3] Beneath these averages, there is considerable variable, with standard deviations about twice the magnitude of the means.

At least a portion of this variability in supply is likely to be based on need, however, and

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[1] We cannot consider tenant-based housing assistance because it was not widely available before 1983. We observe sample members during their youth over the period 1968-1982.

[2] The historical microdata were downloaded from the Integrated Public Use Microdata (IPUMS) website at http://www.ipums.umn.edu/. We used state level data because county level data were not available.

[3] Underlying these ratios, we estimate that the total number of available family units in private subsidized housing climbed from 17,500 in 1968 to 422,000 in 1982.

therefore does not constitute an indicator of purely administrative or political decisions. In order to purge this measure of supply of any association with factors potentially determining need, we regressed it on a vector of county level population characteristics, derived from the 1970, 1980, and 1990 Censuses, interpolating linearly for intercensus years. We then used the residuals from these regressions as our instruments. The population characteristics in these regressions were: total population (logged), percent of families with incomes below poverty, percent white population, percent population aged 65 or more, the percent of adults with a college degree, the ratio of median rent to median income, and the percent of households with a female head. These factors could conceivably affect not only the availability of housing assistance, but also outcomes through, for example, various kinds of "neighborhood effects". In addition, we included state fixed effects to control for broad differences across states in employment, health, education, and welfare programs that could also affect outcomes.

We included the size of the total population because places with larger populations, in addition to having more visible housing problems, are likely to have greater administrative ability and to devote more resources toward obtaining housing assistance. We therefore expected more populous areas to be associated with a greater availability of housing assistance.

We included the proportion of families in poverty as an measure of the income level.[4] It is uncertain what sign this variable will take. Arguably, the housing problems of eligible families in low-income areas would be more severe than in high-income areas, and therefore the demand for housing assistance would be greater.

We included the fraction white because if racial prejudice exists in the allocation of housing assistance, a larger white population should be associated with more assisted housing. The proportion of elderly population was included to absorb any effects of housing allocations to the elderly that we were not able to control for by excluding known elderly units from our data. The fraction of college graduates in the adult population was included because it could be associated with a greater propensity to seek, and ability to secure, housing assistance, and therefore we expected a positive relationship. A higher median rent to median income ratio was included because higher rent burdens should provide an incentive to seek more funds for housing assistance, indicating a positive association. We included the percentage of female-headed households because the majority of families with children in assisted housing are headed by women (Newman and Schnare 1993).

Appendix table A.1 displays the regression results, which confirm most of the expectated relationships. The two strongest factors, which increase supply for both public and private assisted housing, are the size of the population and the fraction of female-headed families. For public housing, every doubling in the population or percentage point increase in the proportion of female-headed families raises the HASR by nearly a full percentage. A higher proportion of whites is

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[4] We also considered including the median income, the median property value, and the unemployment rate, but did not because they were highly correlated with the fraction of families in poverty. We used the fraction of families in poverty in our models because it had the highest predictive ability. The correlations between the variables used in the model are relatively low, the highest being -0.74 between the percentage white population and the fraction of female-headed families.

associated with a greater availability of housing assistance, probably indicating some level of racial discrimination in the allocation of housing assistance. A higher fraction of college graduates is associated with more HUD-assisted private housing, but not with public housing. Counties with a higher proportion of elderly persons are likely to have more public housing but no more likely to have a greater share of other assisted housing. Finally, contrary to expectations, counties with higher median rent to median income ratios are associated with a reduced availability of public housing but not private assisted housing.

Tests of Effectiveness of Instruments

Appendix Table A.2 shows that the housing supply instruments are highly correlated with housing assistance receipt. The difference between the means of the supply instruments for those who ever lived in public housing between ages 10 and 16 versus those who did not is statistically significant ($p \leq .01$). The magnitude of these differences indicate that, net of the local factors affecting supply, public housing residents lived in counties where the supply of public housing units per eligible household was 6-7 percentage higher compared to those who never lived in public housing. For privately-owned assisted housing, the difference in means is not significant at traditional levels ($p \leq .16$) but the difference in maximums is ($p \leq .02$). The magnitude of the differences is modest. On average, residents of privately-owned assisted housing lived in counties where the availability of this type of assisted housing was 0.28-0.73 percentage points higher than counties where non-residents lived. The housing policy regime instrument also has a modest relationship with whether an individual lived in public housing, but is not significantly related to residence in privately-owned assisted housing. In multivariate tests using probit analysis (not shown), the instrumental variables alone produced pseudo R^2s of 6.7 percent and 2.2 percent for public housing and privately-owned assisted housing, respectively. When all instruments are included together, their joint significance was high for public housing ($p \leq .01$) and nearly reached significance for privately-owned assisted housing ($p \leq .07$). These results indicate that both sets of instruments achieve some success in predicting assisted housing residence.

As shown in Appendix Table A.3, none of the instruments was correlated with outcomes. This lack of association was borne out in ordinary least squares (OLS) regressions of the outcome variables on the instruments (not shown). None of these regressions had R^2 s of more than one half of one percent. Thus, these instruments appear to meet the two criteria of a good instrument: association with housing assistance receipt, but not with outcomes.

First Stage Probit Models

We used the residuals from these regressions as the housing supply instruments in a first stage regression model that predicts whether a child lived in assisted housing between ages 10-16, estimating separate probit models for public and private assisted housing. Because we have the instruments for each year children in the analysis sample were 10-16 years old, we could have aggregated these instruments in various ways, in addition to using them without aggregation. We tested four different methods: (a) using the mean value of the instrumental variables for the period the child was 10-16; (b) using the maximum value of the instrumental variable from ages 10-16; (c) using both the mean and the maximum; and (d) using all the instruments without aggregation. For

the policy regime instrument, we summed the number of years a child lived under the first regime. The tests revealed that using both the mean and the maximum supply resulted in better predictions than using either the mean or the maximum alone. Including the unaggregated supply instruments from each year in the first stage model did not improve on using just the mean and maximum.

Independent variables in the model included the child's race, sex, birth year, and number of siblings; an array of variables describing the intensity of the family's reliance on public assistance; earnings, education, and disability status of the child's parent(s); and parental marital status. These variables are described fully in the main text. The main text also discusses the selection of the analysis sample.

Results from the first stage regression models are shown in Appendix Table A.4. The explanatory power of the models is fairly high for both public and other assisted housing with pseudo r^2's of 30 percent. The most important factors determining public housing residence are race and tenure status. The probability of a black youth living in public housing is about 6.5 percentage points higher than that of a white youth, while each additional year of family homeownership reduces the probability of public housing residence by 3.25 percentage points. Families are more likely to live in private assisted housing if the head is employed at least part-time or if the head is a single parent or disabled. Homeownership reduces the probability of living in private assisted housing.

In chi-square tests of significance, the instruments for public housing are jointly significant at 17 percent and those for private assisted development are jointly significant at 23 percent. While this seems low, it must be noted that these models include state fixed effects. Without state fixed effects, the joint significance of the instruments is much higher: less than 1 percent for public housing and less than 2 percent for private assisted developments. With the limited number of assisted housing residents in our sample widely scattered across states, much of the predictive ability of the instruments is absorbed.

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Appendix Table A.1
Results From Regressions Purging Housing Supply Instrument of Endogeneity

	Regression Results			
	Public Housing		Private Assisted Housing	
Variable	Coef.	t-stat	Coef.	t-stat
Log population	0.93	21.75	0.11	10.19
% families in poverty	0.06	8.34	-0.05	-25.99
% white population	0.06	12.23	0.02	16.05
% population 65+	0.12	10.29	-0.01	-2.57
% adults with college degree	-0.03	-3.11	0.09	34.23
Median rent/Median earnings	-0.27	-14.07	0.02	3.58
% female headed families	0.84	44.79	0.29	60.71
(State fixed effects not shown)				
R^2	0.23		0.26	

Source: Assisted Housing Database and U.S. Census Data

Appendix Table A.2
Means of Instruments of T-tests for Association with Housing Assistance

	Ever in public housing			Ever in privately-owned assisted housing		
	Means			Means		
	No	Yes	P("Yes">"No")	No	Yes	P("Yes">"No")
Supply instruments						
Average 10-16	0.01	6.71	0.00	-0.46	-0.18	0.16
Maximum 10-16	1.74	8.99	0.00	0.60	1.33	0.02
Policy regime instrument						
Years in regime 1	3.29	3.56	0.08	3.34	3.27	0.59

Source: PSID - Assisted Housing Database, U.S. Census
Notes:
a. Instruments for those with and without housing assistance assumed to have unequal variances

Appendix Table A.3
First-Stage Model Probit Results Predicting Receipt of Housing Assistance

Variable	Public housing		Privately-owned assisted housing	
	dF/dx	P	dF/dx	P
Instruments				
Maximum 10-16	1.08	0.12	-0.05	0.89
Maximum 10-16 x years in regime 1	-0.16	0.31	0.15	0.12
Mean 10-16	-0.80	0.27	0.21	0.66
Mean 10-16 x years in regime 1	0.15	0.35	-0.19	0.14
Years in regime 1	4.56	0.26	0.55	0.59
Prob>Chi^2	0.17		0.23	
Covariates				
Years earnings < 50% of county median	0.05	0.93	0.24	0.14
Black	6.47	0.01	0.77	0.28
Female	1.91	0.32	-0.05	0.92
Cohort (year born+10)	3.87	0.31	0.77	0.41
Mother's age at birth	-0.03	0.87	0.04	0.39
Head a high-school grad	-0.24	0.92	0.99	0.16
Whether ever received public assistance	3.68	0.22	0.92	0.20
Total transfer earnings 10-16	0.04	0.40	0.00	0.90
Average annual earnings	0.54	0.35	0.00	1.00
Average earnings > $10,000 (spline)	-0.40	0.52	0.21	0.15
Less than 200 hours worked annually	6.24	0.17	-1.58	0.01
Years in one-parent family	0.38	0.38	0.33	0.01
Ever experienced a marital change	-0.39	0.86	0.73	0.25
Number of children in family	0.10	0.87	-0.09	0.62
Number of years head disabled	-0.60	0.21	0.28	0.03
Number of years homeowner	-3.25	0.00	-0.42	0.00
Number of years in city with population > 500,000	-0.43	0.37	0.06	0.70
Number of years in city with population 100,000-500,000	0.55	0.30	-0.01	0.95
(Results for state dummy variable not shown)				
Pseudo r^2	0.30		0.30	

Source: PSID - Assisted Housing Database
Notes:
a. dF/dx = 100 * change in probability with respect to change in variable, evaluated with all variables at their means. The P-values are the significance levels of the underlying coefficient.

