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## **Public Housing and Labor Supply**

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**JCPR Working Paper, October 1998, #8**

We thank Samantha Quan of BLS and participants at the ASPE/Census Bureau Small Grants Conference held in Washington D.C. for helpful comments. We thank the Joint Center for Poverty Research and the Census Bureau for funding this research. The STATA programs and data used in this study may be obtained from the authors; email requests to: [yelowitz@ucla.edu](mailto:yelowitz@ucla.edu) .

## Public Housing and Labor Supply

The federal government spent more than \$19 billion on subsidized housing programs for the poor in Fiscal Year 1992. Of this amount, roughly two-thirds was spent on Section 8 housing vouchers and one-third on public housing projects. Although spending on these programs is nearly equal to Aid to Families with Dependent Children (AFDC), Supplemental Security Income, or Food Stamp expenditure, there is comparatively little empirical evidence on how housing programs affect economic behavior.

The goal of this study is to answer two sets of questions:

- How do the income eligibility rules, marginal tax rates, and subsidies from the housing program affect the work behavior of recipients? We consider whether the fact that some housing benefits are lost in their entirety when income goes beyond the eligibility level (known as the public housing notch) distorts work behavior.
- How does public housing interact with other welfare programs such as AFDC, Medicaid, SSI, and Food Stamps?

To answer these questions, we use the 1990 to 1993 panels of the Survey of Income and Program Participation (SIPP) covering the years 1990 to 1995. The SIPP provides sufficient data to construct a measure of the subsidy that a family receives from the public housing program, and follows households over time, which allows a more complete examination of dynamics than other data sets. The public housing rules create a great deal of variation in the program generosity, through three different dimensions. First, the program generosity varies by region or metropolitan area. Second, it varies over time, through changes in the "fair market rent." Finally, generosity varies based on the sex distribution of the family. A family with an even number of children but an odd number of boys and girls receives a larger subsidy from the program because they are offered a larger apartment than an observationally equivalent family with an even number of boys and girls. For example, a family with one boy and one girl gets a three bedroom apartment, while a family with two boys or two girls gets a two bedroom apartment.

The results, which exploit this variation, indicate that the public housing rules induce substantial labor supply distortions. Among female headed households in our data, a one-standard deviation increase in the housing subsidy at the notch point reduces labor force participation by 3.5 percentage points, from a baseline of 64 percent. It also increases participation in welfare programs by 4.9 percentage points, from a baseline of 36 percent. The implication of these findings is that policy changes which lower marginal tax rates could increase work effort, reduce welfare dependency, and possibly provide more "role models" in the projects.

## I. Introduction

The federal government spent more than \$19 billion on subsidized housing programs for the poor in Fiscal Year 1992 (U.S. House of Representatives, 1994). Of this amount, roughly two-thirds was spent on Section 8 housing vouchers and one-third on public housing projects.<sup>1</sup> Although spending on these programs is nearly equal to the former Aid to Families with Dependent Children (AFDC) program, Supplemental Security Income, or Food Stamp expenditure, there is comparatively little empirical evidence on how housing programs affect economic behavior.

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<sup>1</sup> Throughout this proposal, we will use "public housing" to refer to both the Section 8 voucher program and public housing projects. For the particular focus of this paper, the distinction between them is largely irrelevant, because the eligibility rules and income limits are identical for projects and vouchers.

Most research on the work-incentive effects of the U.S. welfare system focuses on the high implicit tax rates on recipients under the former AFDC program (which reduces benefits by anywhere from \$0.67 to \$1.00 for each \$1.00 earned in the labor market). Most of this research finds modest effects of AFDC program rules on earnings -- for each dollar transferred to a recipient, 37 cents are lost in earnings.<sup>2</sup> Cash benefits are only one of several programs provided to the poor, however. For some welfare recipients, cash benefits comprise less than one-third of the total benefit package. In-kind transfers, such as food stamps, Medicaid, and public housing, may also distort labor supply decisions. Moreover, the structure of these in-kind programs may actually create marginal tax rates far greater than 100 percent, implying a potentially large change in behavior. In recent years a good deal of attention has been given to the effects of the Medicaid program, a smaller amount to food stamps, and virtually none to public housing.<sup>3</sup> To our knowledge, only two studies explore public housing's effects on labor supply, and neither uses the methods that this study will take. Keane and Moffitt (1996) include public housing in their broader analysis of multiple program participation, and Painter (1995) examines how rationing of public housing affects work behavior. The lack of research on public housing is surprising in light of the potentially large distortions it may create and the enormous geographic variation in the program which reduces the challenges to evaluating the public housing program.

The goal of this study is to answer two sets of questions:

- How do the income eligibility rules, marginal tax rates, and subsidies from the housing program affect the work behavior of recipients? We will consider whether the fact that housing benefits for the voucher program are lost in their entirety when income goes beyond the eligibility level distorts work behavior.
- How does public housing interact with other welfare programs such as AFDC, Medicaid, SSI, and Food Stamps?

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<sup>2</sup> See Moffitt (1992) for a summary of this work.

<sup>3</sup> For evidence on Medicaid, see Blank (1989), Winkler (1991), Moffitt and Wolfe (1992), Wolfe and Hill (1995), and Yelowitz (1995, 1996a). For evidence on Food Stamps, see Fraker and Moffitt (1988), Blank and Ruggles (1996), Hagstrom (1996), and Yelowitz (1996b).

To answer these questions, we will use the 1990 to 1993 panels of the Survey of Income and Program Participation (SIPP) covering the calendar years 1990 to 1995. The SIPP provides sufficient data to construct a measure of the subsidy that a family receives from the public housing program, and follows households over time, which allows a more complete examination of dynamics than other data sets such as the Current Population Survey.

The public housing rules create a great deal of variation in the program generosity through three different dimensions. First, the program generosity varies by region or metropolitan area. Second, it varies over time, through changes in the "fair market rent." The "fair market rent" (FMR) is the subsidy that a household with zero income would get from public housing. Finally, generosity varies based on the sex distribution of the family. As Currie and Yelowitz (1997) first noted, a family with an even number of children but an odd number of boys and girls receives a larger subsidy from the program because they are offered a larger apartment (or larger voucher) than an observationally equivalent family with an even number of boys and girls. For example, a family with one boy and one girl gets a three bedroom apartment, while a family with two boys or two girls gets a two bedroom apartment.

The results, which exploit this variation, indicate that the public housing rules induce substantial labor supply distortions. Among female headed households in our data, a one-standard deviation increase in the housing subsidy at the notch point reduces labor force participation by 3.5 percentage points, from a baseline of 64 percent. It also increases participation in welfare programs by 4.9 percentage points, from a baseline of 36 percent. The implication of our findings is that policy changes which lower marginal tax rates could increase work effort and earnings, reduce welfare dependency, and possibly provide more positive "role models" in the projects.