Appendix B

Estimates of the Effects of Housing Assistance Receipt on the Number of Residential Moves and Neighborhood Poverty

Two of the ways in which we hypothesize that housing assistance could affect self-sufficiency outcomes are: a) through enhancing a youth's residential stability and b) by exposing a youth to more distressed neighborhoods. In this appendix, we examine whether the number of moves and the degree of neighborhood experienced between 10-16 are affected by whether a youth received housing assistance.

Appendix Table B.1 displays the results for the effect of housing assistance on the number of moves. Confirming our expectation, youth who lived in public housing tended to move less than their unassisted peers. The sample average number of moves between 10-16 was 1.2. Public housing residence reduced this by 25 in the uninstrumented results and by 90 percent in the instrumented models. In contrast, those who lived in privately-owned assisted housing experienced significantly *more* residential moves than unassisted youth.

It is unclear why this should occur. One consideration is that the direction of causality is not certain. It could be that families who lived in privately-owned assisted housing were more mobile than others, and their spell in assisted housing did not much affect their mobility. This interpretation is supported by the observation that the median number of years in assisted housing for youth who lived in privately-owned assisted housing was three, compared to six for youth who lived in public housing. Further, families that move frequently might be expected to end up in a privately-owned assisted development at some point, simply because frequent moves are likely to expose a family to a variety of housing types.[1]

In addition, it should be noted that these models are admittedly crude. A more sophisticated treatment would use event-history specifications to predict the probability of a move in a given year as a function of tenure and family characteristics. However, these results do lend some support to our speculation that residence in public housing assistance may be associated with greater residential stability.

Table B.2 presents the results from the models estimating the effect of housing assistance on the degree of neighborhood poverty experienced by a youth. These results confirm our expectation that youth who live public housing are exposed to more concentrated poverty than they would if they

[1] The reverse of this logic could also explain why public housing residence is associated with fewer moves. Families that move often could forfeit their place on the waiting list for public housing, leaving more public housing slots open to the less mobile.

were not assisted. Indeed, public housing residence is one of the strongest factors predicting a child's exposure to poverty. On the other hand, for privately owned assisted housing, the results from the uninstrumented models indicate no effect, while the instrumented results indicate a significant *decrease* in neighborhood poverty experience.

Appendix Table B.1
Results from OLS Estimation of the Effect of Housing Assistance Receipt on the Number of Residential Moves 10-16

Variable	Uninstrumented Coef. (Std. Err.)	Instrumented Coef. (Std. Err.)
Housing assistance variables		
Public housing	-0.320 (0.155) **	-1.086 (0.589) *
Privately-owned assisted housing	0.813 (0.215) ***	1.980 (0.643) ***
Individual and family characteristics		
Black	-0.493 (0.143) ***	-0.465 (0.152) ***
Female	-0.021 (0.071)	-0.025 (0.072)
Cohort (year born minus 1957)	0.012 (0.015)	0.010 (0.016)
Mother's age at birth	-0.018 (0.009) **	-0.018 (0.008) **
Head a high-school grad	-0.115 (0.117)	-0.141 (0.120)
Ever received public assistance	0.209 (0.110) *	0.213 (0.113) *
Average $ value of public assistance (in $1,000s)	0.022 (0.018)	0.030 (0.019)
Average annual earnings (in $1,000s)	0.022 (0.023)	0.029 (0.025)
Average annual earnings > $10,000 (spline, in $1,000s)	-0.010 (0.026)	-0.022 (0.028)
Head averaged less than 200 work hours annually	0.094 (0.219)	0.237 (0.229)
Years in one-parent family	0.034 (0.018) *	0.028 (0.019)
Ever experienced a marital change	0.599 (0.101) ***	0.586 (0.104) ***
Number of children in family	0.034 (0.023)	0.041 (0.024) *
Number of years head disabled	0.028 (0.022)	0.013 (0.023)
Number of years homeowner	-0.132 (0.019) ***	-0.134 (0.019) ***
Number of years in city with population > 500,000	-0.007 (0.025)	-0.012 (0.025)
Number of years in city with population 100,000-500,000	0.020 (0.023)	0.025 (0.024)
Constant	-21.32 (30.26)	-18.11 (30.70)
(Results for state dummy variables not shown)		
R^2	0.274	0.264

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

Robust standard errors are used to correct for the non-independence of sibling observations.

Appendix Table B.2
Results from OLS Estimation of the Effect of Housing Assistance Receipt on Average Census Tract Poverty Rate 10-16

Variable	Uninstrumented Coef. (Std. Err.)		Instrumented Coef. (Std. Err.)	
Housing assistance variables				
Public housing	6.914	(1.538) ***	20.603	(5.605) ***
Privately-owned assisted housing	1.902	(1.919)	-18.686	(6.446) ***
Individual and family characteristics				
Black	5.739	(1.247) ***	5.398	(1.277) ***
Female	-0.631	(0.636)	-0.724	(0.643)
Cohort (year born minus 1957)	-0.265	(0.137) *	-0.238	(0.140) *
Mother's age at birth	0.049	(0.075)	0.067	(0.074)
Head a high-school grad	-0.943	(0.963)	-0.534	(1.004)
Ever received public assistance	-1.239	(1.134)	-1.489	(1.161)
Average $ value of public assistance (in $1,000s)	0.043	(0.155)	-0.122	(0.157)
Average annual earnings (in $1,000s)	-0.268	(0.191)	-0.439	(0.197) **
Average annual earnings > $10,000 (spline, in $1,000s)	-0.023	(0.197)	0.242	(0.207)
Head averaged less than 200 work hours annually	-0.047	(1.622)	-2.692	(1.767)
Years in one-parent family	-0.538	(0.200) ***	-0.454	(0.203) **
Ever experienced a marital change	-0.164	(0.828)	0.268	(0.850)
Number of children in family	-0.316	(0.238)	-0.410	(0.234) *
Number of years head disabled	-0.304	(0.207)	-0.052	(0.215)
Number of years homeowner	-0.980	(0.165) ***	-1.094	(0.169) ***
Number of years in city with population > 500,000	0.995	(0.217) ***	1.066	(0.216) ***
Number of years in city with population 100,000-500,000	0.339	(0.225)	0.240	(0.235)
Constant	563	(270) **	507	(276) *
(Results for state dummy variables not shown)				
R^2	0.504		0.497	

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

Robust standard errors are used to correct for the non-independence of sibling observations.

Appendix C

Full Regression Model Results

The tables in this appendix present the full regression model results that are summarized in Tables 6-9. In the one counter-intuitive result, the offspring of older mothers are more welfare-dependent and have lower earnings as adults. Otherwise, the coefficients on the control variables in the models conform to expectations.

Having a head of household who graduated from high-school displays a uniformly strong and positive relationship with self-sufficiency outcomes. Earnings and homeownership are also significant positive factors for most outcomes, though the positive effect of earnings tends to decline as they climb above $10,000. Being black is negatively associated with most outcomes, educational attainment being the exception. A higher level of welfare dependence is uniformly associated with worse outcomes. Interestingly, growing up in a medium sized city of 100,000-500,000 has a significant negative association with adult earnings. Having more siblings appears to militate against educational attainment. Family structure otherwise appears to have little effect.

Appendix Table C.1
Results from OLS Estimation of the Number of Years Off Welfare 20-27

Variable	Uninstrumented Coef. (Std. Err.)	Instrumented Coef. (Std. Err.)
Housing assistance variables		
Public housing	-0.187 (0.294)	1.261 (1.138)
Privately-owned assisted housing	-0.077 (0.479)	-0.737 (1.513)
Individual and family characteristics		
Black	-1.114 (0.244) ***	-1.195 (0.261) ***
Female	-0.973 (0.149) ***	-0.990 (0.148) ***
Cohort (year born minus 1957)	0.004 (0.031)	0.004 (0.031)
Mother's age at birth	-0.029 (0.015) *	-0.028 (0.015) *
Head a high-school grad	0.719 (0.196) ***	0.722 (0.198) ***
Ever received public assistance	-0.432 (0.214) **	-0.463 (0.220) **
Average $ value of public assistance (in $1,000s)	-0.086 (0.036) **	-0.101 (0.036) ***
Average annual earnings (in $1,000s)	0.073 (0.042) *	0.058 (0.043)
Average annual earnings > $10,000 (spline, in $1,000s)	-0.070 (0.045)	-0.052 (0.047)
Head averaged less than 200 work hours annually	-0.053 (0.380)	-0.231 (0.403)
Years in one-parent family	0.050 (0.037)	0.050 (0.038)
Ever experienced a marital change	-0.089 (0.185)	-0.049 (0.188)
Number of children in family	-0.043 (0.053)	-0.045 (0.053)
Number of years head disabled	-0.017 (0.044)	-0.001 (0.045)
Number of years homeowner	0.131 (0.038) ***	0.140 (0.036) ***
Number of years in city with population > 500,000	-0.008 (0.045)	-0.002 (0.045)
Number of years in city with population 100,000-500,000	-0.020 (0.043)	-0.034 (0.044)
Constant	-0.052 (61.552)	-1.475 (61.616)
(Results for state dummy variable not shown)		
R^2	0.320	0.320

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

Robust standard errors are used to correct for the non-independence of sibling observations.