The remainder of this paper is arranged into four sections. Section II goes into detail about the public housing rules, illustrating the public housing "notch," and discusses the theoretical effects of changes in the budget constraint on work effort and welfare participation. Section III reviews the identification strategy for

isolating the effect of public housing from other features of the tax code, welfare system, and economy. This section also discusses the SIPP extract used in the study, and the HUD data that is linked to it. Section IV presents the results, and Section V concludes.

## II. Background and Theory of the Work Incentives Created by Government-Subsidized Housing

### *A. Institutional Background<sup>4</sup>*

Government-subsidized housing is delivered in two basic forms: public housing projects, where the household is offered a specific apartment, and Section 8 vouchers/certificates, where the household can choose any apartment in a given area that meets a set of quality and rent standards specified by Housing and Urban Development (HUD). Approximately 1.3 million households live in 13,000 projects administered by 3,300 distinct public housing authorities. Households with children occupy half of these units, and the elderly and disabled occupy most of the remainder. Another 1.3 million households use the voucher program. Compared with public housing residents, Section 8 residents are younger, less likely to be from minority groups, and more likely to be single parents. These working-age, female-headed households with children (both in and out of subsidized housing) will be the focus of this paper.

Eligibility to live in the projects or to receive vouchers is determined by the local public housing authority (PHA). Eligibility is based on a family's total annual gross income and family size, and is limited to U.S. citizens and specified categories of non-citizens who have eligible immigration status. In general, to initially qualify the family's income may not exceed 50 percent of the median income for the county where the family chooses to live. This rule is known as the "very-low" income limit.

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<sup>4</sup> The description presented in this section draws upon Burke (1993, 1995) and Congressional Research Service (1991, 1993, 1994). It also draws on conversations with HUD economists, who clarified some issues concerning the "notch point."

The PHA collects information on the income, assets, and composition of applicant families, verifies this information with other local agencies, employers, and banks, and then determines program eligibility and the amount of the rental assistance payment. If the PHA is unable to assist eligible families immediately, it places them on a waiting list. Since the demand for housing assistance often exceeds the supply, waiting periods between one and two years are common. In fact, a housing authority may close its waiting list when it has more families on the list than can be assisted in the immediate future. In selecting a family from its waiting list, a PHA may give preference to a family who is (1) homeless or living in substandard housing, (2) paying more than 50 percent of its income for rent, or (3) involuntarily displaced. Families who qualify for these preferences will move ahead of other families on the list who do not qualify for any preference. Each PHA has the discretion to establish other additional preferences to reflect other needs of its particular community.

In subsidized housing, a family generally pays a share of rent equal to either 30 percent of its monthly adjusted gross income (which includes deductions of \$40 per month for each dependent under the age of eighteen, and deductions for child care expenses related to work), 10 percent of its monthly gross income, or its welfare rent payment, whichever is greater. As long as a working family's annual earnings exceed the deductions for dependent children and child care expenses, the marginal tax rate on earnings will be 30 percent.

The family's share of the rent is calculated by the PHA, but the family pays that amount to the landlord in the case of Section 8 vouchers. The PHA pays the remainder of the rent directly to the landlord. In the case of public housing projects, the family's share is paid directly to the PHA. The family's rent share changes when its income or family circumstances change.

The family receives a project apartment or a voucher that is based on its size and composition. HUD's Handbook 4350.03, "Occupancy Requirements of Subsidized Multifamily Housing Programs," offers the following guidelines (pages 2-29 and 2-30) (HUD, 1996):

- (a) Children of the same sex may share a bedroom,
- (b) No more than two persons would be required to occupy a bedroom,

- (c) Unrelated adults and persons of the opposite sex (other than spouses) would not be required to share a bedroom.

The result of these rules is that families with an even number of children but an odd number of boys and girls get larger apartments than equally sized families with even numbers of boys and girls. In the simplest case, a family with one boy and one girl receives a three bedroom apartment, while a family with two boys or two girls only receives a two bedroom apartment. Thus, the subsidy from the program varies not only by family size, but by the sex mix of the children.

### *B. Illustrations of the Effects of the HUD Rules*

The "very-low" income limit varies considerably, and is usually higher than eligibility for most other welfare programs. For example, in 1993 the "very-low" income limit established by HUD for a four-person family ranged in the 48 contiguous States from \$12,100 (in some rural areas of Mississippi) to \$36,700 (in a metropolitan area of Connecticut). In the median county, the "very-low" income limit was \$16,550. The poverty line for this family was \$14,350 (Federal Register, 1993) and more than eighty percent of the counties in the U.S. had public housing income limits greater than the poverty line. In contrast, only a handful of states have income limits for AFDC that approach the poverty line (U.S. House of Representatives, 1994, pages 379-381).

Table 1, which substantially expands on a similar table in U.S. House of Representatives (1996), calculates total income for a family of three in Philadelphia, Pennsylvania as its earnings goes up. The table shows the interaction of earnings with the earned income tax credit (EITC), Aid to Families with Dependent Children (AFDC), Food Stamps, Social Security, federal and state taxes, and work expenses. Our two main changes to this table are that we include Medicaid and public housing in "total income," and we carry out additional computations for \$22,000, \$23,000, and \$25,000 in earnings. This is important because the very-low income limit to initially qualify for public housing in Philadelphia is \$22,200, after which a family is ineligible.

The effect of incorporating public housing (and Medicaid) into the budget constraint is remarkable: "total income" at \$0 of earnings is \$19,217, while "total income" at \$30,000 is \$19,837. This translates into a marginal

tax rate of 98 percent for the first \$30,000 of earnings. Moreover, there are certain portions of the budget constraint where marginal tax rates are greater than 100 percent. By moving from \$22,000 to \$23,000 of earnings, total income falls by \$2,592 because the household loses the housing subsidy. This drop in housing benefits is not unique to Philadelphia: Table 2 illustrates the income limits, subsidies, and the drop in benefits for becoming ineligible (known as the public housing notch) for seven metropolitan areas. Depending on the area and family composition, the notch varies between \$1,656 for two bedroom apartments in Baltimore and \$8,892 for three bedroom apartments in San Francisco. Given these steep drops in benefits, it is plausible that households will alter their earnings decisions either to qualify for, or remain in, public housing.