Appendix Table C.2
Results from Ordered Logit Estimation of the Number of Years On Welfare 20-27

Variable	Uninstrumented Coef. (Std. Err.)	Instrumented Coef. (Std. Err.)
Housing assistance variables		
Public housing	0.284 (0.184)	-0.024 (0.798)
Privately-owned assisted housing	0.204 (0.297)	1.545 (1.025)
Individual and family characteristics		
Black	0.953 (0.171) ***	0.924 (0.187) ***
Female	0.694 (0.116) ***	0.703 (0.116) ***
Cohort (year born minus 1957)	0.004 (0.023)	0.006 (0.023)
Mother's age at birth	0.027 (0.010) ***	0.027 (0.010) ***
Head a high-school grad	-0.588 (0.142) ***	-0.611 (0.144) ***
Ever received public assistance	0.564 (0.174) ***	0.530 (0.177) ***
Average $ value of public assistance (in $1,000s)	0.049 (0.022) **	0.053 (0.023) **
Average annual earnings (in $1,000s)	-0.069 (0.029) **	-0.055 (0.030) *
Average annual earnings > $10,000 (spline, in $1,000s)	0.057 (0.033) *	0.039 (0.035)
Head averaged less than 200 work hours annually	-0.061 (0.242)	0.077 (0.261)
Years in one-parent family	-0.062 (0.024) **	-0.069 (0.026) ***
Ever experienced a marital change	-0.002 (0.132)	-0.045 (0.133)
Number of children in family	0.054 (0.035)	0.061 (0.036) *
Household head ever disabled	-0.020 (0.132)	-0.022 (0.134)
Number of years homeowner	-0.134 (0.024) ***	-0.139 (0.023) ***
Number of years in city with population > 500,000	-0.007 (0.030)	-0.008 (0.030)
Number of years in city with population 100,000-500,000	0.026 (0.029)	0.028 (0.029)
(Results for state dummy variable not shown)		
Cut for 1-2 years on welfare	8.750 (46.187)	12.476 (46.218)
Cut for 3-6 years on welfare	9.988 (46.187)	13.716 (46.218)
Cut for 7-8 years on welfare	11.665 (46.187)	15.393 (46.218)
Log likelihood	-1383.01	-1380.72
Pseudo R^2	0.159	0.159

Dependent variable =
1 if never on welfare,
2 if 1-2 years on welfare,
3 if 3-6 years on welfare,
4 if 7-8 years on welfare.

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

Appendix Table C.3

Results from OLS Estimation of the Number of Years with Earnings Above Poverty 25-27

Variable	Uninstrumented Coef. (Std. Err.)	Instrumented Coef. (Std. Err.)
Housing assistance variables		
Public housing	0.026 (0.120)	0.674 (0.443)
Privately-owned assisted housing	0.108 (0.221)	-0.541 (0.718)
Individual and family characteristics		
Black	-0.575 (0.106) ***	-0.602 (0.113) ***
Female	-0.112 (0.071)	-0.116 (0.071)
Cohort (year born minus 1957)	-0.012 (0.014)	-0.012 (0.014)
Mother's age at birth	-0.009 (0.006)	-0.009 (0.006)
Head a high-school grad	0.316 (0.092) ***	0.327 (0.092) ***
Ever received public assistance	-0.061 (0.101)	-0.074 (0.102)
Average $ value of public assistance (in $1,000s)	-0.023 (0.014) *	-0.030 (0.015) **
Average annual earnings (in $1,000s)	0.041 (0.020) **	0.034 (0.021)
Average annual earnings > $10,000 (spline, in $1,000s)	-0.040 (0.022) *	-0.029 (0.022)
Head averaged less than 200 work hours annually	0.057 (0.164)	-0.062 (0.171)
Years in one-parent family	0.004 (0.016)	0.006 (0.016)
Ever experienced a marital change	-0.089 (0.083)	-0.074 (0.084)
Number of children in family	-0.026 (0.022)	-0.029 (0.022)
Number of years head disabled	0.014 (0.019)	0.023 (0.020)
Number of years homeowner	0.025 (0.016)	0.026 (0.015) *
Number of years in city with population > 500,000	-0.025 (0.020)	-0.022 (0.020)
Number of years in city with population 100,000-500,000	-0.033 (0.019) *	-0.038 (0.019) **
Constant	26.969 (28.506)	26.364 (28.426)
(Results for state dummy variable not shown)		
R^2	0.217	0.219

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

Robust standard errors are used to correct for the non-independence of sibling observations.

Appendix Table C.4
Results from Ordered Logit Estimation of the Number of Years With Earnings Below Poverty 25-27

Variable	Uninstrumented Coef. (Std. Err.)	Instrumented Coef. (Std. Err.)
Housing assistance variables		
Public housing	-0.068 (0.187)	-1.027 (0.813)
Privately-owned assisted housing	-0.196 (0.310)	1.097 (1.063)
Individual and family characteristics		
Black	0.983 (0.175) ***	1.022 (0.192) ***
Female	0.180 (0.117)	0.185 (0.118)
Cohort (year born minus 1957)	0.046 (0.024) *	0.046 (0.024) *
Mother's age at birth	0.012 (0.010)	0.011 (0.010)
Head a high-school grad	-0.651 (0.146) ***	-0.674 (0.149) ***
Ever received public assistance	0.111 (0.175)	0.122 (0.178)
Average $ value of public assistance (in $1,000s)	0.042 (0.023) *	0.054 (0.024) **
Average annual earnings (in $1,000s)	-0.052 (0.031) *	-0.035 (0.032)
Average annual earnings > $10,000 (spline, in $1,000s)	0.041 (0.034)	0.019 (0.036)
Head averaged less than 200 work hours annually	-0.092 (0.253)	0.112 (0.274)
Years in one-parent family	-0.010 (0.025)	-0.013 (0.026)
Ever experienced a marital change	0.146 (0.135)	0.117 (0.136)
Number of children in family	0.047 (0.036)	0.051 (0.037)
Household head ever disabled	-0.126 (0.135)	-0.170 (0.139)
Number of years homeowner	-0.053 (0.024) **	-0.053 (0.023) **
Number of years in city with population > 500,000	0.037 (0.030)	0.032 (0.031)
Number of years in city with population 100,000-500,000	0.060 (0.029) **	0.065 (0.030) **
(Results for state dummy variable not shown)		
Cut for 1-2 years with income below poverty	91.439 (47.730)	91.986 (47.824)
Cut for 3 years with income below poverty	92.767 (47.732)	93.319 (47.826)
Log likelihood	-1159.64	-1156.36
Pseudo R^2	0.118	0.119

Dependent variable =
1 if income never below poverty,
2 if income below poverty 1-2 years,
3 if income always below poverty

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

Appendix Table C.5
Results from OLS Estimation of Average Earnings 25-27

Variable	Uninstrumented Coef. (Std. Err.)		Instrumented Coef. (Std. Err.)	
Housing assistance variables				
Public housing	630	(1,278)	6,474	(5,667)
Privately-owned assisted housing	529	(1,937)	-2,064	(7,834)
Individual and family characteristics				
Black	-8,126	(1,302) ***	-8,523	(1,403) ***
Female	279	(760)	254	(762)
Cohort (year born minus 1957)	-9	(158)	-3	(159)
Mother's age at birth	-130	(69) *	-125	(69) *
Head a high-school grad	3,809	(1,108) ***	3,836	(1,107) ***
Ever received public assistance	-1,026	(1,278)	-1,212	(1,312)
Average $ value of public assistance (in $1,000s)	-218	(140)	-271	(155) *
Average annual earnings (in $1,000s)	199	(196)	152	(203)
Average annual earnings > $10,000 (spline, in $1,000s)	10	(226)	73	(235)
Head averaged less than 200 work hours annually	1,583	(1,588)	768	(1,699)
Years in one-parent family	144	(183)	135	(191)
Ever experienced a marital change	-791	(937)	-727	(930)
Number of children in family	-254	(229)	-259	(230)
Number of years head disabled	189	(197)	262	(208)
Number of years homeowner	457	(157) ***	466	(153) ***
Number of years in city with population > 500,000	-252	(212)	-220	(215)
Number of years in city with population 100,000-500,000	-364	(212) *	-410	(212) *
Constant	40,575	(312,253)	28,492	(313,543)
(Results for state dummy variable not shown)				
R^2	0.269		0.270	

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

Robust standard errors are used to correct for the non-independence of sibling observations.

Appendix Table C.6
Results from Tobit Estimation of Average Earnings 25-27

Variable	Uninstrumented Coef. (Std. Err.)	Instrumented Coef. (Std. Err.)
Housing assistance variables		
Public housing	674 (1,370)	9,245 (5,837)
Privately-owned assisted housing	1,105 (2,151)	-1,470 (7,620)
Individual and family characteristics		
Black	-8,860 (1,241) ***	-9,488 (1,345) ***
Female	065 (840)	023 (841)
Cohort (year born minus 1957)	-010 (172)	001 (172)
Mother's age at birth	-154 (75) **	-149 (75) **
Head a high-school grad	4,206 (1,018) ***	4,214 (1,035) ***
Ever received public assistance	-826 (1,231)	-1,109 (1,252)
Average $ value of public assistance (in $1,000s)	-323 (167) *	-400 (175) **
Average annual earnings (in $1,000s)	226 (226)	168 (231)
Average annual earnings > $10,000 (spline, in $1,000s)	-015 (248)	062 (258)
Head averaged less than 200 work hours annually	1,721 (1,856)	690 (2,002)
Years in one-parent family	178 (180)	159 (189)
Ever experienced a marital change	-868 (957)	-785 (966)
Number of children in family	-208 (264)	-215 (266)
Number of years head disabled	213 (209)	315 (221)
Number of years homeowner	495 (171) ***	510 (169) ***
Number of years in city with population > 500,000	-281 (217)	-235 (219)
Number of years in city with population 100,000-500,000	-365 (209) *	-436 (216) **
Constant	44,003 (338,702)	20,479 (339,413)
(Results for state dummy variable not shown)		
Log likelihood	-12087	-12064
Pseudo R^2	0.015	0.016

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

Appendix Table C.7
Results from Probit Estimation of Whether Had Earnings 25-27

Variable	Uninstrumented Coef. (Std. Err.)		Instrumented Coef. (Std. Err.)	
Housing assistance variables				
Public housing	0.081	(0.153)	1.325	(0.697) *
Privately-owned assisted housing	0.373	(0.294)	0.202	(0.942)
Individual and family characteristics				
Black	-0.578	(0.178) ***	-0.679	(0.188) ***
Female	-0.092	(0.105)	-0.098	(0.105)
Cohort (year born minus 1957)	-0.001	(0.022)	0.002	(0.022)
Mother's age at birth	-0.013	(0.009)	-0.012	(0.009)
Head a high-school grad	0.291	(0.138) **	0.288	(0.142) **
Ever received public assistance	0.133	(0.192)	0.068	(0.192)
Average $ value of public assistance (in $1,000s)	-0.040	(0.019) **	-0.051	(0.020) **
Average annual earnings (in $1,000s)	0.027	(0.025)	0.020	(0.026)
Average annual earnings > $10,000 (spline, in $1,000s)	-0.027	(0.029)	-0.019	(0.029)
Head averaged less than 200 work hours annually	0.136	(0.200)	0.026	(0.227)
Years in one-parent family	0.023	(0.023)	0.021	(0.025)
Ever experienced a marital change	-0.020	(0.119)	-0.011	(0.119)
Number of children in family	0.032	(0.032)	0.034	(0.032)
Number of years head disabled	0.015	(0.026)	0.031	(0.029)
Number of years homeowner	0.032	(0.022)	0.033	(0.021)
Number of years in city with population > 500,000	-0.002	(0.030)	0.007	(0.030)
Number of years in city with population 100,000-500,000	-0.006	(0.030)	-0.015	(0.030)
Constant	3.733	(44.225)	-3.130	(44.328)
(Results for state dummy variable not shown)				
Log likelihood	-375.87		-374.81	
Pseudo R^2	0.110		0.112	

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

Robust standard errors are used to correct for the non-independence of sibling observations.

Appendix Table C.8
Results from Probit Estimation of Whether Graduated From High School

Variable	Uninstrumented Coef. (Std. Err.)		Instrumented Coef. (Std. Err.)	
Housing assistance variables				
Public housing	0.133	(0.155)	-0.293	(0.656)
Privately-owned assisted housing	0.157	(0.296)	-0.604	(0.738)
Individual and family characteristics				
Black	0.399	(0.135) ***	0.458	(0.145) ***
Female	0.252	(0.083) ***	0.253	(0.084) ***
Cohort (year born minus 1957)	0.013	(0.017)	0.012	(0.017)
Mother's age at birth	-0.002	(0.008)	-0.001	(0.008)
Head a high-school grad	0.664	(0.121) ***	0.687	(0.122) ***
Ever received public assistance	-0.021	(0.143)	0.001	(0.145)
Average $ value of public assistance (in $1,000s)	-0.025	(0.018)	-0.022	(0.019)
Average annual earnings (in $1,000s)	0.007	(0.023)	0.004	(0.024)
Average annual earnings > $10,000 (spline, in $1,000s)	0.005	(0.025)	0.010	(0.027)
Head averaged less than 200 work hours annually	0.126	(0.193)	0.079	(0.214)
Years in one-parent family	-0.004	(0.021)	0.002	(0.021)
Ever experienced a marital change	-0.026	(0.104)	-0.023	(0.105)
Number of children in family	-0.094	(0.028) ***	-0.097	(0.028) ***
Number of years head disabled	-0.048	(0.022) **	-0.049	(0.024) **
Number of years homeowner	0.056	(0.019) ***	0.050	(0.019) ***
Number of years in city with population > 500,000	-0.011	(0.024)	-0.013	(0.025)
Number of years in city with population 100,000-500,000	-0.032	(0.023)	-0.027	(0.024)
Constant	-25.362	(34.277)	-22.607	(34.327)
(Results for state dummy variable not shown)				
Log likelihood	-630.37		-629.29	
Pseudo R^2	0.147		0.146	

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

Robust standard errors are used to correct for the non-independence of sibling observations.

Appendix Table C.9
Results from Probit Estimation of Whether Acquired Any Post-Secondary Education

Variable	Uninstrumented Coef. (Std. Err.)		Instrumented Coef. (Std. Err.)	
Housing assistance variables				
Public housing	0.432	(0.156) ***	0.787	(0.645)
Privately-owned assisted housing	0.294	(0.251)	2.080	(0.799) ***
Individual and family characteristics				
Black	0.239	(0.145) *	0.154	(0.153)
Female	0.125	(0.092)	0.128	(0.092)
Cohort (year born minus 1957)	-0.032	(0.017) *	-0.029	(0.018)
Mother's age at birth	-0.008	(0.008)	-0.008	(0.008)
Head a high-school grad	0.298	(0.113) ***	0.243	(0.115) **
Ever received public assistance	-0.083	(0.131)	-0.138	(0.132)
Average $ value of public assistance (in $1,000s)	-0.016	(0.022)	-0.019	(0.021)
Average annual earnings (in $1,000s)	0.029	(0.026)	0.036	(0.027)
Average annual earnings > $10,000 (spline, in $1,000s)	-0.008	(0.029)	-0.021	(0.030)
Head averaged less than 200 work hours annually	0.340	(0.226)	0.454	(0.242) *
Years in one-parent family	0.061	(0.020) ***	0.045	(0.020) **
Ever experienced a marital change	-0.008	(0.104)	-0.027	(0.103)
Number of children in family	-0.119	(0.030) ***	-0.110	(0.030) ***
Number of years head disabled	-0.004	(0.025)	-0.009	(0.025)
Number of years homeowner	0.031	(0.020)	0.020	(0.019)
Number of years in city with population > 500,000	0.017	(0.028)	0.015	(0.028)
Number of years in city with population 100,000-500,000	-0.023	(0.025)	-0.031	(0.025)
Constant	61.585	(34.269) *	55.845	(34.727)
(Results for state dummy variable not shown)				
Log likelihood	-520.79		-520.88	
Pseudo R^2	0.134		0.134	

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

Robust standard errors are used to correct for the non-independence of sibling observations.

APPENDIX TABLE C.10

Results from Box-Cox Estimation of Average Earnings 25-27

Variable	Uninstrumented Coef. (Std. Err.)		Instrumented Coef. (Std. Err.)	
Housing assistance variables				
Public housing	344	(580)	3,049	(2,456)
Privately-owned assisted housing	382	(919)	-1,257	(3,213)
Individual and family characateristics				
Black	-3,784	(529) ***	-3,922	(568) ***
Female	111	(357)	98	(354)
Cohort (year born minus 1957)	-12	(73)	-9	(73)
Mother's age at birth	-61	(32) *	-59	(32) *
Head a high-school grad	1,760	(434) ***	1,770	(437) ***
Ever received public assistance	-508	(525)	-584	(530)
Average $ value of public assistance (in $1,000s)	-104	(70)	-129	(73) *
Average annual earnings (in $1,000s)	98	(96)	73	(97)
Average annual earnings > $10,000 (spline, in $1,000s)	-6	(105)	27	(109)
Head averaged less than 200 work hours annually	749	(781)	329	(837)
Years in one-parent family	66	(77)	64	(80)
Ever experienced a marital change	-358	(407)	-320	(408)
Number of children in family	-113	(112)	-117	(112)
Number of years head disabled	87	(89)	123	(93)
Number of years homeowner	216	(73) ***	216	(71) ***
Number of years in city with population > 500,000	-122	(92)	-106	(92)
Number of years in city with population 100,000-500,000	-169	(89) *	-188	(91) **
Constant	26,962	(143,770)	21,560	(142,916)
(Results for state dummy variable not shown)				
Lamda	0.914		0.913	
Adjusted R^2	0.236		0.237	

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

Appendix Table C.11

Results from OLS Estimation of the Number of Years With Earnings Above Poverty 25-27

Housing Assistance Interacted with Years in a Big City

Variable	Uninstrumented Coef. (Std. Err.)	Instrumented Coef. (Std. Err.)
Housing assistance variables		
Public housing	-0.099 (0.153)	0.722 (0.502)
Privately-owned assisted housing	-0.080 (0.291)	-0.625 (0.900)
Public housing * years in big city	0.043 (0.035)	-0.016 (0.084)
Privately-owned assisted housing * years in big city	0.063 (0.063)	0.023 (0.174)
Individual and family characteristics		
Years in big city (population > 500,000)	-0.035 (0.022)	-0.020 (0.025)
Years in small city (population 100,000-500,000)	-0.032 (0.019) *	-0.039 (0.019) **
Black	-0.553 (0.107) ***	-0.605 (0.116) ***
Female	-0.116 (0.071)	-0.116 (0.071)
Cohort (year born minus 1957)	-0.010 (0.015)	-0.012 (0.015)
Mother's age at birth	-0.010 (0.006)	-0.009 (0.006)
Head a high-school grad	0.302 (0.093) ***	0.327 (0.092) ***
Ever received public assistance	-0.061 (0.101)	-0.073 (0.102)
Average $ value of public assistance (in $1,000s)	-0.025 (0.014) *	-0.030 (0.015) **
Average annual earnings (in $1,000s)	0.039 (0.020) *	0.033 (0.021)
Average annual earnings > $10,000 (spline, in $1,000s)	-0.037 (0.022) *	-0.029 (0.022)
Head averaged less than 200 work hours annually	0.063 (0.162)	-0.063 (0.171)
Years in one-parent family	0.003 (0.016)	0.006 (0.016)
Ever experienced a marital change	-0.084 (0.083)	-0.073 (0.084)
Number of children in family	-0.022 (0.022)	-0.029 (0.023)
Number of years head disabled	0.013 (0.019)	0.023 (0.020)
Number of years homeowner	0.023 (0.016)	0.026 (0.015) *
Constant	22.683 (28.690)	26.569 (28.621)
(Results for state dummy variable not shown)		
R^2	0.219	0.219

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

Robust standard errors are used to correct for the non-independence of sibling observations.

Appendix Table C.12
Results from OLS Estimation of Average Annual Earnings
Housing Assistance Interacted with Years in a Big City

Variable	Uninstrumented Coef. (Std. Err.)			Instrumented Coef. (Std. Err.)		
Housing assistance variables						
Public housing	-573	(1,671)		6,329	(6,211)	
Privately-owned assisted housing	-900	(2,290)		-8,927	(9,765)	
Public housing * years in big city	411	(392)		-33	(980)	
Privately-owned assisted housing * years in big city	490	(566)		2,041	(2,024)	
Individual and family characteristics						
Years in big city (population > 500,000)	-339	(225)		-290	(275)	
Years in small city (population 100,000-500,000)	-351	(212)	*	-397	(215)	*
Black	-7,928	(1,294)	***	-8,435	(1,427)	***
Female	248	(759)		247	(756)	
Cohort (year born minus 1957)	11	(159)		4	(159)	
Mother's age at birth	-134	(69)	*	-128	(69)	*
Head a high-school grad	3,694	(1,123)	***	3,758	(1,109)	***
Ever received public assistance	-1,027	(1,282)		-1,158	(1,306)	
Average $ value of public assistance (in $1,000s)	-234	(140)	*	-276	(154)	*
Average annual earnings (in $1,000s)	183	(197)		127	(205)	
Average annual earnings > $10,000 (spline, in $1,000s)	30	(227)		108	(237)	
Head averaged less than 200 work hours annually	1,636	(1,579)		746	(1,699)	
Years in one-parent family	133	(183)		145	(191)	
Ever experienced a marital change	-751	(936)		-660	(940)	
Number of children in family	-219	(229)		-255	(231)	
Number of years head disabled	177	(200)		255	(208)	
Number of years homeowner	439	(158)	***	462	(154)	***
Constant	3,419	(313,649)		15,524	(314,251)	
(Results for state dummy variable not shown)						
R^2	0.270			0.271		

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

Robust standard errors are used to correct for the non-independence of sibling observations.