### *C. Notches*

Although it is difficult to find good documentation on the specific rules for letting households in public housing, and especially for removing them from public housing, our discussions with HUD economists clarify three points about eligibility:

- For those not in public housing (e.g., neither in the projects nor receiving vouchers), the "very-low" income limit applies, and the notches represented in Tables 1 and 2 are accurate.
- For those receiving Section 8 vouchers/certificates, the "low" income limit applies, and the notches represented in Tables 1 and 2 are too large. The notches would be smaller, but in many cases would not disappear completely.
- For those in public housing projects, it is impossible to be removed for having too much income -- thus, there is no notch. It is possible for a millionaire to live in the projects, but she would have to pay 30 percent of her income toward rent. The tax rate and rent payment associated with it, rather than the income limit, is the reason why very few wealthy households live in the projects.

With 3,300 different public housing authorities, it is not possible for us to verify that these guidelines are used universally (especially for the projects). Nonetheless, in constructing the "notch" we will assume the above eligibility rules hold.

### *D. Theoretical Effects of the Public Housing Program*

The fact that welfare programs may distort labor supply is well known, and the particular quirks of

public housing are also well-recognized theoretically.<sup>5</sup> Assume that the consumer maximizes utility,  $U=u(\text{Leisure}, \text{Consumption})$ . She faces a constant pretax wage,  $w^0$ . The welfare and tax systems create nonlinearities in the budget set. Figure 1 illustrates the resulting static budget constraint for a female-headed household, abstracting for a moment from the possibility of rationing. At zero hours of market work, the mother receives a certain level of AFDC benefits, known as the "guarantee," in addition to public housing. As she begins to work, her AFDC and public housing benefits are taxed away, so her after-tax wage is  $w^1=(1-\tau_1)w^0$ , where  $\tau_1$  is the cumulative marginal tax rate for earning income while on AFDC and public housing (which varies from 67 to 100 percent for AFDC, and 30 percent for public housing). Once she works more than  $H^1$ , the hours of work where the entire AFDC benefit is taxed away, and she loses her AFDC eligibility. In many cases, she still receives public housing because the eligibility limits for public housing are somewhat higher than those for AFDC. She now faces a higher market wage,  $w^2=(1-\tau_2)w^0$ , where  $\tau_2$  is the equal to the 30 percent tax rate. At the hours point  $H^2$ , her eligibility for public housing ends, and her family loses the remaining subsidy in its entirety because it has earned too much income. This discrete drop in benefits creates a marginal tax rate in excess of 100 percent for earning additional income, and is called the public housing notch.<sup>6</sup> In principle, this loss of benefits results in a portion

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<sup>5</sup> Moffitt (1992) reviews how welfare programs change the budget constraint. Stiglitz's (1986) undergraduate text and Blinder and Rosen (1985) present specific discussions of public housing.

<sup>6</sup> Yelowitz (1995) reviews similar disincentives with health insurance created by the "Medicaid notch." The public housing notch differs from the Medicaid notch in two respects, both of which create larger labor

of the budget constraint where we would not expect to see any households. To determine this precise portion of the budget constraint, however, we would need to know the value of the benefits she received from public housing.

Both changing the income eligibility limit and changing the subsidy will have effects on labor supply. Figure 2 illustrates the effects of changing the income eligibility limit, holding the subsidy constant, while Figure 3 shows the effects of changing the subsidy, holding the income limit constant. Even without imposing a particular utility function, several predictions can be made through revealed preference arguments. Increasing the income limit unambiguously increases labor force participation, but has an ambiguous effect on earnings and hours of work. Labor force participation increases because all the new {Leisure,Consumption} bundles in Figure 2 involve the head of the household giving up leisure -- some households who were initially enrolled in public housing and not working may now receive higher utility from these points on the budget constraint. For those who were initially participating in public housing, hours worked and earnings also increase -- all the new bundles are at higher levels than before. For those initially off public housing, however, increasing the income limit may have both "mechanical" and "behavioral" effects. Some households, located on the segment AB, now become eligible for public housing, and assuming they take it up, the income effect of the subsidy reduces hours and

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supply distortions. First, public housing is not an entitlement. If the household earns too much and loses its project apartment or voucher, it may have to wait several years to receive it again. During the time the family is on the waiting list, its income may not go above the "very-low" limit. Medicaid, in contrast, is an entitlement. If a family becomes eligible, it can usually collect Medicaid within 45 days of application. Second, the alternative to not living in subsidized housing is to pay for a unsubsidized apartment or perhaps live with an extended family, both costly alternatives (in terms of dollars or utility). The alternative to not receiving Medicaid is usually less severe: families can use emergency rooms or charity care if they become sick, and if they are healthy the value of Medicaid is probably quite low.

earnings. They will not reduce their hours below  $H^2$ , however, since they could have done that before an increase in the eligibility limit. Other households, located on segment BC, are not mechanically eligible after the limit increases, but may reduce their earnings to become eligible. Overall, then, the effect is ambiguous, but with panel data on public housing participants and nonparticipants it is possible to follow households before and after income eligibility changes and obtain crisper labor supply predictions. It is also usually possible to make predictions about AFDC participation. Assuming that AFDC eligibility ended before the hours of work point  $H^2$ , then increasing the income limit and adding additional public housing bundles on segment AB should reduce cash welfare participation.

The effects of increasing the subsidy are more straightforward as shown in Figure 3 (again, compared to Figure 1). The increase in the subsidy provides an income effect which should reduce hours of work, earnings, and labor force participation for households initially participating. For those initially in unsubsidized housing, this increase may cause them to join the program, and locate somewhere along the segment DEF. All of these bundles are at lower earnings and hours points than before, so the net effect on these outcomes is negative. Some initial nonparticipants may also withdraw from the labor force completely, so the net effect on participation is also negative. Finally, AFDC participation should increase because of this reduction in earnings.

It is also important to note that public housing is not an entitlement -- not all households who are eligible for the program actually receive it. In areas where rationing of public housing is more severe, the rule changes should elicit no behavioral response from those who were initially in unsubsidized housing. Thus, the predictions from policy changes will mirror the predictions for those who were initially in the program. Table 3 summarizes these comparative statics predictions, for both the cases with and without rationing.

Although changing the income limit and overall subsidy lead to some predictions on labor supply and AFDC participation, including both the Fair Market Rent (FMR) and the "very-low" income limit, it does not capture the most stunning feature of the budget constraint in Figures 1, 2, and 3: the public housing notch. Holding the subsidy constant and lowering the income limit makes the notch bigger, and raising the subsidy and

holding the income limit constant has a similar effect. In Figure 2, consider lowering the income limit from  $w^0H^3$  to  $w^0H^2$  (and making the public housing notch bigger). For most sets of preferences, those initially in public housing and working between  $H^2$  and  $H^3$  will reduce their work effort. It is possible, however, for some recipients to leave public housing altogether. In Figure 3, the predictions for making the public housing notch bigger mirror those for raising the subsidy. By combining these two policy choices, the income limit and the subsidy, into one measure for the public housing notch, the labor supply distortions are likely to be larger.

### III. Empirical Methods and Data Description

#### *A. Methods*

To assess the predictions explained in the preceding section, the analysis will focus on the effects of the rules. The effects of the rules on earnings and labor force participation may be viewed as the "reduced form," in the sense that the rules lead to changes in the public housing subsidy and public housing take-up, which consequently leads to changes in labor supply.

To measure the way that the rules affect labor supply, we would estimate a regression that takes the form:

$$(1) \quad \text{WORK}_h = \beta_0 + \beta_1 \text{FMR}_{hmybk} + \beta_2 \text{VERY\_LOW}_{hmyf} + \beta_3 \text{X}_h + \beta_4 \text{MSA}_m + \beta_5 \text{YEAR}_y + \beta_6 \text{BOYS}_b + \beta_7 \text{KIDS}_k + \beta_8 \text{FAMSIZE}_f + \varepsilon_h$$

where  $\text{WORK}$  is a measure of the female head's work effort usually defined as labor force participation or monthly earnings (or in other cases, welfare participation or total income);  $\text{FMR}$  represents the subsidy at zero earnings received by the household from the government housing programs (e.g., in Table 1, it would be \$8,136 per year);  $\text{VERY\_LOW}$  is the very-low income limit defined by HUD rules (e.g., in Table 1, it would be \$22,200);  $\text{X}$  is a detailed set of demographic and family structure variables for the head including race, ethnicity, marital status, age, and number of children in each age range; and  $\text{MSA}$ ,  $\text{YEAR}$ ,  $\text{BOYS}$ ,  $\text{KIDS}$ , and  $\text{FAMSIZE}$  are full sets of dummy variables indicating the location, time period, number of boys, number of children, and

number of family members present.

Including the dummy variables for MSA, YEAR, BOYS, KIDS, and FAMSIZE deserves some explanation. The main effects eliminate many plausible reasons why the policy variables, FMR and VERY\_LOW, would not be representing the public housing rules but instead some other omitted variable. For example, areas with high income eligibility limits are likely to have high per-capita incomes and wages, which could bias the earnings regressions. The analysis eliminates that concern by including MSA fixed effects. By including the main effects for these five variables, the coefficients  $\beta_1$  and  $\beta_2$  are identified only through *interactions* of these dimensions.<sup>7</sup>

Including these effects represents a contribution that previous studies were unable to make -- Keane and Moffitt (1996) estimate their model on cross-sectional data and include only region-specific effects, while Painter (1995) estimates models with county and time variation but does not include the full set of main effects. Including these effects is important to eliminate other confounding factors which would falsely attribute changes in labor supply to public housing policy.

In constructing the second measure, NOTCH, we combine information on HUD's rules with additional family-specific information and whether the household is in unsubsidized housing, receiving Section 8 vouchers, or in the projects. For a family in unsubsidized housing, the rent that would be paid at the public housing notch is equal to:

$$(2) \quad \text{RENT}_h = 0.3 * \text{ADJUSTED}_h$$

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<sup>7</sup> For  $\beta_1$ , identification comes from MSA\*YEAR, MSA\*BOYS, MSA\*KIDS, YEAR\*BOYS, YEAR\*KIDS, BOYS\*KIDS, MSA\*YEAR\*BOYS, MSA\*YEAR\*KIDS, YEAR\*BOYS\*KIDS, and MSA\*YEAR\*BOYS\*KIDS. For  $\beta_2$ , identification comes from MSA\*YEAR, MSA\*FAMSIZE, YEAR\*FAMSIZE, and MSA\*YEAR\*FAMSIZE.

where ADJUSTED is the household's annual income after some adjustments. Adjusted income is related to the maximum income limit as follows:

$$(3) \quad \text{ADJUSTED}_h = \text{VERY\_LOW}_{\text{hmyf}} - 480 * \text{KIDS}_k - \text{CHILDCARE}_k * 1(\text{KIDS}_k < 13),$$

where KIDS is defined above and multiplied by an annual deduction of \$480 per child, CHILDCARE represents the annual child care expenses associated with working, and  $1(\text{KIDS} < 13)$  is an indicator variable for whether the children are under the age of thirteen. We maintain the assumption in Table 1 that child care costs are equal to 10 percent of earnings per child, up to an annual maximum of \$2,100 per child (U.S. House of Representatives, 1996). In following the HUD rules (HUD, 1996), we deduct child care costs only on children ages zero to twelve, inclusive.

Finally, for the family in unsubsidized housing, NOTCH is defined as:

$$(4) \quad \text{NOTCH}_{\text{hmybkf}} = \text{FMR}_{\text{hmybk}} - \text{RENT}_h.$$

For a family receiving Section 8 vouchers, NOTCH is calculated in a similar way except that equation (3) substitutes the "low" income limit for the "very-low" limit. Finally, for families in the projects, NOTCH is set equal to zero -- according to economists at HUD, wealthy families are not automatically removed from the projects.

We return to Table 2 to illustrate our NOTCH measure for families in unsubsidized housing. Consider a family with two young boys who live in Baltimore in 1996. The income limit is \$23,600, while the subsidy is \$7,188. The exemptions for the children are \$960, and child care expenses are \$4,200. The notch of \$1,656 is equal to \$7,188 minus  $0.3 * (23,600 - 960 - 4,200)$ .

There is one additional difficulty with the NOTCH measure defined in equation (4). The value depends on the household's actual housing choice, which is endogenous. NOTCH is equal to zero for households in the projects, is larger for those receiving vouchers, and is largest for those in unsubsidized housing. Thus, families in unsubsidized housing face bigger notches to get into subsidized housing than those already in it. They are also

likely to be more advantaged in certain respects, some observable, others unobservable. In particular, these families are likely to have a greater attachment to the workforce and higher earnings potential. As Appendix Table 2 shows, an OLS regression leads to the counterintuitive result that making the notch bigger increases earnings and encourages labor force participation. But such a conclusion is very misleading, because it does not account for the endogeneity of housing choice.

To get correct inferences, we apply an instrumental variables strategy where the instrument does not rely on the household's actual choice. As an instrument for the household's actual NOTCH level, we take a weighted average of the NOTCH in unsubsidized housing, the NOTCH in the voucher program, and the NOTCH in the projects (which is always equal to zero). The weights correspond to the fraction of households in the MSA that are in vouchers, projects, or unsubsidized housing. These weights were computed from HUD administrative data.<sup>8</sup> Our instrumental variable is equal to:

$$(5) \quad \text{INSTNOTCH} = \text{NOTCH}_{\text{PROJ}} * P_{\text{PROJ}} + \text{NOTCH}_{\text{VOUCH}} * P_{\text{VOUCH}} + \text{NOTCH}_{\text{UNSUB}} * (1 - P_{\text{PROJ}} - P_{\text{VOUCH}})$$

where the subscript under NOTCH stands for the notch from that housing choice (thus, NOTCH<sub>PROJ</sub> is always equal to zero), and P<sub>PROJ</sub> and P<sub>VOUCH</sub> stand for the fraction of households in the MSA that live in the projects or use vouchers. Unlike the original NOTCH variable, INSTNOTCH does not incorporate the household's actual housing choice. The first stage, however, shows this instrument is highly correlated with the actual notch. Regressing NOTCH on INSTNOTCH (and the other covariates) gives a coefficient estimate of .89 with a standard error of .03, and a t-statistic of 30.