Appendix Table C.13
Results from Tobit Estimation of Average Annual Earnings 25-27
Housing Assistance Interacted with Years in a Big City

Variable	Uninstrumented Coef. (Std. Err.)			Instrumented Coef. (Std. Err.)		
Housing assistance variables						
Public housing	-431	(1,820)		8,730	(6,686)	
Privately-owned assisted housing	-998	(2,972)		-8,952	(9,665)	
Public housing * years in big city	389	(398)		72	(1,048)	
Privately-owned assisted housing * years in big city	692	(639)		2,248	(1,774)	
Individual and family characteristics						
Years in big city (population > 500,000)	-371	(230)		-330	(279)	
Years in small city (population 100,000-500,000)	-351	(209)	*	-417	(220)	*
Black	-8,664	(1,253)	***	-9,369	(1,366)	***
Female	29	(840)		11	(843)	
Cohort (year born minus 1957)	11	(172)		10	(173)	
Mother's age at birth	-159	(75)	**	-152	(75)	**
Head a high-school grad	4,050	(1,025)	***	4,124	(1,037)	***
Ever received public assistance	-827	(1,230)		-1,055	(1,253)	
Average $ value of public assistance (in $1,000s)	-344	(167)	**	-406	(175)	**
Average annual earnings (in $1,000s)	207	(226)		139	(232)	
Average annual earnings > $10,000 (spline, in $1,000s)	9	(249)		102	(260)	
Head averaged less than 200 work hours annually	1,800	(1,856)		660	(2,002)	
Years in one-parent family	167	(181)		169	(190)	
Ever experienced a marital change	-808	(958)		-712	(967)	
Number of children in family	-168	(265)		-206	(269)	
Number of years head disabled	205	(209)		305	(222)	
Number of years homeowner	475	(172)	***	504	(169)	***
Constant	1,437	(339,859)		3,239	(340,246)	
(Results for state dummy variable not shown)						
Log likelihood	-12086			-12063		
Pseudo R^2	0.015			0.016		

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

Appendix C.14
Results from Probit Estimation of Whether Any Earnings 25-27
Housing Assistance Interacted with Years in a Big City

Variable	Uninstrumented Coef. (Std. Err.)	Instrumented Coef. (Std. Err.)
Housing assistance variables		
Public housing	0.102 (0.215)	1.004 (0.709)
Privately-owned assisted housing	-0.071 (0.346)	0.106 (1.202)
Public housing * years in big city	0.000 (0.044)	0.107 (0.124)
Privately-owned assisted housing * years in big city	0.157 (0.092) *	0.047 (0.208)
Individual and family characteristics		
Years in big city (population > 500,000)	-0.005 (0.032)	-0.011 (0.036)
Years in small city (population 100,000-500,000)	-0.005 (0.030)	-0.012 (0.030)
Black	-0.569 (0.181) ***	-0.656 (0.190) ***
Female	-0.099 (0.105)	-0.107 (0.104)
Cohort (year born minus 1957)	0.001 (0.023)	0.004 (0.023)
Mother's age at birth	-0.013 (0.009)	-0.012 (0.009)
Head a high-school grad	0.273 (0.138) **	0.284 (0.141) **
Ever received public assistance	0.131 (0.193)	0.066 (0.194)
Average $ value of public assistance (in $1,000s)	-0.043 (0.019) **	-0.053 (0.021) **
Average annual earnings (in $1,000s)	0.024 (0.025)	0.020 (0.026)
Average annual earnings > $10,000 (spline, in $1,000s)	-0.022 (0.029)	-0.018 (0.030)
Head averaged less than 200 work hours annually	0.144 (0.201)	0.036 (0.228)
Years in one-parent family	0.023 (0.023)	0.020 (0.025)
Ever experienced a marital change	-0.012 (0.120)	-0.009 (0.119)
Number of children in family	0.036 (0.033)	0.038 (0.033)
Number of years head disabled	0.017 (0.027)	0.029 (0.029)
Number of years homeowner	0.030 (0.022)	0.032 (0.022)
Constant	0.056 (44.754)	-5.994 (44.614)
(Results for state dummy variable not shown)		
Log likelihood	-374	-374
Pseudo R^2	0.114	0.113

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

Robust standard errors are used to correct for the non-independence of sibling observations.

Appendix Table C.15
Results from Probit Estimation of Whether Graduated from High School
Housing Assistance Interacted with Years in a Big City

Variable	Uninstrumented Coef. (Std. Err.)		Instrumented Coef. (Std. Err.)	
Housing assistance variables				
Public housing	0.113	(0.224)	0.528	(0.751)
Privately-owned assisted housing	-0.026	(0.288)	-0.554	(0.926)
Public housing * years in big city	0.009	(0.044)	-0.269	(0.113) **
Privately-owned assisted housing * years in big city	0.058	(0.096)	-0.046	(0.188)
Individual and family characteristics				
Years in big city (population > 500,000)	-0.014	(0.026)	0.029	(0.031)
Years in small city (population 100,000-500,000)	-0.031	(0.023)	-0.039	(0.024)
Black	0.405	(0.137) ***	0.395	(0.148) ***
Female	0.252	(0.083) ***	0.273	(0.084) ***
Cohort (year born minus 1957)	0.014	(0.017)	0.008	(0.017)
Mother's age at birth	-0.002	(0.008)	-0.001	(0.008)
Head a high-school grad	0.653	(0.120) ***	0.699	(0.124) ***
Ever received public assistance	-0.017	(0.143)	0.015	(0.144)
Average $ value of public assistance (in $1,000s)	-0.026	(0.018)	-0.020	(0.019)
Average annual earnings (in $1,000s)	0.005	(0.023)	0.004	(0.024)
Average annual earnings > $10,000 (spline, in $1,000s)	0.007	(0.025)	0.011	(0.027)
Head averaged less than 200 work hours annually	0.128	(0.192)	0.064	(0.213)
Years in one-parent family	-0.004	(0.021)	0.006	(0.021)
Ever experienced a marital change	-0.021	(0.104)	-0.024	(0.104)
Number of children in family	-0.092	(0.028) ***	-0.108	(0.028) ***
Number of years head disabled	-0.047	(0.022) **	-0.046	(0.024) *
Number of years homeowner	0.055	(0.019) ***	0.053	(0.019) ***
Constant	-27.863	(34.416)	-14.808	(34.286)
(Results for state dummy variable not shown)				
Log likelihood	-630		-626	
Pseudo R^2	0.147		0.151	

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

Robust standard errors are used to correct for the non-independence of sibling observations.

Appendix Table C.16
Results from Probit Estimation of Whether Acquired Post-Secondary Education
Housing Assistance Interacted with Years in a Big City

Variable	Uninstrumented Coef. (Std. Err.)		Instrumented Coef. (Std. Err.)	
Housing assistance variables				
Public housing	0.376	(0.219) *	1.831	(0.793) **
Privately-owned assisted housing	0.177	(0.335)	1.402	(1.071)
Public housing * years in big city	0.020	(0.044)	-0.305	(0.121) **
Privately-owned assisted housing * years in big city	0.039	(0.070)	0.173	(0.205)
Individual and family characteristics				
Years in big city (population > 500,000)	0.012	(0.031)	0.055	(0.036)
Years in small city (population 100,000-500,000)	-0.023	(0.025)	-0.042	(0.025) *
Black	0.248	(0.147) *	0.095	(0.160)
Female	0.122	(0.092)	0.149	(0.091)
Cohort (year born minus 1957)	-0.031	(0.017) *	-0.032	(0.018) *
Mother's age at birth	-0.008	(0.008)	-0.009	(0.008)
Head a high-school grad	0.288	(0.115) **	0.243	(0.116) **
Ever received public assistance	-0.085	(0.131)	-0.120	(0.132)
Average $ value of public assistance (in $1,000s)	-0.017	(0.022)	-0.020	(0.021)
Average annual earnings (in $1,000s)	0.028	(0.026)	0.032	(0.027)
Average annual earnings > $10,000 (spline, in $1,000s)	-0.006	(0.029)	-0.014	(0.030)
Head averaged less than 200 work hours annually	0.343	(0.226)	0.403	(0.237) *
Years in one-parent family	0.060	(0.020) ***	0.047	(0.020) **
Ever experienced a marital change	-0.005	(0.104)	-0.017	(0.104)
Number of children in family	-0.116	(0.031) ***	-0.123	(0.031) ***
Number of years head disabled	-0.004	(0.025)	-0.004	(0.025)
Number of years homeowner	0.029	(0.020)	0.024	(0.019)
Constant	59.399	(34.164) *	61.454	(34.716) *
(Results for state dummy variable not shown)				
Log likelihood	-521		-517	
Pseudo R^2	0.135		0.140	

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

Robust standard errors are used to correct for the non-independence of sibling observations.

Appendix Table C.17
Results from OLS Estimation of the Number of Years Off Welfare 20-27
Housing Assistance Interacted with Average Annual Welfare Income 10-16

Variable	Uninstrumented Coef. (Std. Err.)	Instrumented Coef. (Std. Err.)
Housing assistance variables		
Public housing	-0.696 (0.376) *	-0.956 (1.420)
Privately-owned assisted housing	-0.582 (0.606)	-0.009 (1.589)
Public housing * welfare (average $ public assistance)	0.095 (0.052) *	0.221 (0.104) **
Privately-owned assisted housing * welfare	0.159 (0.117)	-0.216 (0.309)
Individual and family characteristics		
Average $ value of public assistance (in $1,000s)	-0.114 (0.038) ***	-0.152 (0.046) ***
Black	-1.077 (0.242) ***	-1.089 (0.262) ***
Female	-0.959 (0.149) ***	-0.992 (0.148) ***
Cohort (year born minus 1957)	0.003 (0.031)	0.002 (0.031)
Mother's age at birth	-0.029 (0.015) *	-0.028 (0.015) *
Head a high-school grad	0.702 (0.194) ***	0.736 (0.197) ***
Ever received public assistance	-0.408 (0.213) *	-0.329 (0.228)
Average annual earnings (in $1,000s)	0.071 (0.042) *	0.051 (0.044)
Average annual earnings > $10,000 (spline, in $1,000s)	-0.067 (0.045)	-0.049 (0.048)
Head averaged less than 200 work hours annually	-0.106 (0.374)	-0.350 (0.413)
Years in one-parent family	0.051 (0.037)	0.056 (0.038)
Ever experienced a marital change	-0.073 (0.184)	-0.052 (0.187)
Number of children in family	-0.047 (0.053)	-0.040 (0.053)
Number of years head disabled	-0.009 (0.043)	-0.002 (0.045)
Number of years homeowner	0.122 (0.038) ***	0.132 (0.036) ***
Years in big city (population > 500,000)	-0.006 (0.045)	0.007 (0.046)
Years in small city (population 100,000-500,000)	-0.016 (0.043)	-0.020 (0.043)
Constant	2.028 (62.021)	2.768 (61.472)
(Results for state dummy variable not shown)		
R^2	0.324	0.324

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

Robust standard errors are used to correct for the non-independence of sibling observations.