## *B. Data*

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<sup>8</sup> On average, approximately 1 percent of the households in the MSAs live in projects, and 1.3 percent have vouchers. The fractions for each usually vary between 0 and 4 percent, and the total between 0 and 5.5 percent.

For the empirical analysis, we use the Survey of Income and Program Participation. Each household in the SIPP is interviewed at 4-month intervals (known as "waves") for approximately 32 months (36 months for the 1992 and 1993 panels). The SIPP is a panel survey in which a new panel is introduced each year. For the basic analysis, we use all interviews from the 1990, 1991, 1992, and 1993 SIPP panels. The 1990 through 1993 panels interviewed approximately 14,300, 14,000, 19,600, and 19,890 households, respectively. The panels cover the calendar years 1990 to 1995. The SIPP provides information on the economic, demographic, and social situations of the household members. While, in principle, the SIPP asks about income and public housing participation in every month, it is well known that many respondents tend to give the same answer for every month within a 4-month interval.<sup>9</sup> We therefore restrict the analysis to the last month within a 4-month interval. We focus on nonelderly female-headed households because the public housing rules treat income and resources of elderly members (which HUD defines as over age 61) differently than others, and because labor supply issues are largely irrelevant for the elderly. Thus, the analysis focuses on households where the female head was between the ages of 18 and 61. We also restrict the sample to households who live in uniquely identified states in the SIPP. Finally, we restrict the sample to households with one to five children and fewer than nine total family members, so that we can impute the fair market rents and income limits to each household. The sample includes both renters and homeowners, as well as those with high and low income. Both of these variables are endogenous to the public housing rules, so it is inappropriate to condition on them. Appendix Table 1 goes through the precise screens, and the number of observations that are lost, in making our final extract. Overall, the sample consists of 46,172 observations on 11,874 female heads.

#### IV. Labor Supply Results from 1990-93 SIPP Panels Covering the Calendar Years 1990-95.

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<sup>9</sup> See Blank and Ruggles (1996) for a discussion of this seam bias.

Table 4 compares the summary statistics for those in and out of subsidized housing. Although those in subsidized housing recipients earn less and have lower incomes, the average income (measured in constant 1990 dollars) for female heads in unsubsidized housing is only \$1,697 per month.<sup>10</sup> Moreover, 29 percent of those in unsubsidized housing receive some form of welfare payments (usually AFDC, Food Stamps, or SSI). The FMRs and income limits are similar between the two groups; the monthly FMR for the full sample is \$546 (with a standard deviation of \$184) and the monthly income limit is \$1,387 (with a standard deviation of \$328). Female heads in subsidized housing are younger and far less educated than those in unsubsidized housing. They are also more likely to be black, never-married, and live in somewhat large families. Although subsidized housing recipients have larger families on average, they have fewer relatives and nonfamily members living with them; this may reflect public housing overcrowding rules about outside members living in the apartment. This table also makes clear why the endogeneity of housing choice will be important when evaluating the public housing notch. On average, those in subsidized housing face a notch of \$300 per year, while those in unsubsidized housing face a notch that is eight times as large. Moreover, those in unsubsidized housing have earnings that are nearly four times as high. The correlation between the size of the public housing notch and earnings will obviously be positive, but the instrumental variable results will show that this is driven by omitted variable bias.

Tables 5 and 6 present a series of results for the effect of public housing rules on work effort. Table 5 examines the effect of the FMR and income limit, and Table 6 explores the public housing notch. Columns (1) and (2) of Table 5 present results from a probit model on the head's labor force participation and welfare participation, respectively, while columns (3), (4), and (5) run OLS models on earnings, welfare income (e.g., AFDC, Food Stamps, and SSI), and total income. For the probit models, we give both the coefficient estimate and the marginal effects of changing the independent variables. The probability derivatives are given in the second set of columns. The columns report the change in the probability for an infinitesimal change in each independent, continuous variable and the discrete change in the probability for dummy variables. On average,

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<sup>10</sup> Note that all dollar figures in Table 4 (and subsequent tables) are divided by 1000.

each female head is observed 3.9 times during the panel. These observations are obviously not independent; the model uses the Huber-White estimator of variance in place of the traditional calculation. Moreover, the standard errors allow for observations which are not independent within cluster (where the household is the cluster).

The first row of Table 5 shows that raising the FMR generally has a significant, negative impact on work effort (measured either as earnings or labor force participation), and a significant, positive impact on welfare participation. For example, a one-standard deviation change in the FMR (\$184 per month) lowers labor force participation by 4.6 percentage points, and lowers earnings by \$96 per month. A similar change raises the likelihood of collecting welfare income by 7 percentage points, and raises total welfare income by \$34 per month. The effect on total income is insignificant, however; this reflects the fact that as earnings fall, welfare income rises. Recall that the marginal tax rates in Table 1 (the budget constraint in Philadelphia) were very high in the entire range between \$0 and \$30,000 of annual earnings.

The effects of raising the income limit, given in the second row, show significant, negative effects on collecting welfare income (as predicted in Table 3), but insignificant effects on work effort (although the coefficients are correctly signed).

Table 5 also presents some of the other demographic variables included in the regression. The results on the demographics are largely intuitive; for example, those with more education have higher earnings and labor force attachment, and female heads who are divorced or separated, rather than never married, have much stronger attachment to the labor force.

Table 6 combines the information on FMRs and income limits into the NOTCH variable expressed in equation (4). Except for replacing these policy variables, the specifications are identical to those in Table 5 for columns (3)-(5). Columns (1)-(2) replace the probit model with a linear probability model because of the instrumental variables specification. Since the means of labor force participation and welfare participation do not lie near zero or one, this change should not drastically alter the results. Moving across the columns, it is clear that the public housing notch is quite important for work effort. The overall mean of the NOTCH variable is

\$168 per month with a standard deviation of \$143. Therefore, making the public housing notch bigger by one-standard deviation leads a decrease in labor force participation of 3.5 percentage points and an increase in welfare participation of 4.9 percentage points. The baseline participation rates are 63.8 and 36.4 percent, respectively, so modest changes in the rules lead to fairly large effects on the labor force pool and welfare caseloads.

The effects on earnings and welfare income are large, too. A one-standard deviation increase in the notch leads to a decline in monthly earnings of \$91, and an increase in monthly transfer income of \$37. From the baseline, these changes represent a drop in earnings of 8 percent, and an increase in transfer income of 26 percent. The overall effect on income is negative, but not significantly different from zero.

## V. Conclusions and Additional Directions for Research

This paper has evaluated the effects of the public housing program on labor supply. The rules of public housing create non-linearities in the budget constraint, and for families in the Section 8 voucher program or families on waiting to enter public housing, the notches in the program can be substantial. By linking information about fair market rents and income limits to microdata, we construct a measure of the subsidy that would be lost at the "notch point" for public housing. After taking account of the endogeneity of housing choice, the notch has the expected effects on labor supply and welfare participation: making the notch bigger creates strong disincentives to work and strong incentives to collect other transfer income. Overall income (and perhaps well-being) of the family does not change, however, because the implicit tax rate of welfare programs (other than public housing) is around 100 percent.

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**Table 1: Earnings and benefits for a mother with two children with day care expenses after four months on job (January 1996) -- Philadelphia, Pennsylvania.**

Earnings	EITC	AFDC	Food Stamps	Medicaid \$3,307	Eligible for public housing	Housing subsidy, 2 bedrooms	Social Security Tax	Federal Income Tax	State Income Tax	Work Expenses	Total Income
0	0	5,052	2,722	Yes	Yes	8,136	0	0	0	0	19,217
2,000	800	4,892	2,410	Yes	Yes	7,936	153	0	0	600	20,592
4,000	1,600	3,292	2,530	Yes	Yes	7,464	306	0	0	1,200	20,687
5,000	2,000	2,492	2,590	Yes	Yes	7,224	383	0	0	1,500	20,730
6,000	2,400	1,692	2,650	Yes	Yes	6,984	459	0	0	1,800	20,774
7,000	2,800	892	2,710	Yes	Yes	6,744	536	0	0	2,100	20,817
8,000	3,200	0	2,798	Yes	Yes	6,484	612	0	0	2,400	20,776
9,000	3,556	0	2,618	Yes	Yes	6,264	689	0	0	2,700	21,356
10,000	3,556	0	2,438	No	Yes	6,024	765	0	0	3,000	18,253
15,000	2,842	0	1,538	No	Yes	4,824	1,148	0	420	4,200	18,436
20,000	1,789	0	0	No	Yes	3,624	1,530	0	560	5,200	18,123
22,000	1,368	0	0	No	Yes	3,084	1,683	260	616	5,400	18,493
23,000	1,157	0	0	No	No	0	1,760	452	644	5,400	15,901
25,000	736	0	0	No	No	0	1,913	794	700	5,400	16,929
30,000	0	0	0	No	No	0	2,295	1,628	840	5,400	19,837
50,000	0	0	0	No	No	0	3,825	5,187	1,400	5,400	34,188

Notes: See the next page for the assumptions used in this table.

Notes for Table 1:

1. Sources: U.S. House of Representatives, 1996 (<http://aspe.os.dhhs.gov/96gb/08tanf.txt>), HUD Fair Market Rent and Income Eligibility data 1996 (<http://www.huduser.org/data/asthse/fmrdata/hud96pa.txt>), and Pennsylvania Income Tax Form PA-40, 1996 (<http://www.revenue.state.pa.us/forms/pit/1996/index.htm>)
2. The annual income eligibility limit (very low limit) in Philadelphia was \$22,200, and the annual fair market rent was \$10,176 for a three bedroom apartment, and \$8,136 for a two bedroom apartment. The actual rent paid by the public housing recipient is the  $\max\{0.3 \times \text{Adjusted Income}, 0.1 \times \text{Gross Income}, \text{welfare shelter deduction}\}$ . Adjusted income has deductions of \$480 per child and child care costs.
3. Medicaid is valued at its average expenditure in Pennsylvania for an AFDC family with one adult and two children: \$919 per child, and \$1,469 per adult. The total is therefore \$3,307 for this family.
4. AFDC benefits assume these deductions: \$120 monthly standard allowance (which would drop to \$90 after 1 year on the job) and child care costs equal to 20 percent of earnings, up to maximum of \$350 per month for two children.
5. Food stamps assumes these deductions: 20 percent of earnings, \$134 monthly standard deduction and child care costs equal to 20 percent of wages, up to maximum of \$320 for two children.
6. Federal and state taxes assume head of household tax rates in effect for 1996. The dependent care tax credit reduces tax liability at earnings of \$13,550 and above. Personal exemptions were \$2,550 per person in 1996, the standard deduction was \$5,900, the 15% bracket ended at \$32,150 of taxable income, and the 28% bracket ended at \$83,050 of taxable income. Eligible employment-related expenses are limited to \$4,800 if there are two or more qualifying dependents. The 30-percent credit rate is reduced, but not below 20 percent, by 1 percentage point for each \$2,000 (or fraction thereof) of adjusted gross income (AGI) above \$10,000. The marginal tax rate in Pennsylvania was 2.8%.
7. Work expenses assumed to equal 10 percent of earnings up to maximum of \$1200 annually, plus child care costs equal to 20 percent of earnings up to a maximum of \$4,200 annually for two children. for earnings of \$21,000 and over.
8. Family would qualify for Medicaid at \$8,000 of earnings because the mother, by law, would be deemed still an AFDC recipient, even though no AFDC would be paid; her calculated benefit would be below the minimum amount (\$10 monthly) payable.
9. Family would qualify for Medicaid for 12 months after leaving AFDC with \$9,000 in earnings under the 1988 Family Support Act. State must offer Medicaid to all children up to age 6 whose family income is not above 133 percent of the Federal poverty guideline (ceiling of \$17,290 for a family of three in 1996) and to children over age 6 born after September 30, 1983 (up to age 10 years and 4 months in January 1996), whose family income is below the poverty guideline (\$12,600 for a family of three).
10. None of the value of public or subsidized housing is counted as income of an Aid to Families with Dependent Children (AFDC) applicant or recipient in Pennsylvania (Urban Institute)
11. The credit rate for the EITC was 40% for families with two or more children until \$8,890, and the phase-out rate was 21.06% for earnings between \$11,610 and \$28,495.