Appendix Table C.18
Results from OLS Estimation of the Number of Years with Earnings Above Poverty 25-27
Housing Assistance Interacted with Average Annual Welfare Income 10-16

Variable	Uninstrumented Coef. (Std. Err.)	Instrumented Coef. (Std. Err.)
Housing assistance variables		
Public housing	0.081 (0.157)	0.702 (0.605)
Privately-owned assisted housing	-0.148 (0.268)	-0.765 (0.756)
Public housing * welfare (average $ public assistance)	-0.009 (0.018)	-0.006 (0.040)
Privately-owned assisted housing * welfare	0.082 (0.052)	0.115 (0.168)
Individual and family characteristics		
Average $ value of public assistance (in $1,000s)	-0.024 (0.016)	-0.031 (0.018) *
Black	-0.564 (0.106) ***	-0.601 (0.116) ***
Female	-0.110 (0.071)	-0.115 (0.071)
Cohort (year born minus 1957)	-0.012 (0.014)	-0.012 (0.014)
Mother's age at birth	-0.009 (0.006)	-0.008 (0.006)
Head a high-school grad	0.320 (0.092) ***	0.326 (0.091) ***
Ever received public assistance	-0.067 (0.102)	-0.075 (0.105)
Average annual earnings (in $1,000s)	0.043 (0.020) **	0.036 (0.021) *
Average annual earnings > $10,000 (spline, in $1,000s)	-0.041 (0.022) *	-0.031 (0.022)
Head averaged less than 200 work hours annually	0.083 (0.162)	-0.031 (0.173)
Years in one-parent family	0.004 (0.016)	0.006 (0.016)
Ever experienced a marital change	-0.084 (0.083)	-0.074 (0.084)
Number of children in family	-0.025 (0.022)	-0.029 (0.022)
Number of years head disabled	0.015 (0.019)	0.022 (0.020)
Number of years homeowner	0.025 (0.016)	0.027 (0.015) *
Years in big city (population > 500,000)	-0.026 (0.020)	-0.022 (0.020)
Years in small city (population 100,000-500,000)	-0.034 (0.019) *	-0.038 (0.020) *
Constant	25.711 (28.476)	26.456 (28.432)
(Results for state dummy variable not shown)		
R^2	0.219	0.220

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

Robust standard errors are used to correct for the non-independence of sibling observations.

Appendix Table C.19
Results from OLS Estimation of Average Annual Earnings 25-27
Housing Assistance Interacted with Average Annual Welfare Income 10-16

Variable	Uninstrumented Coef. (Std. Err.)		Instrumented Coef. (Std. Err.)	
Housing assistance variables				
Public housing	-501	(1,616)	6,912	(7,470)
Privately-owned assisted housing	-2,302	(2,025)	-6,056	(8,830)
Public housing * welfare (average $ public assistance)	217	(215)	-102	(400)
Privately-owned assisted housing * welfare	895	(506) *	2,058	(1,833)
Individual and family characteristics				
Average $ value of public assistance (in $1,000s)	-298	(150) **	-290	(180)
Black	-7,965	(1,298) ***	-8,485	(1,437) ***
Female	332	(762)	280	(762)
Cohort (year born minus 1957)	-8	(159)	-4	(160)
Mother's age at birth	-129	(69) *	-123	(69) *
Head a high-school grad	3,782	(1,114) ***	3,810	(1,104) ***
Ever received public assistance	-989	(1,276)	-1,220	(1,343)
Average annual earnings (in $1,000s)	207	(197)	188	(205)
Average annual earnings > $10,000 (spline, in $1,000s)	9	(226)	43	(237)
Head averaged less than 200 work hours annually	1,575	(1,597)	1,315	(1,738)
Years in one-parent family	147	(184)	132	(192)
Ever experienced a marital change	-715	(938)	-729	(932)
Number of children in family	-256	(231)	-266	(231)
Number of years head disabled	219	(197)	236	(209)
Number of years homeowner	430	(158) ***	474	(153) ***
Years in big city (population > 500,000)	-250	(214)	-227	(216)
Years in small city (population 100,000-500,000)	-356	(214) *	-405	(216) *
Constant	39,496	(312,699)	30,252	(315,375)
(Results for state dummy variable not shown)				
R^2	0.271		0.271	

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

Robust standard errors are used to correct for the non-independence of sibling observations.

Appendix Table C.20
Results from Tobit Estimation of Average Annual Earnings 25-27
Housing Assistance Interacted with Average Annual Welfare Income 10-16

Variable	Uninstrumented Coef. (Std. Err.)		Instrumented Coef. (Std. Err.)	
Housing assistance variables				
Public housing	-436	(1,891)	9,671	(7,760)
Privately-owned assisted housing	-2,527	(2,762)	-5,745	(8,253)
Public housing * welfare (average $ public assistance)	219	(243)	-107	(513)
Privately-owned assisted housing * welfare	1,143	(548) **	2,206	(1,602)
Individual and family characteristics				
Average $ value of public assistance (in $1,000s)	-414	(178) **	-421	(219) *
Black	-8,662	(1,242) ***	-9,449	(1,369) ***
Female	130	(839)	53	(840)
Cohort (year born minus 1957)	-8	(172)		(172)
Mother's age at birth	-154	(75) **	-146	(75) *
Head a high-school grad	4,185	(1,018) ***	4,186	(1,034) ***
Ever received public assistance	-792	(1,231)	-1,113	(1,291)
Average annual earnings (in $1,000s)	241	(226)	207	(233)
Average annual earnings > $10,000 (spline, in $1,000s)	-21	(248)	29	(259)
Head averaged less than 200 work hours annually	1,796	(1,869)	1,280	(2,052)
Years in one-parent family	181	(180)	156	(190)
Ever experienced a marital change	-775	(956)	-790	(965)
Number of children in family	-206	(264)	-221	(266)
Number of years head disabled	249	(209)	288	(222)
Number of years homeowner	464	(172) ***	519	(169) ***
Years in big city (population > 500,000)	-279	(217)	-242	(220)
Years in small city (population 100,000-500,000)	-358	(209) *	-430	(218) **
Constant	40,032	(338,296)	21,656	(339,280)
(Results for state dummy variable not shown)				
Log likelihood	-12084		-12063	
Pseudo R^2	0.016		0.016	

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

Appendix Table C.21
Results from Probit Estimation of Whether Any Earnings 25-27
Housing Assistance Interacted with Average Annual Welfare Income 10-16

Variable	Uninstrumented Coef. (Std. Err.)		Instrumented Coef. (Std. Err.)	
Housing assistance variables				
Public housing	0.139	(0.201)	1.872	(0.997) *
Privately-owned assisted housing	-0.151	(0.313)	-0.110	(1.012)
Public housing * welfare (average $ public assistance)	-0.008	(0.026)	-0.045	(0.056)
Privately-owned assisted housing * welfare	0.190	(0.060) ***	0.107	(0.159)
Individual and family characteristics				
Average $ value of public assistance (in $1,000s)	-0.041	(0.021) **	-0.044	(0.026) *
Black	-0.554	(0.176) ***	-0.700	(0.194) ***
Female	-0.088	(0.106)	-0.098	(0.105)
Cohort (year born minus 1957)	-0.001	(0.023)	0.002	(0.022)
Mother's age at birth	-0.013	(0.009)	-0.012	(0.009)
Head a high-school grad	0.301	(0.139) **	0.286	(0.143) **
Ever received public assistance	0.120	(0.191)	0.036	(0.195)
Average annual earnings (in $1,000s)	0.029	(0.025)	0.022	(0.026)
Average annual earnings > $10,000 (spline, in $1,000s)	-0.028	(0.029)	-0.018	(0.029)
Head averaged less than 200 work hours annually	0.166	(0.203)	0.057	(0.227)
Years in one-parent family	0.024	(0.023)	0.020	(0.025)
Ever experienced a marital change	-0.013	(0.119)	-0.006	(0.117)
Number of children in family	0.034	(0.032)	0.033	(0.032)
Number of years head disabled	0.018	(0.026)	0.031	(0.029)
Number of years homeowner	0.031	(0.022)	0.035	(0.021) *
Years in big city (population > 500,000)	-0.004	(0.030)	0.005	(0.030)
Years in small city (population 100,000-500,000)	-0.008	(0.030)	-0.019	(0.031)
Constant	3.296	(44.381)	-3.631	(44.252)
(Results for state dummy variable not shown)				
Log likelihood	-374		-374	
Pseudo R^2	0.115		0.113	

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

Robust standard errors are used to correct for the non-independence of sibling observations.

Appendix Table C.22
Results from Probit Estimation of Whether Graduated from High School
Housing Assistance Interacted with Average Annual Welfare Income 10-16

Variable	Uninstrumented Coef. (Std. Err.)		Instrumented Coef. (Std. Err.)	
Housing assistance variables				
Public housing	0.050	(0.203)	-0.993	(0.833)
Privately-owned assisted housing	-0.459	(0.331)	-0.549	(0.830)
Public housing * welfare (average $ public assistance)	0.017	(0.030)	0.061	(0.054)
Privately-owned assisted housing * welfare	0.204	(0.072) ***	0.012	(0.188)
Individual and family characteristics				
Average $ value of public assistance (in $1,000s)	-0.034	(0.019) *	-0.037	(0.023)
Black	0.427	(0.135) ***	0.495	(0.145) ***
Female	0.266	(0.084) ***	0.254	(0.083) ***
Cohort (year born minus 1957)	0.015	(0.017)	0.011	(0.017)
Mother's age at birth	-0.002	(0.008)	-0.001	(0.008)
Head a high-school grad	0.669	(0.120) ***	0.690	(0.123) ***
Ever received public assistance	-0.029	(0.139)	0.043	(0.150)
Average annual earnings (in $1,000s)	0.009	(0.023)	0.004	(0.025)
Average annual earnings > $10,000 (spline, in $1,000s)	0.005	(0.025)	0.009	(0.027)
Head averaged less than 200 work hours annually	0.146	(0.196)	0.069	(0.225)
Years in one-parent family	-0.003	(0.021)	0.004	(0.021)
Ever experienced a marital change	-0.013	(0.104)	-0.024	(0.105)
Number of children in family	-0.094	(0.028) ***	-0.097	(0.028) ***
Number of years head disabled	-0.045	(0.022) **	-0.051	(0.024) **
Number of years homeowner	0.053	(0.019) ***	0.048	(0.019) **
Years in big city (population > 500,000)	-0.010	(0.025)	-0.011	(0.025)
Years in small city (population 100,000-500,000)	-0.030	(0.024)	-0.021	(0.024)
Constant	-28.781	(34.405)	-21.205	(34.316)
(Results for state dummy variable not shown)				
Log likelihood	-625		-628	
Pseudo R^2	0.154		0.148	

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

Robust standard errors are used to correct for the non-independence of sibling observations.

Appendix Table C.23
Results from Probit Estimation of Whether Acquired Post-Secondary Education
Housing Assistance Interacted with Average Annual Welfare Income 10-16

Variable	Uninstrumented Coef. (Std. Err.)		Instrumented Coef. (Std. Err.)	
Housing assistance variables				
Public housing	0.439	(0.203) **	-0.422	(0.780)
Privately-owned assisted housing	0.118	(0.317)	1.700	(0.831) **
Public housing * welfare (average $ public assistance)	-0.001	(0.030)	0.122	(0.062) *
Privately-owned assisted housing * welfare	0.060	(0.059)	0.290	(0.176)
Individual and family characteristics				
Average $ value of public assistance (in $1,000s)	-0.018	(0.025)	-0.060	(0.031) *
Black	0.249	(0.144) *	0.228	(0.156)
Female	0.129	(0.092)	0.139	(0.092)
Cohort (year born minus 1957)	-0.031	(0.017) *	-0.029	(0.018) *
Mother's age at birth	-0.008	(0.008)	-0.008	(0.008)
Head a high-school grad	0.300	(0.114) ***	0.255	(0.116) **
Ever received public assistance	-0.086	(0.132)	-0.059	(0.135)
Average annual earnings (in $1,000s)	0.031	(0.027)	0.042	(0.028)
Average annual earnings > $10,000 (spline, in $1,000s)	-0.009	(0.029)	-0.027	(0.031)
Head averaged less than 200 work hours annually	0.362	(0.230)	0.536	(0.262) **
Years in one-parent family	0.061	(0.020) ***	0.050	(0.020) **
Ever experienced a marital change	-0.005	(0.104)	-0.030	(0.103)
Number of children in family	-0.118	(0.030) ***	-0.108	(0.031) ***
Number of years head disabled	-0.003	(0.025)	-0.013	(0.026)
Number of years homeowner	0.030	(0.020)	0.017	(0.020)
Years in big city (population > 500,000)	0.017	(0.028)	0.019	(0.028)
Years in small city (population 100,000-500,000)	-0.024	(0.025)	-0.023	(0.025)
	60.807	(34.223) *	56.918	(34.572)
(Results for state dummy variable not shown)				
Log likelihood	-520		-517	
Pseudo R^2	0.135		0.141	

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

Robust standard errors are used to correct for the non-independence of sibling observations.

Appendix D

Regression Model Results Using Alternate Sample Definitions

In this appendix we present the results for the main models for the effects of housing assistance on self-sufficiency using alternative definitions of the sample. These results, shown in Appendix Tables D.1 and D.2, are comparable to those presented in Table 6 of the main text.

These samples differ in how "eligibility" is defined. The models discussed in the main text use 80 percent of the county median income, adjusted for family size per HUD's regulations, as the threshold. In Appendix Table D.1 we use a stricter definition: 50 percent of the county median income. This results in a sample with 841 observations--32 percent smaller than 1230 case sample obtained using 80 percent of county median.

At first glance, the results obtained with this sample appear to undermine our claim that results should not depend on the sample definition if the models are correctly specified. Several coefficients in Appendix Tables D.1 have signs opposite those shown in Table 6. However, these discrepancies all occur on the most imprecisely estimated coefficients. In general, the 50 percent sample produces estimates with extremely low levels of statistical significance, as we expected because of the smaller sample size. Had we relied on this smaller sample, our conclusions would have been different. Namely, the imprecision of the results would not have supported any meaningful findings.

Appendix Table D.2 displays the results using a sample with no restrictions on family income. This sample contains 2380 cases, twice as many as the sample used for the results in the main text. Here there are also a few discrepancies in sign between the results shown in Appendix Table D.2 and those in Table 6. But they are rare, and they occur only with the most statistically insignificant coefficients. Had we used this unrestricted sample, our conclusions would have been unchanged.

The ordered logit modes for years off welfare failed on these samples.

Appendix Table D.1
Regression Results Using Sample with Eligibility for Housing Assistance
Defined as Income Below 50 Percent of County Median

	Uninstrumented		Instrumented	
	Coef.	P	Coef.	P
OLS: # years off welfare 20-27				
Public housing	-0.19	0.54	-0.32	0.85
Privately-owned assisted housing	0.18	0.71	1.04	0.48
Ordered logit: Years off welfare[1]				
Public housing	-0.22	0.26	-0.65	0.54
Privately-owned assisted housing	0.07	0.82	0.00	1.00
OLS: # years earnings above poverty 25-27				
Public housing	0.01	0.94	0.30	0.68
Privately-owned assisted housing	0.17	0.46	0.04	0.95
Ordered logit: years with earnings above poverty[2]				
Public housing	NA		NA	
Privately-owned assisted housing	NA		NA	
OLS: Earnings				
Public housing	321	0.81	-2,233	0.78
Privately-owned assisted housing	1,537	0.45	799	0.91
Tobit: Earnings				
Public housing	305	0.82	-595	0.94
Privately-owned assisted housing	2,256	0.28	2,317	0.74
Probit: Had earnings[3]				
Public housing	0.02	0.50	0.22	0.21
Privately-owned assisted housing	0.07	0.11	0.04	0.81
Probit: Graduated from high school[3]				
Public housing	0.07	0.21	0.06	0.87
Privately-owned assisted housing	0.10	0.30	-0.04	0.86
Probit: Any postsecondary education[3]				
Public housing	0.09	0.03	-0.06	0.75
Privately-owned assisted housing	0.09	0.19	0.44	0.01

Source: PSID - Assisted Housing Database

[1]Categorical dependent variable: 0-1, 2-5, 6-7, or 8 years off welfare.

[2]Categorical dependent variable: 0, 1-2, or 3 years with earnings above poverty.

[3]The probit coefficients have been transformed to show the change in probability with respect to a unit change in the policy variable with the other variables in the models set to their means.

Notes:

a. Welfare includes AFDC, Food Stamps and "other welfare". SSI is excluded.

b. 1990 dollars used for monetary values.

Appendix Table D.2

Regression Results Using Unrestricted Sample (No Eligibility Threshold for Housing Assistance)

	Uninstrumented		Instrumented	
	Coef.	P	Coef.	P
OLS: # years off welfare 20-27				
Public housing	-0.27	0.32	0.91	0.25
Privately-owned assisted housing	-0.19	0.69	-0.57	0.74
Ordered logit: Years off welfare[1]				
Public housing	-0.28	0.11	0.72	0.21
Privately-owned assisted housing	-0.28	0.34	-0.42	0.70
OLS: # years earnings above poverty 25-27				
Public housing	-0.01	0.93	0.42	0.20
Privately-owned assisted housing	0.05	0.80	-0.12	0.87
Ordered logit: years with earnings above poverty[2]				
Public housing	NA		NA	
Privately-owned assisted housing	NA		NA	
OLS: Earnings				
Public housing	124	0.92	3,893	0.34
Privately-owned assisted housing	141	0.94	-1,952	0.79
Tobit: Earnings				
Public housing	112	0.94	5,517	0.22
Privately-owned assisted housing	626	0.79	-2,537	0.78
Probit: Had earnings[3]				
Public housing	0.00	0.98	0.04	0.48
Privately-owned assisted housing	0.02	0.31	0.02	0.88
Probit: Graduated from high school[3]				
Public housing	0.02	0.54	-0.12	0.32
Privately-owned assisted housing	0.03	0.62	0.28	0.18
Probit: Any postsecondary education[3]				
Public housing	0.10	0.05	-0.01	0.94
Privately-owned assisted housing	0.05	0.57	0.96	0.00

Source: PSID - Assisted Housing Database

[1]Categorical dependent variable: 0-1, 2-5, 6-7, or 8 years off welfare.

[2]Categorical dependent variable: 0, 1-2, or 3 years with earnings above poverty.

[3]The probit coefficients have been transformed to show the change in probability with respect to a unit change in the policy variable with the other variables in the models set to their means.

Notes:

a. Welfare includes AFDC, Food Stamps and "other welfare". SSI is excluded.

b. 1990 dollars used for monetary values.

Appendix E

Proof of Formula Used to Compute Standard Errors in Tests for Attrition Bias

Let the models predicting outcomes of the stayers, dropouts, and pooled sample of stayers and dropouts, respectively, be:

$$Y_1 = X_1\beta_1 + \epsilon_1 \quad (1)$$

$$Y_2 = X_2 b_2 + \epsilon_2 \quad (2)$$

and

$$Y = X\beta + \epsilon \quad (3)$$

where

$$Y = \begin{bmatrix} Y_1 \\ Y_2 \end{bmatrix}, \quad X = \begin{bmatrix} X_1 \\ X_2 \end{bmatrix}, \quad \epsilon = \begin{bmatrix} \epsilon_1 \\ \epsilon_2 \end{bmatrix} \quad (4)$$

We want to test the hypothesis H_0: $\beta=\beta_1$. To do so, we need to obtain:

$$VAR(\hat{\beta}_1 - \hat{\beta}) \quad (5)$$

Below we will show that

$$VAR(\hat{\beta}_1 - \hat{\beta}) = VAR(\hat{\beta}_1) - VAR(\hat{\beta}) \quad (6)$$

Proof.