**Table 2: Very-Low Income Limits, Fair Market Rents, and Public Housing "Notches"  
for Several Metropolitan Areas, 1996**

	Very Low Income Limit for female head with 2 children	2 bedroom apartment (two boys or girls)		3 bedroom apartment (one boy and one girl)	
		Subsidy at \$0 earnings	Public housing notch	Subsidy at \$0 earnings	Public housing notch
Baltimore	\$23,600	7,188	1,656	9,504	3,972
Boston	25,400	9,696	3,624	12,120	6,048
Chicago	24,350	8,448	2,691	10,572	4,815
Los Angeles	23,100	10,260	4,878	13,848	8,446
New York	22,050	9,804	4,737	12,264	7,197
Philadelphia	22,200	8,136	3,024	10,176	5,064
San Francisco	27,600	11,400	4,668	15,624	8,892

Note: The computations assume \$4,200 in annual child care expenses and \$960 in deductions.

**Table 3: Summary of Empirical Predictions Generated by Figures 1, 2, and 3.**

	Earnings and Hours of Work			Labor Force Participation		
	Total Effect	Initially In Public Housing	Initially Out of Public Housing	Total Effect	Initially In Public Housing	Initially Out of Public Housing
<i>No rationing</i>						
1. Increase the Income Limit	Ambiguous	>0	Ambiguous	>0	>0	>0
2. Increase the Subsidy	<0	<0	<0	<0	<0	<0
<i>With rationing</i>						
1. Increase the Income Limit	>0	>0	0	>0	>0	0
2. Increase the Subsidy	<0	<0	0	<0	<0	0

**Table 4: Variable Means (Standard Errors)**

	In Subsidized Housing	Out of Subsidized Housing
Monthly household earnings/10 <sup>3</sup>	.356 (.007)	1.290 (.007)
Monthly household welfare income/10 <sup>3</sup>	.265 (.003)	.114 (.001)
Monthly household total income/10 <sup>3</sup>	.714 (.007)	1.697 (.007)
Head's labor force participation	.360 (.005)	.704 (.002)
Household received any welfare income?	.694 (.005)	.286 (.002)
Public housing project participation	.549 (.005)	0 (0)
Voucher participation	.451 (.005)	0 (0)
Fair Market Rent (FMR)/10 <sup>3</sup> (monthly)	.567 (.002)	.541 (.001)
Very-low income limit/10 <sup>3</sup> (monthly)	1.423 (.004)	1.379 (.002)
Subsidy at notch point/10 <sup>3</sup> (monthly)	.025 (.001)	.201 (.001)
Head's age (range is 18 to 61)	32.918 (.095)	36.497 (.046)
Head's education<8	.098 (.003)	.070 (.001)
9≤Head's education≤11	.289 (.005)	.154 (.002)
Head's education=12	.356 (.005)	.369 (.002)
13≤Head's education≤15	.231 (.005)	.288 (.002)
Head's education>15	.025 (.002)	.119 (.002)
Head is white	.430 (.005)	.665 (.002)
Head is black	.544 (.005)	.303 (.002)
Head is hispanic	.183 (.004)	.141 (.002)
Head is never married	.496 (.005)	.248 (.002)
Head is widowed	.039 (.002)	.081 (.001)
Head is divorced/separated	.446 (.005)	.635 (.002)
Family size (range is 2 to 8)	3.258 (.013)	3.108 (.006)
Number of children	2.087 (.012)	1.821 (.005)
Number of other relatives	.165 (.006)	.274 (.004)
Number of nonrelatives	.007 (.001)	.013 (.001)

Note: 46,172 observations on 11,874 female headed households. All dollar amounts are expressed in 1990 constant dollars, and measured at the monthly level. There are 8,603 observations in column (1), and 37,569 in column (2).

**Table 5: Results using the income limits and FMRs**

	(1)		(2)		(3)		(4)		(5)
	Probit, LFP	Probability derivative	Probit, Welf. Inc	Probability derivative	OLS, Earnings	OLS, Welf. Inc	OLS, Total Inc		
FMR/10 <sup>3</sup>	-.679 (.292)	-.248 (.107)	1.056 (.306)	.380 (.110)	-.522 (.227)	.185 (.049)	-.380 (.220)		
Very Low Limit/10 <sup>3</sup>	.106 (.301)	.039 (.110)	-1.110 (.312)	-.400 (.112)	.319 (.243)	.032 (.054)	.411 (.232)		
Head's Characteristics									
Age	.076 (.012)	.028 (.005)	-.054 (.013)	-.020 (.005)	.042 (.010)	-.003 (.002)	.043 (.009)		
Age <sup>2</sup> /10 <sup>2</sup>	-.102 (.016)	-.037 (.006)	.060 (.017)	.021 (.006)	-.050 (.013)	.004 (.003)	-.046 (.013)		
9≤Educ≤11	.203 (.060)	.072 (.021)	-.251 (.062)	-.087 (.020)	.151 (.037)	-.035 (.011)	.172 (.035)		
Educ=12	.786 (.056)	.268 (.018)	-.770 (.058)	-.259 (.018)	.507 (.036)	-.111 (.010)	.512 (.035)		
13≤Educ≤15	.953 (.059)	.304 (.016)	-.986 (.061)	-.307 (.016)	.760 (.039)	-.134 (.011)	.802 (.038)		
Educ>15	1.433 (.077)	.346 (.010)	-1.684 (.089)	-.364 (.009)	1.558 (.057)	-.182 (.011)	1.704 (.056)		
White	.118 (.085)	.043 (.031)	-.221 (.091)	-.080 (.033)	.185 (.071)	-.041 (.021)	.275 (.069)		
Black	-.067 (.089)	-.024 (.033)	.245 (.095)	.090 (.035)	-.149 (.074)	.004 (.022)	-.202 (.071)		
Hispanic	-.127 (.047)	-.047 (.018)	.116 (.049)	.043 (.018)	-.174 (.035)	.017 (.008)	-.257 (.034)		
Widowed	-.104 (.065)	-.039 (.025)	-.475 (.073)	-.152 (.020)	-.114 (.053)	-.054 (.012)	-.370 (.058)		
Divorced/ Separated	.321 (.036)	.118 (.013)	-.316 (.037)	-.115 (.014)	.179 (.028)	-.045 (.006)	.159 (.026)		
Adjusted R <sup>2</sup>	.201		.236		.273	.280	.301		
Mean of dep.variable	.638		.364		1.112	.142	1.510		

Notes: Columns (1) and (2) are probit specifications (with the associated probability derivatives), and columns (3), (4), and (5) are the OLS specifications. Also included, but not shown in the regressions, are dummy variables for MSA (132 categories), YEAR (6 categories), BOYS (6 categories), KIDS (5 categories), number of children in each age bracket entered linearly, number of nonfamily members, number of other relatives, and a constant term. The standard errors in all columns are corrected for repeated observations on the same household. Sample consists of 46,172 observations on 11,874 female headed households drawn from the 1990-1993 SIPP panels covering the years 1990-1995.

**Table 6: IV Results using the public housing notch**

	(1)	(2)	(3)	(4)	(5)
	Labor Force Part.	Any Welfare Inc.	Earnings	Welf. Inc	Total Inc
Subsidy at notch point	-.248 (.101)	.344 (.103)	-.643 (.256)	.260 (.055)	-.437 (.246)
<b>Head's Characteristics</b>					
Age	.026 (.004)	-.020 (.004)	.044 (.009)	-.004 (.002)	.044 (.009)
Age <sup>2</sup> /10 <sup>2</sup>	-.035 (.005)	.022 (.005)	-.052 (.013)	.004 (.002)	-.047 (.012)
9≤Educ≤11	.070 (.020)	-.078 (.020)	.147 (.037)	-.034 (.011)	.168 (.035)
Educ=12	.276 (.019)	-.259 (.019)	.512 (.036)	-.113 (.010)	.515 (.035)
13≤Educ≤15	.327 (.019)	-.322 (.019)	.767 (.039)	-.136 (.010)	.806 (.038)
Educ>15	.438 (.021)	-.451 (.020)	1.575 (.058)	-.189 (.011)	1.714 (.056)
White	.030 (.026)	-.054 (.027)	.182 (.072)	-.040 (.022)	.272 (.070)
Black	-.034 (.028)	.091 (.029)	-.172 (.076)	.012 (.023)	-.219 (.073)
Hispanic	-.045 (.014)	.040 (.015)	-.180 (.035)	.019 (.007)	-.261 (.034)
Widowed	-.026 (.021)	-.150 (.021)	-.103 (.053)	-.058 (.013)	.376 (.058)
Divorced/ Separated	.104 (.011)	-.104 (.012)	.187 (.028)	-.048 (.005)	.164 (.026)
Adjusted R <sup>2</sup>	.225	.247	.264	.247	.296
Mean of dep.variable	.638	.364	1.112	.142	1.510

Notes: Columns (1)-(5) are IV specifications, and columns (1)-(2) estimate linear probability models. Also included, but not shown in the regressions, are dummy variables for MSA (132 categories), YEAR (6 categories), BOYS (6 categories), KIDS (5 categories), number of children in each age bracket entered linearly, number of nonfamily members, number of other relatives, and a constant term. The standard errors in all columns are corrected for repeated observations on the same household. Sample consists of 46,172 observations on 11,874 female headed households drawn from the 1990-1993 SIPP panels covering the years 1990-1995.

**Appendix Table 1: Sample Selection Criteria from 1990 to 1993 SIPP Panels**

Unit of observation is the household (HH) or household-wave (HH-W).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Initial # HH-Obs in reference month 4	Female headed household	HH in uniquely identified SIPP state	HH has 1-5 kids and 1-9 members	Female head between ages of 18 and 61 inclusive	No HH member over age 61	Merged to FMR and income eligibility data, HH weight >0
1990, HH	32,161	5,512	5,319	3,853	3,671	3,631	3,620
1990, HH-W	166,903	23,832	23,107	15,156	14,283	14,092	14,032
1991, HH	20,769	3,083	2,978	2,143	2,051	2,020	2,017
1991, HH-W	108,155	12,751	12,357	8,009	7,598	7,437	7,407
1992, HH	29,667	4,711	4,577	3,348	3,171	3,141	3,138
1992, HH-W	166,344	20,695	20,163	13,295	12,420	12,247	12,224
1993, HH	29,583	4,597	4,471	3,306	3,167	3,124	3,099
1993, HH-W	166,686	20,588	20,086	13,433	12,589	12,589	12,509
All panels, HH	112,180	17,903	17,345	12,650	12,060	11,916	11,874
All panels, HH- W	608,088	77,866	75,713	49,893	46,890	46,365	46,172

Notes: There were 8 waves in the 1990, 1991, and 9 waves in the 1992 and 1993 panels. Source for SIPP data is <http://www.census.gov/ftp/pub/DES/www/welcome.html>, and the source for the FMR and income eligibility data is <http://www.huduser.org/publications/publicassist/assisted/fmrhist.html>

**Appendix Table 2: OLS Results using the public housing notch**

	(1)	(2)	(3)	(4)	(5)
	Labor Force Part.	Any Welfare Inc.	Earnings	Welf. Inc	Total Inc
Subsidy at notch point	.530 (.045)	-.683 (.047)	1.317 (.097)	-.238 (.030)	1.355 (.095)
<b>Head's Characteristics</b>					
Age	.024 (.003)	-.016 (.003)	.037 (.009)	-.002 (.001)	.037 (.009)
Age <sup>2</sup> /10 <sup>2</sup>	-.032 (.005)	.018 (.005)	-.044 (.012)	.002 (.002)	-.039 (.012)
9≤Educ≤11	.072 (.019)	-.081 (.019)	.153 (.036)	-.035 (.011)	.174 (.034)
Educ=12	.269 (.018)	-.249 (.018)	.494 (.035)	-.109 (.010)	.499 (.034)
13≤Educ≤15	.317 (.019)	-.309 (.019)	.744 (.038)	-.130 (.010)	.785 (.037)
Educ>15	.417 (.020)	-.423 (.020)	1.521 (.057)	-.176 (.011)	1.666 (.056)
White	.033 (.024)	-.058 (.024)	.189 (.069)	-.042 (.020)	.279 (.067)
Black	-.006 (.026)	.055 (.026)	-.104 (.071)	-.005 (.021)	-.157 (.069)
Hispanic	-.039 (.014)	.032 (.014)	-.164 (.034)	.015 (.007)	-.246 (.033)
Widowed	-.040 (.021)	-.132 (.020)	-.138 (.052)	-.049 (.012)	.344 (.057)
Divorced/ Separated	.094 (.011)	-.090 (.011)	.160 (.027)	-.041 (.005)	.139 (.026)
Adjusted R <sup>2</sup>	.250	.290	.285	.291	.312
Mean of dep.variable	.638	.364	1.112	.142	1.510

Notes: Columns (1)-(5) are OLS specifications, and columns (1)-(2) are linear probability models. Also included, but not shown in the regressions, are dummy variables for MSA (132 categories), YEAR (6 categories), BOYS (6 categories), KIDS (5 categories), number of children in each age bracket entered linearly, number of nonfamily members, number of other relatives, and a constant term. The standard errors in all columns are corrected for repeated observations on the same household. Sample consists of 46,172 observations on 11,874 female headed households drawn from the 1990-1993 SIPP panels covering the years 1990-1995.

FIGURE 1  
Budget Constraint with Subsidized Housing

Consumption  
Goods

Leisure

FIGURE 2  
Increasing the "very-low" income limit

Consumption  
Goods

Leisure

FIGURE 3  
Raising the "fair market rent"

Consumption  
Goods

Leisure