Define

$$\hat{\beta}_1-\beta_1=M_1^{-1}S_1 \qquad M_1=X_1'X_1\ , \qquad S_1=X_1'\epsilon_1 \tag{7}$$

$$\hat{\beta}-\beta=(M_1+M_2)^{-1}(S_1+S_2) \tag{8}$$

Then

$$\begin{aligned}(\hat{\beta}_1-\hat{\beta})&=M_1^{-1}S_1-(M_1+M_2)^{-1}(S_1+S_2)\\ &=[M_1^{-1}-(M_1+M_2)^{-1}]S_1-(M_1+M_2)^{-1}S_2\\ &=[M_1^{-1}-M^{-1}]S_1-M^{-1}S_2\end{aligned} \tag{9}$$

If ϵ_1 and ϵ_2 are independent and VAR(ϵ)=VAR(ϵ_1) then

$$\begin{aligned}VAR(\hat{\beta}_1-\hat{\beta})&=\sigma^2[(M_1^{-1}-M^{-1})M_1(M_1^{-1}-M^{-1})+M^{-1}M_2M^{-1}]\\ &=\sigma^2[M_1^{-1}M_1(M_1^{-1}-M^{-1})-M^{-1}M_1(M_1^{-1}-M^{-1})+M^{-1}M_2M^{-1}]\\ &=\sigma^2[(M_1^{-1}-M^{-1})-M^{-1}+M^{-1}M_1M^{-1}+M^{-1}M_2M^{-1}]\\ &=\sigma^2[M_1^{-1}-2M^{-1}+M^{-1}MM^{-1}]\\ &=\sigma^2[M_1^{-1}-M^{-1}]\\ &=VAR(\hat{\beta}_1)-VAR(\hat{\beta})\end{aligned} \tag{10}$$

where σ^2=VAR(ϵ)=VAR(ϵ_1) .

Appendix F

Database Construction

I. Introduction

The database used in this analysis is the PSID-Assisted-Housing Database. Briefly, this includes records from *A Panel Study of Income Dynamics* (PSID) with attached information on whether the family resided in public or other project-based assisted housing. This latter information was derived from our Assisted Housing Database. A detailed description of the Assisted Housing Database can be found in the Appendix to Newman and Schnare (1997).[1] In this Appendix, we describe the specific analysis files for the present report.

The PSID data sets are available from the Institute for Social Research at the University of Michigan (www.isr.umich.edu/src/psid/). Analysis and data management for this analysis were done using Stata statistical software. Due to the confidential nature of PSID addresses, we are obligated to not release any part of the address-match files that would reveal these addresses or any other data that could identify particular panel members.

II. Assisted Housing Address Match

For each PSID family in every year (except 1969, for which the addresses were lost), we classified its housing as either public housing, other project-based federally-subsidized privately-owned housing, or neither. This was accomplished by matching the addresses of PSID families in each year with those in the Assisted Housing Database. The basic part of this match was done under contract by Terry Adams at the PSID office at the University of Michigan, with special arrangements to allow us access to PSID addresses. The automated matching process was based on postal coding of both address sets using a combination of AccuMail and Lorton (Postware ACE 4.20a) software. This was supplemented by substantial additional work on our part. First, there was a large set of addresses, both in the Assisted Housing Database and in the PSID address set, that were not fully postal-coded (due to either poor quality of addresses, or to limitations in the postal-coding software), and were therefore not subject to automated matching. These were clerically matched, using their (partial) postal codes as a guide. Second, a certain set of PSID families were suspected of possibly being in assisted housing but had not been matched to assisted housing addresses. For these, we contacted local housing authorities to verify whether the addresses in question were project-based assisted housing sites. We were not able to cover the entire set of these addresses, but focused our efforts on particular states with large stocks of assisted housing. These clerical steps approximately doubled the number of address matches.

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[1] Sandra Newman and Ann Schnare (1997). "'...And a Suitable Living Environment': The Failure of Housing Programs to Deliver on Neighborhood Quality", *Housing Policy Debate*, 8(4).

As mentioned above, addresses for 1969 were lost. The address-match data, therefore, skips 1969. For individuals who did not move to a new location in 1969, however, we imputed their assisted housing status based on their 1968 or 1970 address. A similar procedure was used to impute place-size for 1969. (The derivation of place-size is discussed below.)

The address match was funded by a grant from the Ford Foundation with support from the Rockefeller Foundation.

III. Basic Analysis File

The basic data set for this analysis is a set of individuals in the PSID, selected such that they could be observed in two phases of their lives: late childhood, ages 10-16, and early adulthood, ages 20-27. Thus the oldest are ones age 10 in 1968, the first year of the PSID; the youngest are 27 in 1993, the latest year of final-release data presently available. This works out to nine birth cohorts, with the oldest being age 10 in 1968, and the youngest being age 10 in 1976. Cohort assignment is not based on the calendar year of birth, but rather on a "nominal" birth year (to be described below).[2]

The PSID family data described in the main text were joined to these records. Census data were also appended: county median family incomes and size-of-place data (in the age 10-16 phase), and tract poverty rate measures (for both phases). Census data is joined using supplemental geocode files, available by special arrangement with the PSID office. Some of the Census data were from Census extract files that the PSID provides along with the geocode files, while other Census data were obtained directly from Census Bureau files.

The records were then filtered to keep ones that have family data for all seven years of the age 10-16 phase. This resulted in a set of 3416 observations. Further restricting the set to ones having family data in years 25-27 resulted in 2380 observations.

IV. Cleaning of Birth Years

As mentioned, a nominal birth year was used for assigning cohorts. We computed this as part of a birth-date cleaning process. Birth-date data required cleaning because the PSID does not have one definitive birth date for each person. Rather, it reports a birth date in each year starting in 1983, and it reports an age in every year. The cleaning algorithm took all of these into consideration. The following discussion refers to all the birth date and age information for any one given individual. Also, several modal values were computed, and this was done with preference to later years. That is, if more than one value were tied for being the most common, the one from the latest year was chosen. Let y_1 be the mode of all the reported birth years. Let y_2 be the mode of the latest three reported birth years. Let m_1 be the mode of all the birth months. Then two nominal birth years, n_1

[2] The nominal birth year is the year y such that, in the interview of year x, the age of the person can be expected to be x-y. The nominal birth year is sometimes the actual year of birth, or it may be one year later. Our selection criterion is that the nominal birth year is in the range of 1958 to 1966.

and n_2, were generated, corresponding to y_1 and y_2, as follows.

$n_1 = y_1$ if m_1 is January through April;
$n_1 = y_1+1$ otherwise (or if m_1 is missing).[3]

n_2 is defined in a similar way, based on y_2 and m_1. We then inspected the set of reported ages. The earliest value of 1 that is followed by another 1 was first converted to 0.[4] Then these values were subtracted from their corresponding interview years, yielding a set of potential nominal birth years. From this set the mode was computed, called y_3. Finally a single value was derived as follows. If n_1 was missing, but y_3 was present, then we took y_3. If n_1 was present, but y_3 was missing, then we took n_1. If n_1 and y_3 were both present, then let y_4 be either n_1 or n_2, whichever is closer to y_3. Then if y_3 and y_4 were within three years of each other, we took y_4.

V. Size-of-Place Data

Using the PSID geocode and Census data, we classified the population size of the place where our sample members lived ages 10-16 (1968-1982 in calendar years). We were primarily interested in identifying large cities (population>500,000) or medium-sized cities (population 100,000-500,000). "Place" is a Census concept that refers to specific geographic regions. It may not correspond precisely to the boundaries of urban areas, nor are places designated for areas with very low population. We could not identify the place for about 5 percent of cases, either due to a geocode failure or because the place was not defined. The 1970 and 1980 geocodes used the same place-coding scheme, while the 1990 geocode used a different one. Therefore, we used only the 1970 and 1980 geocodes and Census data to classify the size of places. Place sizes for intercensal years were estimated by linear interpolation, or linear extrapolation for 1968-69 and 1981-82. To the extent possible, we imputed missing place sizes by examining the sequence of moves. Where no move occurred, we assigned either the place-size of the preceding or succeeding year, if available. Coding failures were assigned a variable designating "place size unknown."

VI. Miscellaneous Imputations

A. Imputation of Food Stamp Receipt for 1973

Food Stamp data were not collected by the PSID in 1973. We used a two-stage regression-based method to impute them. In the first stage, we used probit to impute whether a household

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[3] The rationale is that most PSID interviewing is done in the Spring, beginning around April. Persons born in the latter part of the year are likely to have their age in a given year to be 1 year younger than persons born in the early part of the same birth year. That increment of 1 compensates for this effect. In other words, persons born from May of 1964 through April of 1965 are considered to be in the same cohort, nominally called the 1965 cohort. Secondly, if the birth month is unknown, it is imputed as being in the latter part of the year since this is the more-likely situation.

[4] The PSID reports age as 1 for the first year of life (i.e., age 0) as well as for the second year (age 1).

received Food Stamps, estimated using the entire dataset. In the second stage, we estimated the cash value of Food Stamps received, using OLS on a sample of those who received Food Stamps. The independent variables in these models were: whether black, cohort, current year, whether and amount of AFDC receipt, whether and amount of SSI receipt, whether and amount of other welfare receipt, marital status of head, number of children in family, educational attainment of head, whether head disabled, city size indicators (whether population more than 500,000, whether population 100,000-500,000), tenure, family labor income, whether public housing resident, and whether privately-owned assisted housing resident. We also included state fixed-effects.

B. Imputation of Mother's Age When Child Born

The age of the mother when she gave birth to the child was missing for 13 percent of cases. We imputed these missing values by performing an OLS regression on those where it was not missing and then assigned the predicted value to the missing cases. The independent variables in this regression were: whether black, whether female, current years, years and average amount of AFDC receipt 10-16, years and average amount of Food Stamp receipt 10-16, years and average amount of other welfare receipt 10-16, number of years in single-parent household 10-16, average earnings and work hours 10-16, whether average work hours below 200 annually, educational attainment of head, modal number of children in household 10-16, number of years with disable head 10-16, and city size indicators. We also included state fixed-effects.

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